



ROYAL COLLEGE OF PHYSICIANS LONDON | 11-13 JUNE 2018

EUROPEAN HEALTHCARE DESIGN

RESEARCH • POLICY • PRACTICE

FINAL PROGRAMME

UTOPIA OR DYSTOPIA?
VISIONING THE
FUTURE OF HEALTH

Organised by:



ARCHITECTS FOR HEALTH



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Twitter hashtag: #EHD2018
www.europeanhealthcaredesign.eu
info@europeanhealthcaredesign.eu

With over 50 years of innovation in hospital design, Llewelyn Davies is one of the world's leading healthcare architects. The pioneering work of the firm embraced change, flexibility and a patient centred approach which remains as relevant today as ever before. Llewelyn Davies has worked closely with some of London's most renowned Trusts, including University College London Hospital (UCLH), Royal National Orthopaedic Hospital, Guy's and St Thomas' Hospital and since 2005, Great Ormond Street Hospital (GOSH), one of the world's leading tertiary care paediatric hospitals.

LLEWELYN
DAVIES

The Morgan Stanley Clinical Building (Phase 1 of the Mittal Children's Medical Centre for GOSH) was completed in 2012 with Phase 2, the Premier Inn Clinical Building, completed in 2017.

Internationally, Llewelyn Davies has worked in over 80 countries and is currently undertaking major commissions for 6 hospital projects in Europe, the Middle East and the West Indies.



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Dear colleagues,

We are delighted to welcome you to the 4th European Healthcare Design 2018 Congress & Exhibition.

Providing an international forum for researchers, policymakers and practitioners to explore the relationship between health service and system design, technology and the built environment, the congress continues to go from strength to strength and is now in its fourth year.

Last year's congress took place just a few weeks after the sad death of Architects for Health's Susan Francis, whose tireless efforts helped establish the congress as one of the world's most celebrated events in healthcare design. We hope the congress continues to be a fitting legacy to her work for many years to come.

This year's congress theme, 'Utopia or dystopia? Visioning the future for health', acknowledges that rapid technological change and disturbance to our natural environment require radical rethinking for our health systems.

The future is accelerating ever faster towards us. Fictional predictions of the past 50 years – such as driverless cars and interactive robots – are now here. Advances in healthcare technologies are hastening, from remote or algorithmic diagnosis, to the application of AI, nanotechnology and personalised medicine. The means with which we can diagnose, cure or manage diseases and chronic conditions are growing every year.

Health systems have changed at a slower pace. Some new models of care are now emerging, with an emphasis on population-based models that work across the continuum of primary, community, mental health and acute care. But the profound social, political and economic implications associated with refining complex systems present challenges that often put a brake on progress. The architecture of healthcare must contribute to sustainable development, while there is also an increasing need for an architectural response to the consequences of climate change.

More health-conscious and digitally savvy, young people today are developing different attitudes to personal health and organised healthcare than previous generations. The difficult choices being made now around the design, funding and development of our healthcare buildings, technology and system architecture will define whether healthcare provision is a utopia or dystopia for future generations.

Organised by Architects for Health and SALUS Global Knowledge Exchange, in collaboration with our host, the Royal College of Physicians, our partners, sponsors and exhibitors, we are delighted to welcome you to London.

In addition to a two-day conference programme with eight streams featuring expert speakers from across the globe, the event will also host a welcome drinks reception (p33), an exhibition of the latest design solutions (p148-163), a garden party (p33), study tours (p34-37) of some of the UK's most innovative new health facilities, and an international awards programme (p39-53).

We look forward to your participation in this exciting congress and to working with you to create and share new knowledge around the value of design in transforming services and infrastructure, and in improving the quality of healthcare in Europe and around the world.

**CHRIS SHAW**

Chairman
Architects for Health

**JOHN COOPER**

Past Chairman
Architects for Health

**MARC SANSOM**

Director
SALUS Global Knowledge
Exchange

teal

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THE ROYAL COLLEGE OF PHYSICIANS

The fourth European Healthcare Design Congress & Exhibition, 11–13 June 2018, will, once again, be held at the prestigious headquarters of the Royal College of Physicians (RCP) in London.

Since its foundation in 1518, the RCP has had five headquarters in London. The current Grade 1 listed building in Regent's Park was designed by architect Sir Denys Lasdun and opened in 1964. Considered a modernist masterpiece, it's one of London's most important post-war buildings.

In 1992, Sir Lasdun was awarded the Royal Institute of British Architects' Trustee Medal in recognition of his work at the RCP, considered to be "the best architecture of its time anywhere in the world".

Sir Lasdun won the competition to design the new headquarters in 1959. He was surprised at being asked to design for such a traditional body, given his modernist philosophy, and he made it clear that he would not create a classical-style building. Ultimately, he responded to the challenge with a skilful integration of centuries-old traditions and his own vision.

As an award-winning and highly versatile venue for conferences, meetings, banquets, training and outdoor events, the building has an atmosphere of space and light, with stylish, modern architecture and a selection of both old and new styles to suit all tastes.

The venue offers:

- **A central London location** – overlooking Regent's Park, with good access to road, rail and tube.
- **Magnificent conference and banqueting facilities** – tiered auditoriums, exhibition space, event and dining facilities, including the stunning Council Chamber and the 'jewel in the crown', the Dorchester Library.
- **An award-winning Grade 1 listed modern building** – an atmosphere of space and light with a contrasting mix of old and new facilities.
- **A rare heritage collection** – with over 500 years of history and more than 50,000 antiquarian books.

- **High-quality food and service** – eclectic cuisine, bespoke menus and first-class service.
- **A professional venue for international conferences** – a member of Unique Venues of London, International Association of Conference Centres, and London and Partners, to name a few.
- **A private 'Physic Garden' for events** – filled with rare plants and flowers from all over the world, suitable for barbecues, receptions and al fresco dining.
- **A professional and friendly events team** – dedicated event managers, catering experts and technicians. Full support is provided before, during and following events.





GROUND FLOOR

Wolfson Theatre

- Main conference plenary sessions, breakout sessions and the EHD2018 Awards presentation

Council Chamber

- Breakout sessions and lunchtime workshops

Linacre Room

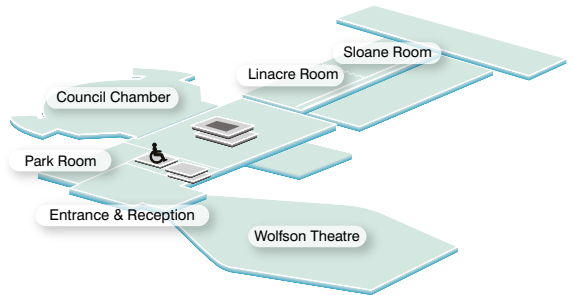
- Breakout sessions

Sloane Room

- Breakout sessions

Park Room

- Organisers' office



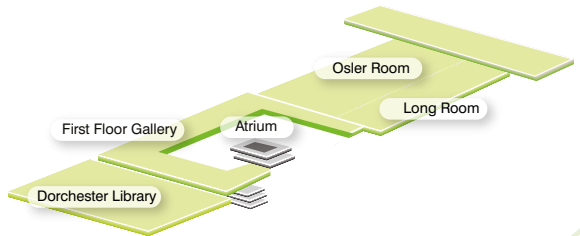
FIRST FLOOR

Dorchester Library

- Poster gallery and the EHD2018 Awards shortlist gallery

Long Room and Osler Room

- Lunch, exhibition and the welcome drinks reception



08.00 REGISTRATION OPENS



Session 1

Opening plenary

Chair: Richard Darch, Archus, UK

08.45 **Welcome and introduction**

John Cooper, Architects for Health; programme chair, EHD2018, UK

08.50 **Chair's welcome**

Richard Darch, Chief executive, Archus, UK

09.00 **Keynote address: The global health impacts of population ageing**

Prof Sarah Harper, Professor of gerontology, and director, Oxford Institute of Population Ageing, UK

09.30 **Keynote address: Digital health and AI – personalised healthcare made accessible, affordable and universal**

Dr Ali Parsa, Founder and CEO, Babylon, UK

10.00 **Panel discussion**

10.15 **COFFEE, EXHIBITION AND POSTER GALLERY**



Session 2

Utopia or dystopia? New visions

Chair: John Cole, Queen's University Belfast, UK

10.45 **Health as capital**

John Cooper, Director, John Cooper Architecture, UK

11.10 **Intensive care unit design in 2050: merging the future with the present**

Neil A Halpern MD, Director, Critical Care Center, Memorial Sloan Kettering Cancer Center, USA

11.35 **Do we have any idea where medical algorithms are taking us?**

Andy Black, Chairman, Durrow Health Services Management, New Zealand/UK

12.00 **Panel discussion**

12.30 **LUNCH, EXHIBITION AND POSTER GALLERY**



Session 3

Architecture and technology

Chair: Katie Wood, Arup, UK

14.00 Transformational cancer centre design supports the implementation of disruptive technologies

Catherine Zeliotis, Healthcare design leader, Stantec, UK

14.20 The future of cancer care, supported by an interactive digital platform: a perspective from Maggie's

Simon Butler, Associate, Arup, UK

14.40 Pharmacogenetics and architecture

Emma Smyth, Architect, Cowan Architects, UK

15.00 Panel discussion

15.30 COFFEE, EXHIBITION AND POSTER GALLERY



Session 4

Telecare and remote health

Chair: Noemi Bitterman, Technion, Israel

16.00 Telemedicine and the future of disruption

Louis A Meilink, Jr, Principal, Ballinger, USA

Christina Grimes, Senior associate, healthcare planner, Ballinger, USA

16.20 NHS Calderdale CCG's 'Quest for quality in care homes' – using telehealthcare to enable integrated, anticipatory and sustainable health and care services

Dr Belinda Coker, Clinical director, Tunstall Healthcare (UK), UK

16.40 Panel discussion



Session 5

Keynote plenary

Chair: Richard Darch, Archus, UK

17.00 Keynote address: Democratising capital – the choice to invest in health

Bruce Davis, Co-founder and joint managing director, Abundance Investment, UK

Louise Wilson, Co-founder and joint managing director, Abundance Investment, UK

17.45 Panel discussion

18.00 Close

18.00-20.00 EXHIBITION, POSTER GALLERY AND WELCOME DRINKS RECEPTION

Stream 2 begins at 10.45 in the Council Chamber, after the day's opening plenary session (08.45–10.15).



Session 6

Designing care pathways

Chair: **Dan Wellings**, King's Fund, UK

10.45 **Better together: the power of collaboration in Singapore's healthcare infrastructure**

Yvonne Lim Lai Yong, Senior lead specialist, MOH Holdings, Singapore

Kelly Hi Kai Ling, Specialist, MOH Holdings, Singapore

11.05 **Integrated health hubs in the new healthcare economy**

Justin Harris, Global healthcare deputy lead, IBI Group, UK

11.25 **Transforming the future of post-acute care models**

Hank Adams, Senior vice-president; global director, health, HDR, USA

Barry Fleischer, Corporate strategy, Shirley Ryan AbilityLab, USA

Jon Crane, Director, translational health, HDR, USA

11.45 **Care Pathway Blueprint: a tool that helps introduce new technologies to enable effective healthcare improvement**

Sara Manzini, Design researcher, Frog Design, Italy

12.05 **Panel discussion**

12.30-14.00 **LUNCH, EXHIBITION AND POSTER GALLERY**

12.40-13.50 **Lunchtime panel discussion**

Clinicians for Design: applying medical practice and research at the interface of healthcare design

Organised by:



PERKINS+WILL

See page 133 for the full abstract on the issues that will be discussed in this session.

Led by: Dr Eve Edelstein, Co-founder, Clinicians for Design, and research director, Perkins+Will Hx Lab, USA/International

Co-authors/presenters: Emma Stockton MD, Great Ormond Street Hospital, UK; **Ruchi Masand PhD**, Clinicians for Design; Perkins+Will HxLab, USA; **Anita Honkanen MD**, Stanford University School of Medicine, USA; **Maria Savoia MD**, School of Medicine, University of California San Diego, USA; **Diana Anderson MD**, Co-founder, Clinicians for Design; Perkins+Will HxLab, USA/Canada/Intl



Session 7

Hospitals without walls

Chair: **Sasha Karakusevic**, NHS Horizons, UK

14.00 **Western Health HealthLinks**

Craig Nelson, Head of unit – nephrology, and medical director, HealthLinks, Western Health, Australia
Robert Rothnie, Director, service planning and development, Western Health, Australia
Jason Plant, Programme director, HealthLinks, Western Health, Australia
Dr Arlene Wake, Executive director, community integration, allied health and service planning, Western Health, Australia

14.20 **Creating hospitals without walls: addressing health at the level of individuals, communities and globally**

David Allison, Alumni distinguished professor, and director, Clemson University, USA

14.40 **What level of estate transformation is needed to enable the future multispeciality community provider (MCP) models to be implemented and deliver full potential benefits?**

Laura Garnham, Strategic estate planner, Shared Agenda, UK

15.00 **Panel discussion**

15.30 **COFFEE, EXHIBITION AND POSTER GALLERY**



Session 8

New models of residential care

Chair: **Sylvia Wyatt**, Age UK Isle of Wight, UK

16.00 **Carebnb concept for short-term alternative attendant care in a homely environment close to home**

Femke Feenstra, Board architect and interior architect, De Jong Gortemaker Algra Architects and Engineers, Netherlands

16.20 **Mixed building: an inclusive environment for therapeutic activity and apartments for independent living**

Albert Vitaller i Santiro, Chief architect, Vitaller Arquitectura, Spain

16.40 **Panel discussion**

Stream 2 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–18.00).

Stream 3 begins at 10.45 in the Sloane Room, after the day's opening plenary session (08.45–10.15).



Session 9

Innovation in capital investment

Chair: **Chris Shaw**, Architects for Health, UK

10.45 Tail wagging the dog? Using investment in facilities to support and encourage new clinical models

Kate Copeland, Executive director, Metro North Hospital and Health Service, Australia

11.05 Innovation in commercial design for healthcare infrastructure

Richard Darch, Chief executive, Archus, UK

11.25 Enabling the future: funding health infrastructure for transformational change

Rhonda Kerr, Director, Economics, Health Services and Planning, Guidelines and Economics (GENI); Principal health planner, Hames Sharley Architects and Planners; PhD candidate, Curtin University, Australia

11.45 Making health projects more commercial and sustainable – Brighton General Hospital as one such example

Conor Ellis, Partner, Rider Levett Bucknall, UK
Geoff Braterman, Associate director, Sussex Community NHS FT, UK

12.05 Panel discussion

12.30 LUNCH, EXHIBITION AND POSTER GALLERY



Session 10

Lean and flexible design

Chair: **Hank Adams**, HDR, USA

14.00 A novel Lean-designed ED-based critical care centre in the United States reduces ICU utilisation

Dr Cemal B Sozener MD, Assistant professor, University of Michigan Medical Center, USA
Dr Benjamin S Bassin MD, Assistant professor, University of Michigan Medical Center, USA

14.40 Evaluation of design strategies for flexibility and adaptation

William Fawcett, Director and architect, CAR Activity-Space Simulation, Cambridge Architectural Research, Cambridge, UK

15.00 Panel discussion

15.30 COFFEE, EXHIBITION AND POSTER GALLERY

**Session 11****Visioning the healthcare estate**Chair: **Jim Chapman**, Manchester School of Architecture, UK**16.00 Circle Birmingham Hospital****Martina Cardi**, Associate and architect, Bryden Wood, UK**Paul O'Neill**, Director, Bryden Wood, UK**16.20 Re-imagining the estate and clinical visions at Oxford University Hospitals NHS Foundation Trust****Dr Bruno Holthof**, Chief executive, Oxford University Hospitals NHS FT, UK**Jason Pearson**, Healthcare architecture lead, AECOM, UK**16.40 Panel discussion**

Stream 3 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–18.00).

Stream 4 begins at 10.45 in the Linacre Room, after the day's opening plenary session (08.45–10.15).



Session 12
Translational research design
Chair: Simon Kydd, WSP, UK

10.45 Transformational design for translational research

Eleanor Richardson, Healthcare planner, Great Ormond Street Hospital for Children NHS FT, UK
Gavin Henderson, Director, Stanton Williams Architects, UK

11.05 Blurring boundaries: creating porous healthcare environments for teaching, learning and healing

Dr Stéphane Lasserre PhD, Principal, B+H Architects, Singapore

11.25 Hybrids – are research buildings the new hospitals?

Stefanie Matthys, Architect, Nickl & Partner Architekten, Germany
Hieronimus Nickl, Board member, Nickl & Partner Architekten, Germany

11.45 Would I want to work there? Stitching a successful health precinct together

Sheree Proposch, Principal, HASSELL, Australia

12.05 Panel discussion

12.30 LUNCH, EXHIBITION AND POSTER GALLERY



Session 13
Mental health design
Chair: Marte Lauvsnes, Sykehusbygg, Norway

14.00 Dolf's Room: how changing the environment of a client with mental disabilities can make a difference to his life

Andrea Möhn, Director and architect, AM_A, Andrea Möhn Architects (formerly Möhn + Bouman Architects), Netherlands
Linda van Beest, Manager, healthcare, Ipse de Bruggen, Netherlands

14.20 Designing for autism

Paul Yeomans, Director, Medical Architecture, UK

14.40 Collaboration to improve the psychiatric care environment in Sweden

Joseph Stuyfzand, Senior creative director, Philips Design, Netherlands

15.00 Panel discussion

15.30 COFFEE, EXHIBITION AND POSTER GALLERY

**Session 14****Designing for remote communities**Chair: **Stéphane Vermeulen**, VK Architects & Engineers, Belgium**16.00 Lessons from Aboriginal Australia****Brett Cowling**, CEO, Australian Regional & Remote Community Services, Australia**David Kaunitz**, Director and architect, Kaunitz Yeung Architecture, Australia**16.20 Multidisciplinary design: a prototype for a mobile peritoneal dialysis unit****Soranart Sinuraibhan**, Assistant professor, Kasetsart University, Thailand**Kuanchai Kakaew**, Lecturer, Kasetsart University, Thailand**16.40 Panel discussion**

Stream 4 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–18.00).

08.00 REGISTRATION OPENS



Session 15

Opening plenary, day two

Chair: **John Cooper**, Architects for Health

08.55 **Welcome and introduction**

John Cooper, Architects for Health; programme chair, EHD2018, UK

09.00 **Keynote address: How the arts, creativity and cultural participation can support health**

Dr Daisy Fancourt, Research fellow, Wellcome, Psychobiology Group, Department of Behavioural Science and Health, University College London, UK

09.30 **Keynote address: Saving doctors from themselves – designing medicine with empathy and compassion**

Dr Sharad P Paul MD, Surgeon, physician, biologist, and adjunct professor, Auckland University of Technology, New Zealand

10.00 **Panel discussion**

10.15 **COFFEE, EXHIBITION AND POSTER GALLERY**



Session 16

Redefining health and sustainability

Chair: **Tye Farrow**, Farrow Partners, Canada

10.45 **Designing future-ready healthcare in the city**

David Symons, Future Ready global leader, WSP, UK

11.05 **Health quarters of the future**

DI Albert Wimmer / DI Semir Zubcevic, Architects, Albert Wimmer ZT / Architects Collective ZT, Austria
Dr Hansjörg Reimer, Director, Centre Hospitalier Emile Mayrisch, Luxembourg

11.25 **Food as medicine, farm as therapy: a multidisciplinary approach to planning a food-based social enterprise for Toronto Rehabilitation Institute**

Adeline Cohen, Senior fellow, OpenLab, University Health Network, Canada
Ryan Turnbull, Founder and president, Eco-ethnomomics, Canada

Co-authors: Kendra Delicaet, Research consultant, OpenLab, University Health Network, Canada;
Edward Rubinstein, Director – environmental compliance, energy, and sustainability, University Health Network, Canada; **Megan Torza**, Partner, DTAH, Canada; **Phil Mount; Kathleen Camaya; Brenda Nistor**

11.45 **Dumfries and Galloway Royal Infirmary – delivering a new garden hospital**

Paul Bell, Partner, Ryder Architecture, UK
David Lewis, Partner, NBBJ, UK

12.05 **Panel discussion**

12.30 **LUNCH, EXHIBITION AND POSTER GALLERY**



Session 17
Greening healthcare
 Chair: **Jonathan Wilson**, Stantec, UK

14.00 Healing environment: the South West Acute Hospital, Enniskillen

Alison King, Principal landscape architect, LUC, UK
Richard Hannay, Director, landscape architecture, LUC, UK

14.20 The hospital, a living organism – towards a biophilic design approach

Coen Van Den Wijngaert, Architect; international business development manager, Art & Build, Belgium
Steven Ware, Architect and partner, Art & Build, Belgium

14.40 Children's Health Park with the New Alder Hey

David Powell, Development director, Alder Hey Children's NHS FT, UK

15.00 Panel discussion

15.30 COFFEE, EXHIBITION AND POSTER GALLERY



Session 18
International standards
 Chair: **Chris Liddle**, HLM, UK

16.00 Restorative design for healthcare workers: from research to practice

Whitney Austin Gray, Senior vice-president, Delos, USA
Mara Baum, Director of sustainability and health, HOK, USA

16.20 Towards a quantitative sustainability assessment of hospital buildings in Belgium

Milena Stevanovic, PhD candidate, KU Leuven, Belgium
Stephane Vermeulen, Director of healthcare, VK Architects & Engineers, Belgium

16.40 Panel discussion



Session 19
Closing plenary and awards
 Chair: **Chris Shaw**, Architects for Health, UK

17.00 European Healthcare Design Awards 2018

Supported by (Lead sponsor):



17.40 Announcement of the Visualite competition winner of £10,000 worth of clinical lighting solutions



17.50 Closing address

John Cooper, Architects for Health; programme chair, EHD2018, UK

18.00-22.00 GARDEN PARTY

Supported by



Stream 6 begins at 10.45 in the Council Chamber, after the day's opening plenary session (08.55–10.15).



Session 20

Designing for women and children

Chair: James Crispino, Gensler, USA

10.45 Sheffield Children's Hospital – the hospital as a civic building in the 21st century

Duncan Finch, Director, Avanti Architects, UK

11.05 Case study: creating a new hospital typology – together with the users

Elisabeth Ginsberg, Innovation consultant, Rigshospitalet (University Hospital Copenhagen), Denmark

Bent Ottesen, Medical director, Rigshospitalet, Denmark

Stig Vesterager Gothelf, Head of design and partner, 3XN, Denmark

11.25 The Alder Centre

Susi Le Good, Associate director, Allford Hall Monaghan Morris, UK

11.45 Concept design for a new mother and baby unit at Panzi Hospital, Bukavu, DR Congo

Cristiana Caira, Lead architect and partner, White arkitekter, Sweden

Agnes Orstadius, Architect, White arkitekter, Sweden

Marie Berg, Professor in healthcare sciences (specialising in reproductive and perinatal health), University of Gothenburg, Sweden

12.05 Panel discussion

12.30-14.00 LUNCH, EXHIBITION AND POSTER GALLERY

12.40-13.50 Lunchtime design workshop

How prepared is healthcare for the future?

Organised by:



Following on from David Symons' paper (10.45–11.05) in the Wolfson Theatre, this interactive workshop will set out to design and understand the criteria for cities to meet the healthcare needs of their rapidly growing and ageing populations, exploring issues such as quality, access, equity, affordability and sustainable development. See page 135 for full details on this session.

Led by: Nolan Rome, Global healthcare lead, WSP, UK; **David Symons**, Future Ready global leader, WSP, UK; **Jonathan West**, Research fellow; **Gail Ramster**, Senior research associate; **Dr Gerard Briscoe**, Research associate, Helen Hamlyn Centre for Design, Royal College of Art, UK



Session 21

Designing for older people

Chair: **Dr Göran Lindahl PhD**, Chalmers University of Technology, Sweden;
Tampere University of Technology, Finland

14.00 **Architecture for Alzheimer's disease**

Catarina Oom, Architect, Pinearq, Spain

14.20 **Caring for the elderly in China**

Zheng Rong, Partner, Roberts Spaces, China

Sophie Crocker, Architecture/healthcare designer, Roberts Spaces, China

Co-authors: Adam Roberts, Architect and director, Roberts Spaces, China; **Michelle Cheng**, Interior designer, Roberts Spaces, China

14.40 **Prescribing virtual reality (VRX): can exposure to simulated natural environments using virtual reality offer an alternative therapy to those living with dementia/cognitive impairment who are limited to being outside?**

Lora Appel, Research scientist, University Health Network, Canada

15.00 **Panel discussion**

15.30 **COFFEE, EXHIBITION AND POSTER GALLERY**



Session 22

Paediatric and neonatal care design

Chair: **Warren Kerr**, Hames Sharley, Australia

16.00 **Agency in the paediatric hospital: architectural strategies to support independence and empowerment**

Rebecca McLaughlan, Research fellow, Melbourne School of Design, University of Melbourne, Australia

16.20 **The future of lighting design for neonatal care – Helsingborg Hospital**

Moa Pauhson, Lighting designer, WSP, Sweden

Åsa Moum, Lighting designer, Moum Design, Sweden

16.40 **Panel discussion**

Stream 6 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–17.50).



Stream 7 begins at 10.45 in the Sloane Room, after the day's opening plenary session (08.55–10.15).



Session 23

Designing for emergency and critical care

Chair: Ganesh Suntharalingam, Intensive Care Society, UK

10.45 Maximising emergency department capacity through comprehensive design

Jon Huddy, President and senior healthcare consultant, Huddy HealthCare Solutions, USA

11.05 The effect of ward typologies on quality of care: lessons from the past to inform the future

Rosica Pachilova, PhD researcher, UCL, UK

11.25 A healing bridge: King's Critical Care Centre

Thomas Best, Critical care consultant and clinical lead for the KCCC Project, King's College Hospital NHS Foundation Trust, UK

Nick Benn, Director, BMJ Architects, UK

Matthew Ellams, Capital Projects Team, King's College Hospital, UK

11.45 Humanising spaces: the Hepatic Intensive Care Unit of the Hospital Clinic of Barcelona

Clara Rius, Architect, Estudi PSP Arquitectura, Spain

12.05 Panel discussion

12.30 LUNCH, EXHIBITION AND POSTER GALLERY

**Session 24****Operating theatre design**

Chair: **Charlotte Ruben**, White arkitekter, Sweden

14.00 Understanding the impact of induction room versus operating theatre on child and parent anxiety during the ambulatory surgical process

Dr Lynn Martin, Medical director, continuous improvement and innovation; interim director, Bellevue Clinic and Surgery Center, Seattle Children's, USA

Deborah Wingler, Doctoral candidate, Clemson University, USA

14.20 Operating room design: characteristics and future suggestions

Noemi Bitterman, Director, Medical Design Graduate Programme, Technion – Israel Institute of Technology, Israel

14.40 How large should the OR be? Using a multidisciplinary systems approach to designing safer operating rooms

Anjali Joseph, Associate professor, Spartanburg Regional Healthcare System; Endowed chair in Architecture + Health, Clemson University, USA

15.00 Panel discussion

15.30 COFFEE, EXHIBITION AND POSTER GALLERY

**Session 25****Integrating technology in the operating theatre**

Chair: **Stephanie Williamson**, Great Ormond Street Hospital for Children NHS FT, UK

16.00 Operating theatre integration – new efficiencies

Andrew Frost, Technical director, MTS Health, UK

16.20 Design considerations for hybrid/digital operating rooms

Daniel Zikovitz, Senior solutions architect, GE Healthcare, Canada

Christine Chadwick, Senior national director, infrastructure solutions, GE Healthcare, Canada

16.40 Panel discussion

Stream 7 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–17.50).

Stream 8 begins at 10.45 in the Linacre Room, after the day's opening plenary session (08.55–10.15).



Session 26

Health infrastructure workshop: investment, planning and delivery

Chair: John Cole, Queen's University Belfast, UK

10.45-12.30 Health infrastructure workshop: investment, planning and delivery

Organised by:



ARCHITECTS FOR HEALTH



Panel: Simon Corben, Director and head of profession, NHS Estates and Facilities, NHS Improvement, UK; **David Powell**, Development director and executive lead for innovation, Alder Hey Children's Hospital NHS FT, UK; **Marte Lauvsnes**, Project and development hospital planning manager, Sykehusbygg, Norway; **Yvonne Lim**, Senior lead specialist, Health Infrastructure Projects Division, MOH Holdings, Singapore

In the morning session of this two-part workshop targeted at project and development directors and strategic health planners, participants will explore issues concerning the 'Lifecycle economy of healthcare infrastructure'. A core focus will be how to form and evaluate business cases for capital investment that connect with informed thinking on the future direction of clinical services, and the planning and design of infrastructure. The session will explore how to plan the estate and property to match the need, by taking into account the costs of both operating the services and capital investment. Longer-term infrastructure resilience challenges and responses to climate change, and health service impacts from population migration and major incidents, will also be discussed.

12.30 LUNCH, EXHIBITION AND POSTER GALLERY



Session 27

Health infrastructure workshop: international approaches to health design guidance

Chair: Jonathan Erskine, European Health Property Network, UK

14.00 Health infrastructure workshop: healthcare design guidance and standards – how are we doing and where are we going?

Organised by:



ARCHITECTS FOR HEALTH



Panel: Chris Shaw, Chairman, Architects for Health, UK; **Paul Mercer**, Architects for Health, UK; **Carole Crane**, Architects for Health, UK

For some time now, Architects for Health (AfH) has been making the case for developing and redrafting the Department of Health's healthcare design guidance, encapsulated in the suite of documents known as Health Building Notes and Health Technical Memoranda. Over several years, significant organisational changes in the NHS have impacted on the development of this guidance, as have parallel widespread cost pressures in the service.

This workshop session will report and reflect on the work carried out to date by Architects for Health. We shall look at the recommendations of our 2016 round-table discussion and the results of our 2017 survey, all of which assessed the need for, and concerned the continuation and revival of, UK health guidance.

Members of AfH and UK partner organisations, along with international colleagues, will be invited to give input, and share their experiences and challenges in the development of new guidance programmes and models.

15.30 COFFEE, EXHIBITION AND POSTER GALLERY

**Session 28****Design evaluation and performance**Chair: **Jonathan Puddle**, AECOM, UK**16.00 ProCure 22 Efficiency and Productivity Programme, pre- and post-occupancy evaluations toolkit****Rosemary Jenssen**, Director, Jenssen Architecture, UK**Alan Kondys**, P22 framework director, Integrated Health Projects, UK**16.20 The performance gap in modern design****James Outram**, Principal engineer, Hoare Lea, UK**Gavin Crook**, Associate engineer, Hoare Lea, UK**16.40 Panel discussion**

Stream 8 will be brought to a close at 17.00, whereupon delegates are invited to return to the Wolfson Theatre for the day's closing plenary session (17.00–17.50).

Hosted in the Royal College's historic Dorchester Library, the poster gallery offers delegates the chance to explore and learn about many wonderful research projects and design schemes, supplementing and enriching the oral presentations taking place throughout the two days.

Supported this year by AECOM, the poster gallery is a great place to spend time during the coffee breaks, lunch, and in the early morning before the congress sessions begin. Posters of the shortlisted projects for the European Healthcare Design Awards, (see pp 29-31; and pp 39-53) will also be on display.

All the knowledge on show in the poster gallery is also available digitally on the SALUS Global Knowledge Exchange, a new online, knowledge-sharing community platform, which features videos of all the talks from the past two European Healthcare Design Congresses, and last year's inaugural Healthy City Design International Congress.

To view the digital posters and their full abstracts, visit SALUS at www.salus.global and join up for free as an individual member.

P01 Patient-centred retail health in China

Sophie Crocker (China), Zheng Rong (China), Luigi Della Morte (China), Michelle Cheng (China)

www.salus.global/article-show/ehd2018-p01

P02 Patient safety case

Kate Bradley (UK), Dan Gibson (UK)

www.salus.global/article-show/ehd2018-p02

P03 Cross-sector pioneers

Wendy de Silva (UK), Pat Farrell (UK)

www.salus.global/article-show/ehd2018-p03

P04 Haunted: addressing the memory of violence in a design culture of security

Gavin McLachlan (Canada)

www.salus.global/article-show/ehd2018-p04

P05 Creating wellness in architecture – utilising integrated, multidisciplinary systems for better health and wellness in the built environment through an architectural doctor

Timothy D Rossi (USA)

www.salus.global/article-show/ehd2018-p05

P06 The need for collective intelligence in strategic health planning

Alexandru Senciuc (UK)

www.salus.global/article-show/ehd2018-p06

P07 The Metric Handbook

Claudia Bloom (UK), Vicky Braouzu (UK)

www.salus.global/article-show/ehd2018-p07

P08 Personnel-centred study for advancing the quality of hospital care

Paulina Szuba (Poland), Agata Gawiak (Poland), Magda Matuszewska (Poland)

www.salus.global/article-show/ehd2018-p08

P09 Availability of health facility design and research curricula opportunities in the USA

Juliet L Rogers (USA), Anjali Joseph (USA)
www.salus.global/article-show/ehd2018-p09

P10 Research collaboration as innovation: moving the science forward with a multi-firm research coalition model for major healthcare design projects

Juliet L Rogers (USA), Jeri Brittin (USA)
www.salus.global/article-show/ehd2018-p10

P11 Reframing stroke rehabilitation spaces: a multidisciplinary approach to design evaluation

Ruby Lipson-Smith (Australia), Julie Bernhardt (Australia), Heidi Zeeman (Australia), Clare Newton (Australia)
www.salus.global/article-show/ehd2018-p11

P12 Ecologies of care: designing, construction and living with care (homes)

Mikaela Patrick (UK), Chris McGinley (UK), Christina Buse (UK), Sarah Nettleton (UK)
www.salus.global/article-show/ehd2018-p12

P13 Evaluating design options of a family-centred inpatient unit

Nirit Putievsky Pilosof (Israel), Yehuda E Kalay (Israel), Jacob Yahav (Israel)
www.salus.global/article-show/ehd2018-p13

P14 A look from the inside

Veronica Baroni (UK)
www.salus.global/article-show/ehd2018-p14

P15 From Foucault to Hillier: the interconnection of space and society in facilities for behavioural health

Dr Evangelia Chryssikou (UK), Alan Penn (UK)
www.salus.global/article-show/ehd2018-p15

P16 Bio-inspired approach to healthcare environment – case study of a private clinic for integrative medicine

Mayumi Iitsuka (France)
www.salus.global/article-show/ehd2018-p16

P17 Nature that nurtures: a journey to good health that improves the bottom line

Rebecca Moore (Australia), Katharina Nieberler-Walker (Australia), Cheryl Desha (Australia)
www.salus.global/article-show/ehd2018-p17

P18 Medical equipment planning – the value of data

Sara Wennergren (Sweden)
www.salus.global/article-show/ehd2018-p18

P19 Primary care clinical room – HBN 11-01 calculation methodology challenge and recommended alternative method

Richard Clark (UK)
www.salus.global/article-show/ehd2018-p19

P20 Dynamic environments in healthcare

Michael Joyce (USA), Caroline DeWick (USA)
www.salus.global/article-show/ehd2018-p20

P21 Designing through limits for a familiar clinic

Iulia Udrea (Romania), Dr Anghel Adrian Udrea (Romania), Mara Oprea (Romania), Serban Udrea (Romania)
www.salus.global/article-show/ehd2018-p21

P22 Designing effective medical device management programmes to simultaneously improve care quality and drive commercial savings

Caroline Finlay (UK), Ruth Strickland (UK), Andrew Frost (UK)
www.salus.global/article-show/ehd2018-p22

P23 Shoring up the foundations: can PPP healthcare schemes be better by design?

Burkhard Musselmann (UK), Dean Kaardal (Canada), Joel Martineau (UK)
www.salus.global/article-show/ehd2018-p23

P24 Learning from Maggie's: healthcare architecture research by drawing, a MSc students' project

Johan van der Zwart (Norway)
www.salus.global/article-show/ehd2018-p24

P25 Integrating technology in patient care spaces: using scenario-based evaluations to compare design alternatives in virtual reality

Anjali Joseph (USA), Deborah Wingler (USA), Andrew Robb (USA), Sara Bayramzadeh (USA)
www.salus.global/article-show/ehd2018-p25

P26 The restorative impact of perceived open space: exploring multisensory illusions as a neuroarchitecture design tool

David A Navarrete (USA)
www.salus.global/article-show/ehd2018-p26

P27 Machines that heal?

Regina Kennedy (UK), Tas Hind (UK)
www.salus.global/article-show/ehd2018-p27

P28 Integrated experiential solutions: commitment, measurement, continuous improvement, success

Brenda M Bush-Moline (USA), Herschel Block (USA)
www.salus.global/article-show/ehd2018-p28

P29 How does the built environment support neurorehabilitation? Exploring the experiences of staff and patients following spinal cord and brain injury

Jacinta Colley (Australia), Heidi Zeeman (Australia), Elizabeth Kendall (Australia)
www.salus.global/article-show/ehd2018-p29

P30 Using data and technology to enable efficient, patient-centred design

Kevin Cassidy (Canada), Damien Kenny (Australia)
www.salus.global/article-show/ehd2018-p30

P31 Playful and soothing – a pattern of paediatric facility

Cressida Toon (UK), Gary Toon (UK), Agata Zamasz (UK)
www.salus.global/article-show/ehd2018-p31

P32 Socio-cultural factors in diabetes management in South Korea

Young-ae Hahn (South Korea)
www.salus.global/article-show/ehd2018-p32

P33 A promenade through a Barcelona referenced hospital: an example to improve the experience

Laiá Isern Meix (Spain), Albert Vitaller Santiro (Spain)
www.salus.global/article-show/ehd2018-p33

P34 Co-visualised sleep disturbances: design toolkit for improving sleep of older patients within hospital environment

Magda Matuszewska (Poland/UK)
www.salus.global/article-show/ehd2018-p34

P35 Powerfully good: art, nature and placemaking in healthcare landscape design

Alison King (UK), Jim Buchanan (UK), Jennette Emery-Wallis (UK)
www.salus.global/article-show/ehd2018-p35

P36 Integrating art into clinical briefing and early design development to deliver child-friendly environments that enhance the patient and family experience

Crispin Walking-Lea (UK),
Vivienne Reiss (UK)

www.salus.global/article-show/ehd2018-p36

P37 How can I improve the environmental impact in existing retirement home buildings?

Rogelio Zubizarreta Jimenez (Spain),
Manuel Gallardo Salazar (Spain),
Salvador Rodriguez Perez (Spain),
Rafael Ramos (Spain)

www.salus.global/article-show/ehd2018-p37

P38 Could architectural planning enable hospitals to 'build in' the organic space needed to answer capacity challenges and enhance the performance of the healthcare estate?

Meg Henley (UK), Steven Peak (UK),
Dave Clarke (UK)

www.salus.global/article-show/ehd2018-p38

P39 Re-imagining 'regenerative' healthcare for a circular economy

Anuradha Sabherwal (UK)

www.salus.global/article-show/ehd2018-p39

P40 The art of healing: a people-centric approach to healthcare design

Chris McQuillan (Canada)

www.salus.global/article-show/ehd2018-p40

P41 The flexible surgery ward – an interdisciplinary approach

Toke Laugesen (Denmark),
Kristian Bille Nielsen (Denmark),
Christian Michel Sorup (Denmark)

www.salus.global/article-show/ehd2018-p41

P42 Can population health survive in the United States?

Louis A Meilink, Jr (USA),
Christina Grimes (USA)

www.salus.global/article-show/ehd2018-p42

P43 Passivhaus proof of concept: reducing the cost of healthcare buildings

Jamie Andrews (UK),
Harpriya Chaggar (UK), Peter Ranken (UK)

www.salus.global/article-show/ehd2018-p43

P44 Beyond green – case study of Reading HealthPlex

Louis A Meilink, Jr (USA),
Christina Grimes (USA)

www.salus.global/article-show/ehd2018-p44

P45 Blending art with information to improve the patient experience and reduce aggression in A&E

Peter Shenai (UK), Louisa Williams (UK),
Martin Jones (UK)

www.salus.global/article-show/ehd2018-p45

P46 Floor patterns as a potential risk factor for the elderly and cognitively impaired?

Dr Birgit Dietz (Germany),
Janine Diehl Schmid (Germany)

www.salus.global/article-show/ehd2018-p46

P47 How design can be a tool for healing

Joseph Stuyfzand (Netherlands)

www.salus.global/article-show/ehd2018-p47

P48 Community wellness for triple bottom-line sustainability

Mara Baum (USA)

www.salus.global/article-show/ehd2018-p48

P49 Healing architecture 4.0

Stefanie Matthys (Germany)

www.salus.global/article-show/ehd2018-p49

Managing change

Planting the right trees in the right place can help our cities improve air quality, making us all healthier. Just like good health, good healthcare design starts with getting the basics right. At AECOM, we understand that success lies in seeing the whole, nothing works in isolation.

Please contact:
John Hicks
john.hicks@aecom.com

aecom.com

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Healthcare Design (Over 20,000 sqm)

- A01** Joseph and Rosalie Segal Family Health Centre, Canada
- A02** Omagh Hospital and Primary Care Complex, UK
- A03** University of Iowa Stead Family Children's Hospital, USA
-

Healthcare Design (Under 20,000 sqm)

- A04** Maternity Unit at Kachumbala Health Centre 3, Uganda
- A05** St Andrew's Hospital, Eastern Clinical Development, Australia
- A06** Waterfall House, Birmingham Children's Hospital, UK
-

Mental Health Design

- A07** Clinic for Psychosomatic Medicine and Psychotherapy, Westerstede, Germany
- A08** Psykiatrisygehus i Vejle (Mental Health Hospital in Vejle), Denmark
-

Interior Design and Arts

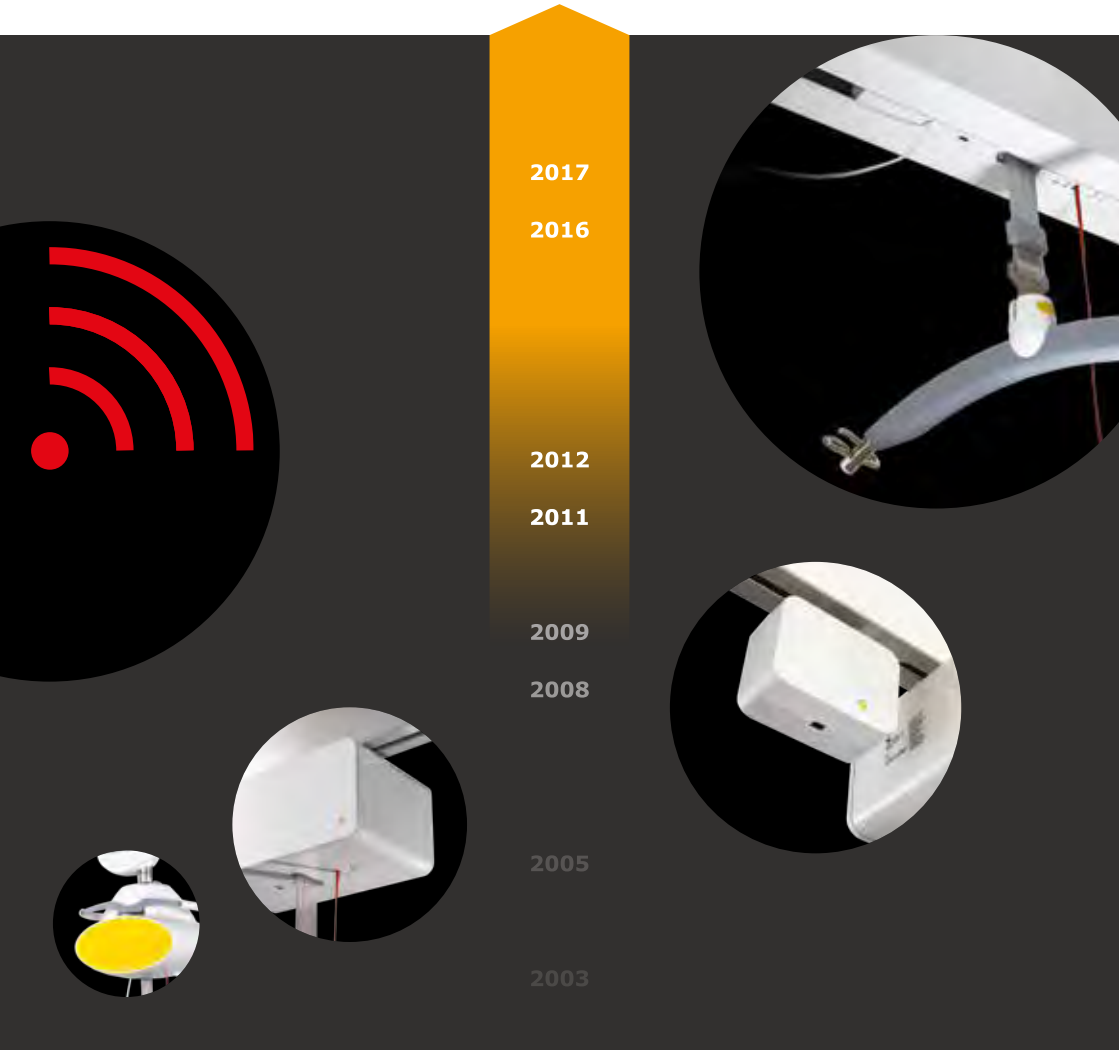
- A09** COACH – Centre for Overweight Adolescent and Children's Healthcare, Netherlands
- A10** Renovation of Radboud UMC Dentistry, Netherlands
- A11** University of Iowa Stead Family Children's Hospital, USA
-

Future Healthcare Design

- A12** Children's Hospital Copenhagen (BørneRiget), Denmark
- A13** Desa Semesta, Indonesia
- A14** Hospital of "Île de Nantes", new healthcare district of Nantes, France
- A15** National University for Oral Health, Singapore (NUCOHS), Singapore



Ongoing innovation



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Design for Adaptation and Conversion

A16 The Halo, UK

Design Innovation for Quality Improvement

A17 Carebnb – a new concept for short-term light care in your own neighbourhood, Netherlands

A18 High-Risk Pregnancy Toolkit, Netherlands

Design for Health and Wellness

A19 Maternity Unit at Kachumbala Health Centre 3, Uganda

A20 Kalasatama Health and Wellbeing Center, Finland

A21 Omagh Hospital and Primary Care Complex, UK

Health and Life Sciences Design

A22 Cardiff University Brain Research Imaging Centre (CUBRIC), UK

A23 Center for Stroke and Dementia Research, Germany

A24 The Francis Crick Institute, UK





Their work removes some of the fear and provides a narrative to what is happening. It's a much more mature approach to designing this type of environment.

John Criddle
Senior Paediatric Consultant



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Art in Site

WELCOME DRINKS RECEPTION

The Welcome Drinks Reception takes place immediately after the close of the first day's proceedings on the evening of Monday 11 June in the Osler and Long Rooms.

Offering a fantastic chance to network and unwind, the reception will feature a classical musical performance by the Royal Academy of Music.

Since its foundation in 1822, the Royal Academy of Music has made an inestimable impact on the musical landscape, both in the UK and abroad. Indeed, it has permeated the music profession at all levels, with Academy alumni including classical giants Sir Simon Rattle and Sir Harrison Birtwistle, along with pop stars Sir Elton John and Annie Lennox.

Every year, talented young musicians from more than 50 countries come to the UK to study at the Academy, attracted as they are by world-renowned teaching and a rich culture that broadens their musical horizons.

The European Healthcare Design 2018 exhibition will also be open during the Welcome Drinks Reception.

Venue: Osler and Long Rooms

Date: Monday 11 June

Time: 18.00-20.00



GARDEN PARTY

Held outside in the informal surroundings of the medicinal gardens of the Royal College of Physicians, the European Healthcare Design 2018 Congress Garden Party will immediately follow the end of the congress and the European Healthcare Design Awards ceremony.

Celebrate with the winners in the Royal College's beautiful medicinal gardens.

Opened in 1965, the gardens were extensively replanted in 2005-06, thanks to a generous grant from the Wolfson Foundation, and now feature more than 1300 plants.

Throughout the evening, a jazz quartet comprising students of the Royal Academy of Music will deliver a captivating musical performance.

Featuring spectacular garden lighting, lanterns and candles, the Garden Party will offer a great opportunity at the close of the congress to network and socialise, and enjoy the British summer! To reflect the surroundings, and as a relaxing end to an intense two days of congress activity, the dress code will be smart casual, with delegates treated to a barbeque buffet dinner.

Venue: Medicinal Gardens

Date: Tuesday 12 June

Time: 18.00-22.00



Supported by



Participants in the European Healthcare Design 2018 Congress get the opportunity to choose one of three study tours featuring some of the UK's latest benchmark healthcare projects and architectural landmarks. Places on each tour are now fully booked.

Study tour 1: London

Departure point: Melia White House Hotel

Date: 13 June 2018

Time: 08.45–17.00

New Cancer Centre at Guy's Hospital, private wing

Designed by HOK, the 5600 sqm private patients' wing in the New Cancer Centre at Guy's Hospital was part of the first wave of schemes to implement a new 'Design Quality Standards' report to guide the interior specifications. Sonnemann Toon Architects (design-build architect) developed the standards to help HCA Healthcare UK ensure a high-quality patient-facing environment. A soothing palette of neutral finishes and textures was used to create a relaxed but upmarket impression. Good contrast between door architraves and walls, and the introduction of artwork help patients with visual impairment or dementia identify individual rooms.



Private outpatients and diagnostics facility, the Shard

Sonnemann Toon Architects designed the fit-out of this private outpatients and diagnostics facility on the fourth to sixth floors of the world-renowned Shard. Services include MRI, CT, fluoroscopy, mammography, ultrasound and X-ray, consulting suites, physiotherapy, MDT, and cafe spaces. The facility benefits from its own independent entrance on St Thomas' Street. The 78 consulting rooms enjoy stunning views of London's skyline.

Maggie's Barts

The site of this Maggie's Centre is adjacent to the large courtyard of the historic St Bartholomew's Hospital in central London. The three-storey facility is more vertical than other Maggie's centres and is envisioned as a "vessel within a vessel". Its structure is a branching concrete frame, an inner layer comprising perforated bamboo, and an outer layer of matte white glass with coloured glass fragments recalling Medieval music notation. A public roof garden with flowering trees opens to a large room for yoga, tai chi and meetings.



Study tour 2: Cambridge

Departure point: Melia White House Hotel

Date: 13 June 2018

Time: 07.30–18.00



Papworth Hospital, Cambridge

Designed by HOK, the new Papworth Hospital is a state-of-the-art cardiothoracic facility on the Cambridge Biomedical Campus. The holistic design concept embraces the NHS Foundation Trust's ambition to thrive as a centre of excellence in cardiothoracic services for the East of England. The new 310-bed hospital is in a beautiful park-like setting and will provide a comfortable, easy-to-navigate environment. Meeting places in the main atrium, gardens and restaurant for patients, family and staff will enhance communication and collaboration across the campus. The hospital layout creates separate zones for outpatient care, emergency services, and diagnostic and treatment functions. Each inpatient floor incorporates two nursing units.

Cambridge walking and architecture tour

This 90-minute tour will cover the historic heart of this world-famous university city, including: the golden Corpus Clock; the Senate House and Old Schools; stunning colleges such as King's, Corpus Christi and Trinity; and the Old Cavendish Laboratory, home of world-changing scientific discoveries. Tour guides will explain features common to all 31 university colleges and that shape student life. Delegates will learn about student life and pranks, see well-known landmarks, and hear fascinating insights from more than 800 years of the university's history.





Design thinking by HKS

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Study tour 3: Manchester

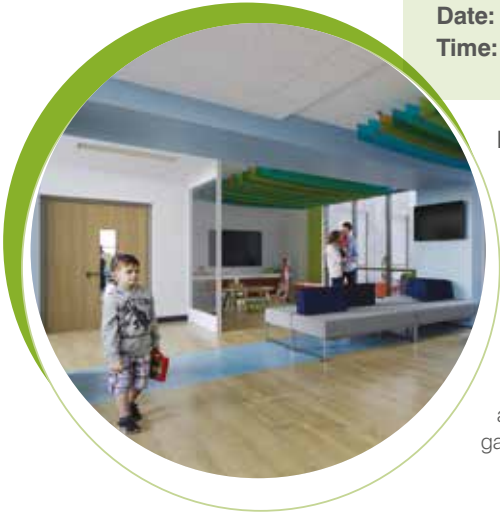
Departure point: Melia White House Hotel

Date: 13 June 2018

Time: 06.45–19.30

Manchester Proton Beam Therapy Centre

The Christie NHS Foundation Trust Proton Beam Therapy Centre is the first of two new centres in England delivering high-energy proton beam therapy. Various measures were applied to create a warm, inviting space, aimed at reducing fear and anxiety. Natural daylighting and landscaping were given high priority, as well as creating a sense of community among the building's users. Waiting spaces were located at external walls and courtyards, and the main waiting area was designed as a winter garden, integrating light, vegetation and social interactivity.



Maggie's Manchester, Robert Parfett Building

Designed by Foster + Partners, Maggie's Manchester aims to create a domestic atmosphere in a garden setting, and is a short walk from the Christie Hospital. Spaces include intimate private niches, a library, exercise rooms, and places to share a cup of tea. The heart of the building is the kitchen and its large communal table. There is a focus throughout on natural light, greenery and garden views, while a greenhouse provides a retreat for people to work with their hands and enjoy nature.

Brooks Building, Manchester Metropolitan University

As masterplanner and architect, Sheppard Robson led the design of Manchester Metropolitan University's new Birley Campus. Its focal point is the Brooks Building, a new academic facility for the Faculty of Health, Psychology & Social Care and the Institute of Education. The building's key design themes are openness, informality and the dissolution of barriers between the community and higher education. The building is clad in glazed white ceramic and fritted glass panels, which change in density across the facade and lift to reveal the community-accessible spaces on the ground floor.





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The European Healthcare Design Awards 2018

Lead Awards Sponsor



The European Healthcare Design Awards 2018 celebrate and recognise professional and research excellence in the design of healthcare environments both in Europe and around the world.

The awards aim to have a significant influence on the creation of environments that promote health and wellbeing, embed quality improvement, and support the delivery of treatment and care in an accessible, economic and equitable way.

Organised by Architects for Health and SALUS Global Knowledge Exchange, the awards comprise ten categories across primary, community, secondary and tertiary levels of international healthcare provision and delivery. They will be presented at an illustrious ceremony during the final session of the 4th European Healthcare Design 2018 Congress & Exhibition on Tuesday 12 June. The awards will contribute towards the development of knowledge and standards in the design of healthcare environments around the world.

Recipients of the awards will be multidisciplinary project teams demonstrating outstanding vision, leadership and knowledge in the design, development and implementation of projects that have positively transformed the delivery and experience of healthcare for the patients and community they serve.

All award submissions are also given the opportunity to be featured on a fully searchable map of healthcare projects on the SALUS Global Knowledge Exchange (www.salus.global).



Evaluation committee

The awards evaluation committee features international researchers, practitioners and policy advisors, who bring specialist multidisciplinary expertise to the specific categories they have been invited to judge.

The shortlist and winner of each award are determined by a category chair, supported by two other judges with proven expertise in their field. This robust evaluation methodology ensures a balanced and transparent decision-making process.



Healthcare Design (Over 20,000 sqm)

An outstanding healthcare project in a secondary or tertiary care setting that demonstrates high levels of sustainability and urban integration, creates an effective clinical environment, promotes service improvement, and provides a supportive environment for staff, patients and their families.



Lead judge:
Marte Lauvsnes,
Sykehusbygg, Norway

Panel judges:
Tricia Down, North Bristol
NHS Trust, UK

Ganesh Suntharalingam,
Intensive Care Society, UK

Shortlist

Joseph and Rosalie Segal Family Health Centre

Commissioned by Fraser Health
Designed by Parkin Architects Western (*pic: top*)

Omagh Hospital and Primary Care Complex

Commissioned by the Western Health
and Social Care Trust
Designed by TODD Architects, with Hall Black
Douglas

**University of Iowa Stead Family
Children’s Hospital**

Commissioned by
Board of Regents State of Iowa,
University of Iowa Hospitals and Clinics
Designed by CBRE/Heery
(*pic: bottom*)



Longlist

Bendigo Hospital

Commissioned by Exemplar Health (NBH)
Partnership
Designed by Silver Thomas Hanley in collaboration with Bates Smart

Hong Kong Children's Hospital

Commissioned by Architectural Services Department HKSAR
Designed by Simon Kwan & Associates

The Greater Accra Regional Hospital at Ridge

Commissioned by Bouygues Construction Ghana
Designed by Perkins+Will

Mittal Children's Medical Centre at Great Ormond Street Hospital

Commissioned by Great Ormond Street Hospital
Designed by Llewelyn Davies

Growing Up Healthy | CHU Sainte-Justine

Commissioned by CHU Sainte-Justine
Designed by Provencher_Roy | Menkès Shoener Dagenais LeTourneux Architectes

The Maersk Tower, extension of the Panum complex at the University of Copenhagen

Commissioned by the Danish University and Property Agency (BYGST) and the University of Copenhagen
Designed by CF Møller Architects

Peel Memorial Centre for Integrated Health and Wellness

Commissioned by William Osler Health System
Designed by Diamond Schmitt Architects / Callison RTKL

Erasmus MC Medical Center

Commissioned by Erasmus MC
Designed by EGM Architects

HealthPlex for Advanced Surgical + Patient Care

Commissioned by Tower Health
Designed by Ballinger

Milton District Hospital Expansion

Commissioned by Halton Healthcare Services Corporation
Designed by B+H Architects

General Hospital Sint-Maarten, Mechelen

Commissioned by AZ Sint-Maarten
Designed by VK Architects & Engineers

Kalasadama Health and Wellbeing Center

Commissioned by City of Helsinki
Designed by Helin & Co Architects

Hospital Maas en Kempen

Commissioned by Ziekenhuis Maas en Kempen VZW
Designed by de Jong Gortemaker Algra architecten en ingenieurs

Dumfries and Galloway Royal Infirmary

Commissioned by NHS Dumfries and Galloway
Designed by NBBJ in collaboration with Ryder Architecture

Joseph Brant Hospital

Commissioned by Joseph Brant Hospital
Designed by Parkin Architects

Sunshine Coast University Hospital

Designed by HDR and Architectur Brisbane as Sunshine Coast Architects

AZ Zeno Knokke

Commissioned by AZ Zeno vzw
Designed by Temporary association AAPROG – BOECKX – B2Ai

Cleveland Clinic Taussig Cancer Center

Commissioned by Cleveland Clinic
Designed by William Rawn Associates and Stantec Architecture

Wagga Wagga Rural Referral Hospital

Commissioned by Health Infrastructure
Designed by Billard Leece Partnership

Healthcare Design (Under 20,000 sqm)

An outstanding healthcare project in a community or primary care setting that demonstrates high levels of sustainability and urban integration, transforming the quality of care services in an accessible location, and supporting the integrated needs of staff, patients and the community.



Lead judge:
Liesbeth Van Heel, Erasmus
University Medical Centre,
Netherlands

Panel judges:
Coen van den Wijngaart,
Art & Build, Belgium
Hank Adams, HDR, USA

Shortlist

Maternity Unit at Kachumbala Health Centre 3, Uganda

Designed by HKS Architects and EFOD (*pic: top*)

St Andrew's Hospital, Eastern Clinical Development, Australia

Commissioned by St Andrew's Hospital
Designed by wiltshire + swain architects

Waterfall House, Birmingham Children's Hospital

Commissioned by Birmingham Women's
and Children's NHS Foundation Trust
Designed by BDP (*pic: bottom*)



Longlist

Erlanger Health System East Campus Addition

Commissioned by Erlanger Health System
Designed by HKS

Medisprof Cancer Center

Commissioned by Medisprof
Designed by Arhitecti Udrea

NGS Macmillan Unit

Commissioned by Chesterfield Royal Hospital NHS Foundation Trust
Designed by the Manser Practice with Mott MacDonald

Bupa Medical Centre – GT Land

Commissioned by Bupa China
Designed by Robarts Spaces, Architecture, Interiors, Engineering

Ballarat Base Hospital – Additional Beds, Ambulatory Care and Helipad

Commissioned by Ballarat Health Services
Designed by Billard Leece Partnership

Mercer’s Institute for Successful Ageing

Commissioned by St James’s Hospital, Dublin, Ireland
Designed by O’Connell Mahon Architects / Moloney O’Beirne Architects

Patient-centric Psychiatric Ward, Västerbotten

Commissioned by Västerbotten läns landsting
Designed by Philips Design

Center for Stroke and Dementia Research

Commissioned by Staatliches Bauamt München 2, Germany
Designed by Nickl & Partner Architekten AG

Celbridge Primary Care Centre

Commissioned by Clarington Developments Celbridge
Designed by Hussey Architects

Expansion and Rehabilitation of Hospital del Mar

Commissioned by Consorci Mar Parc de Salut Mar de Barcelona
Designed by Pinearq and Brullet de Luna

De Nieuwe Klinkenberg

Commissioned by Vilente
Designed by Wiegerinck Architecten Arnhem BV

Sahlgrenska University Hospital, Centre for Imaging & Intervention

Commissioned by Region Västra Götaland
Designed by Pyramiden arkitekter with WSP

Chamberlain Court Care Home

Commissioned by Hallmark Care Homes
Designed by Buckle Chamberlain





Future Healthcare Design

A future healthcare project that can demonstrate the potential for outstanding outcomes in masterplanning, placemaking, wellness and sustainability, in alignment with the strategic requirements of the healthcare provider to transform their services within the wider community, regional or national health system.



Lead judge:

Cliff Harvey, Union of International Architects Public Health Group, Canada

Panel judges:

Yvonne Lim, MOHH, Singapore

Hieronimus Nickl,
Nickl & Partner, Germany

Shortlist

Children’s Hospital Copenhagen (BørneRiget)

Commissioned by the Capital Region of Denmark, Copenhagen University Hospital (Rigshospitalet) and Ole Kirk’s Foundation

Designed by 3XN Architects, Arkitema, Niras, Kristine Jensens Tegnestue and Rosan Bosch Studio (*pic: top*)

Desa Semesta

Commissioned by Semesta Foundation
Designed by Magi Design Studio (*pic: bottom*)

**Hospital of “Île de Nantes”,
new healthcare district of Nantes**

Commissioned by le Centre Hospitalier Universitaire de Nantes
Designed by Art & Build Architects in collaboration with Pargade Architectes, Artelia, Signes Paysage

**The National University for Oral Health,
Singapore (NUCOHS)**

Commissioned by NUH (National University Hospital), NUS (National University of Health) and FoD (Faculty of Dentistry)
Designed by B+H Architects in collaboration with Architects 61



Longlist

National Diagnostic Centre, Malé

Commissioned by Indira Ghandhi Memorial Hospital
Designed by MODE Architects

Panzi Hospital

Commissioned by the Panzi Foundation
Designed by White Arkitekter

Cayman Islands Long-Term Residential Mental Health Facility

Commissioned by Ministry of Health, Environment, Culture & Housing, Cayman Islands Government
Designed by Montgomery Sisam Architects

Ewha Women's University Medical Center

Commissioned by Ewha Women's University
Designed by Junglim Architecture and AECOM

Manny Pacquiao Medical Center

Commissioned by Manny Pacquiao Medical Center
Designed by Salac Greenworld Architects

King Hussein Medical City (KHMC)

Commissioned by Royal Jordanian Armed Forces
Designed by AECOM

Children and Adolescents Clinic – University of Freiburg

Commissioned by Land Baden-Württemberg, Universitätsklinikum Freiburg
Designed by Health Team Vienna – Albert Wimmer ZT / Architects Collective ZT

HospitaCité, les nouvelles Cliniques Universitaires Saint-Luc

Commissioned by CUSL, Cliniques Universitaires Saint-Luc
Designed by VK Architects & Engineers

Middle East Hospital, Riyadh, Kingdom of Saudi Arabia

Designed by Philips Design

VUmc Imaging Center

Commissioned by VU Medisch Centrum
Designed by Wiegerinck Architecten Arnhem BV

Erlanger Health System Children's Hospital Outpatient Center (CHOC)

Commissioned by Erlanger Health System
Designed by HKS

Kidapawan Medical Specialists Center

Commissioned by Kidapawan Medical Specialists Center
Designed by Salac Greenworld Architects

The Reikai Centre, Cherry Place with Options for Homes, Cherry North

Commissioned by the Reikai Centres
Designed by Montgomery Sisam Architects

Palliative Care Center, St Petersburg

Commissioned by St Petersburg Health Committee
Designed by Werfau

Vulnerable Persons Extra Care Facility

Commissioned by Falklands Islands Government
Designed by One Creative Environments (One)

Advanced Wellbeing Research Centre

Commissioned by Legacy Park
Designed by HLM Architects, with Turner & Townsend

Stella Maris Hospital

Commissioned by Fondazione Stella Maris
Designed by Heliopolis 21 – Architetti Associati

Kuwait Children's Hospitals

Commissioned by Kuwait Ministry of Public Works
Designed by WSP with HKS Architects

Grange University Hospital 'Ysbyty Prifysgol y Faenor' Specialist Critical Care Centre, Wales

Commissioned by Aneurin Bevan Local Health Board
Designed by BDP

Health and Life Sciences Design

An outstanding health and life sciences project that supports the alignment of training and education, clinical research, informatics, innovation and healthcare delivery, with a focus to improve patient and population health outcomes by translating research into practice to develop integrated health services.



Lead judge:
David Powell, Alder Hey
Children's Hospital, UK

Panel judges:
Karin Imberdorf, Lead
Consultants, Switzerland

Tye Farrow, Farrow Partnership
Architects, Canada

Shortlist

**Cardiff University Brain Research
Imaging Centre (CUBRIC)**

Commissioned by Cardiff University
Designed by IBI Group (*pic: top*)

Center for Stroke and Dementia Research

Commissioned by Staatliches Bauamt München 2,
Germany
Designed by Nickl & Partner Architekten AG

The Francis Crick Institute

Designed by HOK with PLP Architecture (*pic: bottom*)



Longlist

Fred & Pamela Buffett Cancer Center

Commissioned by University
of Nebraska Medical Center
Designed by HDR

Shirley Ryan AbilityLab

Commissioned by Shirley Ryan AbilityLab
Designed by HDR | Gensler in association
with Clive Wilkinson Architects

The Halo

Commissioned by Health Services Laboratories
Designed by Steffian Bradley Architects

Mercer's Institute for Successful Ageing

Commissioned by St James's Hospital,
Dublin, Ireland
Designed by O'Connell Mahon Architects /
Moloney O'Beirne Architects

Mental Health Design

A mental health project that, through innovative design thinking, achieves a reconciliation between the needs of the patient/resident for a humanistic environment that supports ongoing therapy, care and recovery, and the requirement for appropriate levels of safety, security and supervision.



Lead judge:
Jonathan Erskine,
European Health Property
Network, UK

Panel judges:
Alice Liang, Montgomery
Sisam, Canada
Mungo Smith, MAAAP, Australia



Shortlist

Clinic for Psychosomatic Medicine and Psychotherapy, Westerstede

Designed by GSP Gerlach Schneider
Partner Architekten (*pic: top*)

Psykiatrisygehus i Vejle (Mental Health Hospital in Vejle)

Commissioned by Region of Syddanmark, Denmark
Designed by Arkitema Architects (*pic: bottom*)

Longlist

Patient-centric Psychiatric Ward, Västerbotten

Commissioned by Västerbotten läns landsting
Designed by Philips Design

Joseph and Rosalie Segal Family Health Centre

Commissioned by Fraser Health
Designed by Parkin Architects Western

Fern House

Commissioned by Abbeyfield The Dales
Designed by Alessandro
Caruso Architecture and Interiors

SUN Behavioral Health

Commissioned by Sun Behavioral Health
Designed by NK Architects

Design for Health and Wellness

An inspirational project that encompasses services outside of traditional healthcare settings and, through an alignment of the care philosophy with the design of the environment, helps promote positive behaviours towards healthy living and wellness.



Lead judge:

Dr Liz Paslawsky, Consultant advisor, SALUS Global Knowledge Exchange, Australia

Panel judges:

Helina Kotilainen, Architect, Finland
Jonathan Wilson, Stantec, UK

Shortlist

Maternity Unit at Kachumbala Health Centre 3, Uganda

Designed by HKS Architects and EFOD

Kalasatama Health and Wellbeing Center

Commissioned by City of Helsinki
Designed by Helin & Co Architects (*pic: bottom*)

Omagh Hospital and Primary Care Complex

Commissioned by the Western Health and Social Care Trust
Designed by TODD Architects, with Hall Black Douglas (*pic: top*)

Longlist

Children's National Medical Center: Bunny Mellon Healing Garden

Commissioned by Children's National Medical Center
Designed by Perkins+Will

HealthPlex for Advanced Surgical + Patient Care

Commissioned by Tower Health
Designed by Ballinger



Chamberlain Court Care Home

Commissioned by Hallmark Care Homes
Designed by Buckle Chamberlain

Design for Adaptation and Conversion

An outstanding healthcare project that is small in scale but has a high transformational impact on resolving complex and difficult service design challenges in a location with significant constraints. Submissions may include, but are not restricted to, conversions, extensions, infills, refurbishments and exterior projects.



Lead judge:

Jim Chapman,
Visiting professor, Manchester
School of Architecture, UK

Panel judges:

Chris Shaw,
Medical Architecture, UK

Jane McElroy,
NBBJ, UK



Shortlist

The Halo

Commissioned by Health Services Laboratories
Designed by Steffian Bradley Architects
(pics: top and bottom)

Longlist

Renovation of the Hepatic ICU

Commissioned by Hospital Clínic de Barcelona
Designed by Estudi PSP Arquitectura

Emergency Care Pathway, St Thomas' Hospital, London

Commissioned by Essentia for Guy's and St Thomas' NHS Foundation Trust
Designed by ADP Architecture, with Currie and Brown

Harley Street Proton Beam Therapy

Commissioned by the Howard de Walden Estate
Designed by Sonnemann Toon Architects

Sahlgrenska University Hospital, Centre for Imaging & Intervention

Commissioned by Region Västra Götaland
Designed by Pyramiden arkitekter with WSP

Interior Design and Arts

An inspirational project that demonstrates exceptional skill in creating a compassionate healthcare environment that reflects and communicates the values of the healthcare provider through the integrated application of interior design with the visual arts.



Lead judge:
Alexandra Coulter,
Arts & Health South West, UK

Panel judges:
Vivienne Reiss,
Arts consultant, UK
Pam Bate,
Hopkins Architects, UK

Shortlist

COACH – Centre for Overweight Adolescent and Children’s Healthcare

Commissioned by Maastricht UMC+
Designed by Tinker imagineers (*pic: top*)

Renovation of Radboud UMC Dentistry

Commissioned by Radboud UMC
Designed by Wiegierck Architecten Arnhem BV in collaboration with Ex Interiors (*pic: bottom*)

University of Iowa Stead Family Children’s Hospital

Commissioned by Board of Regents State of Iowa, University of Iowa Hospitals and Clinics
Designed by CBRE/Heery



Longlist

Erlanger Health System, East Campus Addition

Commissioned by Erlanger Health System
Designed by HKS

Lucile Packard Children’s Hospital Phase II Expansion Project

Commissioned by Lucile Packard Children’s Hospital
Designed by Aesthetics

Princess Máxima Center for pediatric oncology

Commissioned by Princess Máxima Center
Designed by MMEK

Children’s Healing Experience Project at the Teck Acute Care Centre, BC Children’s Hospital

Commissioned by BC Children’s Hospital Foundation and BC Children’s Hospital
Designed by various artists; Principal contractor: Balfour Beatty and Ledcor (Affinity)

Euro-Polyclinic Switzerland

Commissioned by Euro-Polyclinic Switzerland, Day Hospital; Designed by MeierZosso Planungs

Fern House

Commissioned by Abbeyfield The Dales; Designed by Alessandro Caruso Architecture and Interiors

Design Innovation for Quality Improvement

A technological or product innovation that has had a transformational impact on the design of healthcare services and/or the patient experience, improving the quality, efficiency and accessibility of care in a specific healthcare setting or across the continuum of primary, community and secondary care.



Lead judge:

Jonathan West, Helen Hamlyn
Centre for Design,
Royal College of Art, UK

Panel judges:

Christine Chadwick,
GE Healthcare, Canada

Danny Gibson, MJ Medical, UK



Shortlist

Carebnb – a new concept for short-term light care in your own neighbourhood

Designed by de Jong Gortemaker
Algra architecten en ingenieurs,
and Aziza Achiche (*pic: bottom*)

High-Risk Pregnancy Toolkit

Commissioned by the Philips Foundation
Developed by the International Committee
of the Red Cross and Philips Design (*pic: top*)

Longlist

GH Positioning Lock

Designed by Guldmann

Contour 21+ and Markwik 21+

Designed by Armitage Shanks

Empowering medical staff by design

Designed by Panton

Naso-Gastric Feeding Sofa

Designed by Pineapple Contracts

The Concept Ward

Designed by Static Systems Group

Mood-based patient-centred design concept

Commissioned by AMC, Academisch
Medisch Centrum
Designed by Koos Service Design

MedModular

Designed by EIR Innovation

Adeo Beam Seating

Designed by Teal HealthCare

AMC Patient Rooms

Commissioned by AMC
Designed by MMEK



Design Research

An independently assessed, completed and novel research study that can demonstrate innovation, relevance and practical application in the design of healthcare environments. The research should rate highly in originality, showing critical thinking in a new area of investigation, or by applying new and innovative methods and analysis to known issues.



Lead judge:

Dr John Zeisel PhD,
Hearthstone
Alzheimer's Care, USA

Panel judge:

Dr Göran Lindahl PhD,
Chalmers, Sweden; Tampere
University of Technology, Finland

Shortlist

From open building to open room. Flexibility as a tool for innovation in future healthcare environments

Andrea Brambilla, PhD candidate; Marco Gola, Politecnico di Milano, Department of Architecture, Built Environment, Construction Engineering

Measuring the space planning efficiency of 21st century hospitals: a unique benchmarking study

Dr Kenneth D Fisher PhD, DSc (hc), MProjMan, Grad Dip Ed; BTech, Assoc. prof, Faculty of Architecture, Building & Planning, University of Melbourne

Systematic review of emerging models of cancer care: implications for the health industry

Dr Upali Nanda PhD, Assoc. AIA, EDAC, ACHE, Associate principal, director of research, HKS, USA; Bitu Kash PhD, MBA, FACHE, Director, Centre for Health Organization Transformation; Assoc. prof, Texas A & M Health Science Center; Director, Center for Outcomes Research, Houston Methodist, USA

Agency in the paediatric hospital: architectural strategies to support independence and empowerment

Dr Rebecca McLaughlan PhD, Research fellow, Melbourne School of Design, University of Melbourne; Dr Stephanie Liddicoat-Ocampo PhD, Architectural researcher, University of Melbourne

Western Health HealthLinks: helping chronic and complex patients stay at home

A/Prof Craig Nelson, Head of unit, nephrology / medical director, HealthLinks, Western Health; Russell Harrison, CEO, Western Health; Jason Plant, Programme director, HealthLinks, Western Health; Dr Arlene Wake, Executive director, community integration, allied health and service planning, Western Health; Robert Rothnie, Director, service planning and development, Western Health

Longlist

Medicine of built environment. Chronic inflammatory state-mediated disease and cancer

Eva Hernandez Garcia, Architect; MSc Integrative Physiology (graduate student), Polytechnic University of Valencia, School of Architecture

Fast care

Massimo D'Alessio, Architect, Politecnico di Milano, Italy

Care Pathway Blueprint: a tool that facilitates the adoption of service innovation in a healthcare organisation

Sara Manzini, Design researcher, Frog Design, Italy

The Susan Francis Design Champion Award

Recognising her undoubted legacy, the European Healthcare Design signature award is this year being relaunched as the Susan Francis Design Champion Award.

The Design Champion Award is the signature prize of the European Healthcare Design Congress, and has been awarded since 2016 to a visionary healthcare leader who has championed, advocated and monitored the value of design across one or more major healthcare projects, working in close collaboration with multiple stakeholders to deliver excellence and set new standards in design quality.

Few have embodied these values and personified such qualities throughout a distinguished career more than Susan Francis, who sadly passed away following illness in April 2017. In a fitting tribute to her memory and legacy, and as co-creator and the driving force behind the successful European Healthcare Design Congress, the prize will this year be relaunched as the Susan Francis Design Champion Award.

Respected worldwide for her dedication over many decades to healthcare design, Susan's ideas thread through every fibre of European Healthcare Design. The Design Champion Award recognises her legacy and lasting vision in the field – not least, her immense contribution in helping launch and organise the Congress since its inception in 2015. Indeed, as her colleague and friend, Claudia Bloom, director of Avanti Architects, so eloquently put, the Congress represents “a fitting memorial to her work”.

Sue began her professional life in the co-operative movements of the late 70s and early 80s, and she was a founder member of the Matrix Feminist Design Cooperative, working across disciplines as an architect, enabler, writer and occasional political firebrand. She also held positions at the Medical Architecture Research Unit (MARU), the Commission for Architecture and the Built Environment (CABE), and the Future Health Network at the NHS Confederation, before joining Architects for Health (AfH) as programme director in 2011.

The European Healthcare Design Congress is one of several fitting memorials to her vision, the network of contacts and bonds of friendship she had developed across Europe, and her ability to bring people together in a common cause. The lengthy applause that rang out to acknowledge her honour at last year's congress signified the profound connections she made during her life and career, as well as the esteem in which she was held among the healthcare design community.

Integrated Health Projects (IHP) is proud to support and sponsor the new Susan Francis Design Champion Award.





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Health facilities bid for clinical lighting prize

Over the past few months, health facilities up and down the UK have been competing for the chance to win £10,000 worth of clinical lighting solutions.

Innovative lighting technology company Visualite launched the competition in partnership with EHD2018 co-organiser SALUS Global Knowledge Exchange, and the announcement of the winner will be made at the congress following the presentation of the European Healthcare Design Awards during the closing session on Tuesday 12 June.

The competition sought entries from any department treating and caring directly for patients, in any healthcare facility operating within the primary, community, secondary or tertiary care sectors in the UK. This included, but was not restricted to, medical wards and clinical departments of general, district, specialised and teaching hospitals, as well as clinics.

As part of the entry process, teams were asked to submit information on several areas, including: demonstrating their knowledge of the impact of the environment on patient recovery; describing their department's vision for their internal environment; and illustrating how staff, patients, families and visitors would benefit from the installation of the lighting solutions. Visualite is also offering the winning team the chance to carry out a post-installation evaluation of its lighting solutions.



The competition attracted 24 entries in total from the following organisations:

- South Tees Hospitals NHS Foundation Trust – two entries
- The Rotherham NHS Foundation Trust
- The Mid Yorkshire Hospitals NHS Trust
- Sheffield Children's NHS Foundation Trust – two entries
- Black Country Partnership NHS Foundation Trust
- Cancer Help (Preston)
- Airedale NHS Foundation Trust
- Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust
- Leeds Children's Hospital, Leeds Teaching Hospitals NHS Trust
- Royal Free London NHS Foundation Trust
- NHS Orkney
- Southport and Ormskirk Hospital NHS Trust
- University Hospitals of Morecambe Bay NHS Foundation Trust
- Clatterbridge PropCare Services
- Great Ormond Street Hospital
- Haven House Children's Hospice
- Shooting Star Chase (Children's Hospice Care)
- Zoe's Place Baby Hospice
- Barnsley Hospital NHS Foundation Trust
- North Tees and Hartlepool NHS Foundation Trust
- University Hospitals of Leicester NHS Trust
- Balhousie Care Group

The entries were judged by an expert panel comprising: Stephanie Williamson, deputy director of development, Great Ormond Street Hospital for Children*; Dr Robin Baddeley, editorial registrar, BMJ; and Jonathan West, senior fellow, Helen Hamlyn Centre for Design, Royal College of Art.

*Stephanie Williamson acknowledged a conflict of interest with the application of Great Ormond Street Hospital and, consequently, did not judge this entry.



Sarah Harper (UK)

Professor of gerontology,
and director
Oxford Institute
of Population Ageing

Keynote address: The global health impacts of population ageing

How will changes in population transform the world's ability to meet the challenges that lie ahead for society and our healthcare services?

As we look to reform ageing and old age in the light of extreme longevity, we must also look to the institutions that currently define ageing and old age – not only to respect the experiences and realities of a growing proportion of our populations but also to ensure that our societies continue to distribute resources fairly across the life course.

We need to recognise, too, that 21st century living is structured by 20th century institutions, which may not be effective for today's dynamics. Our education and legal systems, work patterns, healthcare, and even marriage and families were built during a very different demographic.

There are also deep stereotypes and preconceptions around the contribution and burden of older adults that are not supported by robust evidence, and these need to be revisited. That's partly because many of them lead to unjust behaviour towards older people, but also because these institutions and perceptions influence the behaviour of older people themselves.

There are challenges in measuring healthy life expectancy, with significant and large geographical variations. Evidence suggests we're pushing back the onset of disability, and so can expect people in their 60s and early 70s to have better health and therefore keep active for longer. However, the evidence also suggests an increase in time spent living with disability among the oldest members of the population.

As people age, many also remain active in the labour market while others may provide informal care services, not only for grandchildren but also for other adults, either with family or other social links, so for many people, older age is still a time of activity.

Predicting the shape of our future populations is vital for installing the infrastructure, welfare and provisions necessary for society to survive. There are many opportunities and challenges that will come with the changes in our populations over the 21st century. This keynote address will consider the future shape of our populations in light of demographic trends in fertility, mortality and migration, and their national and global impact both on society and our healthcare system.

A professor of gerontology at the University of Oxford, Sarah was appointed to the Prime Minister's Council for Science and Technology in 2014. She has chaired the UK Government's Foresight Review on Ageing Populations, and the European Ageing Index Panel for the UNECE Population Unit. Her research was recognised by the 2011 Royal Society for Public Health: Arts and Health Research Award. She is a fellow of the Royal Anthropological Institute and the Royal Society of Arts.

Keynote address: Digital health and AI – personalised healthcare made accessible, affordable and universal

In the ancient city of Babylon, almost 2500 years ago, citizens needing medical advice often gathered in the town square to share thoughts on treatments for common illnesses. This is one of the earliest examples of democratising healthcare – and, as it was the Babylonians who enjoyed the longest life expectancy across the ancient world, it's from our health-conscious ancestors that we take inspiration for our 21st century services.

Health innovator babylon believes it's possible to put an accessible and affordable health service in the hands of every person on earth. How? By combining the ever-growing computing power of machines with the best medical expertise of humans to create a comprehensive, immediate and personalised health service and making it universally available. The mission of babylon is to deliver unparalleled access to healthcare, including personalised health assessments, treatment advice, and face-to-face appointments with a doctor 24/7.

The company's AI system has been created by experienced doctors and scientists using the latest advances in deep learning. Much more than a searchable database, it assesses known symptoms and risk factors to provide informed, up-to-date medical information.

With existing operations in the UK and Rwanda, plus plans in progress with major providers in China, the USA and the Middle East, babylon is home to the largest collection of scientists, clinicians, mathematicians and engineers, recruited from more than 60 different countries.

With a PhD in Engineering Physics, Dr Ali Parsa is a serial healthcare entrepreneur, as well as the founder and CEO of babylon. Prior to babylon, Ali founded Circle and built it within a few years to become Europe's largest partnership of clinicians, with some £200m of revenue, some 3000 employees and a successful IPO.

Ali was recipient of the Royal Award for the Young Entrepreneur of the Year for founding his first business, V&G, and the Healthcare Entrepreneurial Achievement Award for establishing Circle. He was named by *The Times* among 100 global people to watch, and is the UK Cabinet Office Ambassador for Mutuals.



Dr Ali Parsa (UK)

Founder and CEO
babylon



John Cooper (UK)

Architect and director
John Cooper Architecture

Health as capital

Extraordinary and accelerating advances are taking place in healthcare – in smartphone telemedicine, miniaturisation, nano-sensors, robotics, pharmaceuticals, and genomics.

But, set against the backdrop of a rapidly polarising global society, this progress is, in the main, yet to be matched by system change or adaptation. This presentation will examine which predictions have come true in research bearing fruit or technology coming to market, such as Babylon, those areas that appear to require much longer maturation, and those that have proved difficult or unable to realise.

It will also look away from science and technology towards those perennial conference themes of system transformation and redesign, and determine what progress has been made in the last decade in achieving what we have been talking about for the last 20 years.

It will also look at the disruptive effects that this fourth industrial revolution will have – and is already having – on the medical professions, health budgets, and the relationship between patient and physician. Conversely, it will examine the resistance of mature health systems to make simple use of available technology, while looking at what developing countries, such as Rwanda, are achieving by building advanced technologies into their fledgling systems.

This presentation will conclude by attempting to understand the balance that will exist between these inherently dystopian and utopian elements. Will access by the rich to transformative healthcare become another form of capital or can we continue to extend universal care across society?

Intensive care unit design in 2050: merging the future with the present

In this presentation, we will explore futuristic intensive care unit (ICU) design with a view to how it may look in 2050. We will focus on various approaches to futuristic innovations and look at new technologies that are seemingly way beyond today's capabilities. These technologies will include a mixture of iterative improvements, as well as marked transformative changes.

As we introduce each new technology, we'll explore their current stages of development. The main technology of ICU care will be a bio-spheric capsule. In this capsule, online holographic intensivists direct care, working with local providers and the 'Worldwide Critical Care Diagnostics and Therapeutics Center'. This centre contains the sum of all critical care experiential and academic knowledge, and is managed with artificial intelligence and advanced computer-based learning. The biosphere monitors not only its own environment but also the patient's, as well using advanced sensors with surface and deep organ-based diagnostic capabilities.

A helmet/visor provides bidirectional neurological and psychological evaluation and care using software. This transforms the patient's thoughts and communicates them to the caregivers, and concomitantly allows the insertion of digital communications and psychological therapies to prevent, diagnose and treat ICU psychological syndromes. Additionally, the helmet will permit distant visitors to visit digitally with virtual human-touch capabilities.

The biosphere contains a multi-modality platform with on-board organ and system-based diagnostics, imaging, therapeutics, infection control, and environmental management systems. Tissue and fluids are virtually sampled; 3D printers generate implantable devices and exoskeletons to provide mobility. Mini-robots handle diagnostics and therapeutics that cannot be addressed virtually. Finally, the capsule provides cryogenic capabilities for long-term preservation of patients for whom therapeutics are not yet available.



Neil A Halpern MD (USA)

Director
Critical Care Center, Memorial
Sloan Kettering Cancer Center



Andy Black
(New Zealand / UK)

Chair
Darrow Health Services
Management

Do we have any idea where medical algorithms are taking us?

Artificial intelligence algorithms for clinical care, built on big-data learning loops, can deliver major gains in efficiency and outcomes. These same algorithms can also send a bowling ball through the traditional doctor–patient relationship, the doctor–dollar status quo and the political–ethical foundation of a ‘national health service’.

“Move fast and break things” is the mantra of the new info-corporations. Are these the soldiers of the new dawn or just chimps with h-bombs? Try overlaying how much this technology has changed the contemporary experience of children and teenagers on to the NHS, and ask yourself: is healthcare ready for it? A fully enabled medical algorithm-driven service will:

- disrupt long-established medical hierarchies and their pay differentials;
- alter the training requirements of all clinical professions;
- change the boundary between human labour and automation (and traditional staffing patterns);
- change public perceptions of health services and the traditional ways they access services;
- move faster than socio-legal frameworks; and
- inform the political issue of who pays into healthcare and who takes out.

In each of these dimensions, there is a pattern and background of good and evil. This future is coming, ready or not, so a discussion, particularly among the young, would be timely.

Transformational cancer centre design supports the implementation of disruptive technologies

This paper will examine how the design of the Calgary Cancer Centre (CCC) is addressing the client's aspirations and supporting the patient journey against an ever-changing medical landscape.

Addressing individual patient needs is important, particularly in cancer treatment, where a 'one size fits all' approach can be, at best, ineffective or, at worse, harmful. Precision medicine seeks to harness artificial intelligence by using cost-effective genomic sequencing, thus allowing tumour genomic profile data, and enabling targeted treatments, personalised therapies and bespoke drugs.

These developments are impacting building design on multiple levels. Big data increases the need for data connectivity, with a corresponding increase in infrastructure and space. Using artificial intelligence to support patient triage is changing patient flow and design. Targeted therapies require more blood sampling and increase pressure on the workflow of pathology labs. Advances in radiology and imaging require adaptable design with expansion capabilities. The 'connected' patient, who wears medical devices and transmits back to the 'home base' health professional, directly impacts space usage.

How do we ensure the patient voice isn't lost under this avalanche of technological innovation and ensure the design meets the emotional needs of patients, families and staff?

Drivers of change and design challenges for the CCC include:

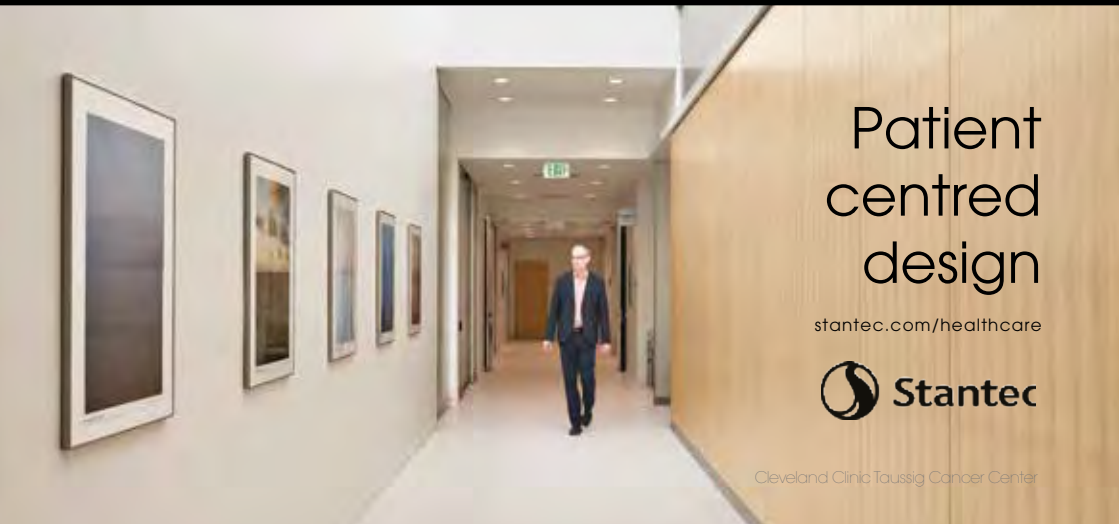
- Addressing emotional needs – providing links to nature and daylight throughout the patient journey creates feelings of hope. The welcome zone encourages patients to access supportive care, retail and catering.
- Multidisciplinary care – standardised outpatient assessment clinic modules and co-location of systemic treatment areas allow for multidisciplinary care.
- Research and technology – extensive pathology, wet lab research, and education facilities promote integration with academic partners and embed knowledge transfer at the heart of the building.
- Adaptable for the future – inpatient facilities are co-located with 'soft' spaces to allow future renovation and increased bed counts; radiotherapy treatment facilities include bunkers for future technologies; and data provision in clinical areas allows for connectivity to research programmes.

These drivers have provided a decision-making framework to enable evolution of the building concept, and are guiding clinicians' and patients' participation against measurable outcomes.



Catherine Zeliotis (UK)

Healthcare design leader
Stantec



Patient centred design

stantec.com/healthcare



Cleveland Clinic Taussig Cancer Center

The future of cancer care, supported by an interactive digital platform: a perspective from Maggie's

Great architecture is vital to the care Maggie's offers, and each brief it gives architects is based on the need to create a calm environment for users.

Purpose: This research looks at the future of cancer care using Maggie's as a test case. Maggie's offers emotional and practical support to cancer patients, including families and friends, within the premises of a signature building. It's recognised, however, that demand for care is outstripping capacity and that home treatment better suits patients' needs. Therefore, the structure of primary cancer services and aftercare are evolving, and the framework within which treatment and care are administered may be affected. We looked at the current care model to understand how cancer support will evolve, with a view to helping Maggie's become resilient to change and plan its future cancer care.

Methods: Phase 1: Desk-study research – in-depth analysis of the cancer care model, evaluating the level of service provided for patients and current technology interventions used to support and enhance communication and data sharing. This will include a review of other support services reliant on digital media to connect with customers/patients.

Phase 2: Stakeholder workshop – delivery of a workshop with stakeholders to shape our understanding and vision for an interactive digital platform for cancer care support. This workshop will be run with Maggie's to challenge the route to transforming cancer care and the role digital media should play.

Phase 3: Awareness-raising – a series of presentations via healthcare forums to promote awareness of the research, including a 'thought piece' on digital healthcare transformation.

Conclusions: The research has helped align Maggie's understanding of the built environment and gain an in-depth knowledge of the patient's emotional and psychological needs during treatment, and following their discharge. Through the research, we've improved our understanding of how the physical features of a building can enhance the patient experience.

The work has ensured Maggie's can articulate the importance of future digital media platforms needed to support patients and their families, which is often overlooked when developing cancer facilities.



Simon Butler (UK)

Associate
Arup



Emma Smyth (UK)

Architect
Cowan Architects

Pharmacogenetics and architecture

Pharmacogenetics is the study of inherited genetic reactions to particular medicines and treatments. Advancements will lead to doctors using genetic screening and the information gained to inform the type and dosage of medication, with a reduced risk of adverse side-effects or the treatment not having the desired effect.

Application: Genetically influenced treatment plans could transform the rate of onset of disease, success of treatment, and survival rates of many illnesses. Pharmacogenetics can be used to influence prescriptions of drugs for Parkinson's and Crohn's disease, as well as everyday medication such as anti-depressants and contraceptives.

These advancements will bring a change in the architectural and clinical layout of the hospital estate and wider network. It will impact on how and where treatment is delivered, and how research and pathology in healthcare will evolve. It has the potential to transform the treatment path for patients with myriad diseases and conditions; in response, the buildings and medical landscape of the future could be vastly different to that of today.

Methodology: Expert opinions from scientists, health planners and architects will be gathered to inform predictions of how the future of our health service can emerge alongside the advancement of genetic research. Findings will be presented as schematics, drawings and infographics, feeding into further research.

Results: The impact on hospital design will be wider reaching than simply including laboratory facilities on site. With both the therapeutic and adverse effects of medication informing the treatment plan, risk to the patient is reduced. The patient may not need to attend hospital but instead be treated and monitored in the community. Personalised treatment removes trial and error from care, and provides each patient with the most suitable plan for them at the right time.

Implications: Through targeted treatment management, reduced hospital attendance would promote a change to clinical processes and, in turn, all buildings in the healthcare infrastructure. A shift in the types of services delivered by hospitals would provide architects with the opportunity to rethink their approach to healthcare facility design.

Keywords: architecture; design; genetics; hospital; treatment; future

Telemedicine and the future of disruption

Well-trained and effective clinical staff are in high demand, and schools of medicine and nursing are struggling to keep up. In the United States, specialists outnumber primary care physicians three to one, leaving populations in remote areas without physicians to address chronic and primary care. Large institutions with multiple campuses have staff who see patients in more than one location across the enterprise, further overstressing health workers.

Purpose and objectives: One opportunity to extend the reach of existing staff lies in telemedicine, but this impacts on the physical spaces and care model required. The shift to telemedicine allows specialists in urban areas to connect remotely with patients in rural hospitals, and offers physicians opportunities to extend their careers by working short shifts to their own schedule.

With the rise of Skype and other on-demand services, telemedicine services are being requested by patients and encouraged by health staff throughout the United States. How can we build in the data networks and spaces needed for this new care model? What impact can we anticipate this model to have on consumer-driven care?

Methods and results: The presentation team will begin by discussing how institutions are embracing techniques such as live, two-way audio/visual technology and remote monitoring programmes on computers, tablets and smartphones.

The team will then address the notion of hospitals without beds, tele-ICUs, and opportunities in the inpatient environment. The impact on space planning requirements and room typologies that can support telemedicine as it evolves will also be reviewed.

Conclusions: By taking advantage of digital opportunities, “place” becomes less of a constraint. On the consumer side, patients can see a primary care physician from their home while the physician is between patients at an offsite ambulatory care facility. Nurses can monitor patients remotely while supporting on-site care teams. Patients have access to increased levels of care, which can be provided in less-expensive locations. Clinicians, too, can reach patients at their convenience, potentially extending their service at a lower cost to the overall institution. Technology can then drive better care at a lower cost.



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NHS Calderdale CCG's 'Quest for quality in care homes' – using telehealthcare to enable integrated, anticipatory and sustainable health and care services

NHS Calderdale CCG's commissioning plan for 2013–14 had a clear aim to establish a more consistent and sustainable model of care for older and vulnerable individuals in Calderdale; a person-centred approach that would best meet the needs of people with long-term health and care needs, and make efficient use of NHS resources.

Methods: The 'Quest for quality in care homes' pilot aims to address variations in practice across care homes, supporting the delivery of consistent, efficient, proactive care by upskilling and empowering staff. A key focus has been to reduce admissions to hospital among care-home residents. The pilot, which provides support for care-home staff to help improve outcomes and prevent unnecessary admissions, has been implemented in three phases:

- 1) Providing GPs and Quest matrons with access to real-time clinical records through provision of an IT system in the care homes. This enables GPs and Quest matrons to access their patients' medical records, enabling joined-up care and informed decision-making.
- 2) Development of telecare and telehealth systems to support prevention, diagnosis and treatment. Advanced telecare and telehealth solutions have been provided to support homes to improve the quality of care delivered and proactively give care that helps prevent deterioration and exacerbation of chronic conditions.
- 3) Investment in a multidisciplinary team, providing an integrated social and clinical approach to support anticipatory care planning. As part of the pilot, NHS Calderdale CCG commissioned Calderdale and Huddersfield NHS Foundation Trust to provide an integrated professional and clinical multidisciplinary team.

Results: Technology is used to help maximise efficiencies across the health and social care economy, and enable people to live healthier and happier lives with greater control of their own care. Results for the second year of the pilot (2015–16) showed:

- the cost of hospital stays has reduced, saving £799,561 year on year;
- emergency admissions are down 26 per cent year on year;
- hospital stays are down 72 per cent year on year;
- hospital bed days used have decreased by 68 per cent year on year; and
- GP care home visits have reduced, with 'Quest for quality' care homes requiring 45-per-cent fewer visits than non-Quest homes.

Keynote address: Democratising capital – the choice to invest in health

At a time when the operational costs of delivering high-quality, accessible, equitable and affordable healthcare are rising exponentially, traditional ways of securing capital financing for new health infrastructure projects are fraught with social, political and financial risk.

At the same time, today's technology is creating new ways of both raising finance and providing direct opportunities for the public and community to invest in infrastructure projects that directly and tangibly serve their needs, and provide a return.

This keynote address will explore how capital can be democratised, giving community investors the choice to invest in health.

Specialising in structuring and marketing investment offers to the public for organisations and projects that want to help bring about a better future, Abundance has a track record in providing long- and short-term debt in the renewable and energy sector, including for construction and development capital.

With more than 4000 investors, it is now expanding into other infrastructure and delivery services, such as housing, transport, education, communications, utilities – as well as healthcare – which will play an important role in delivering a more sustainable future.

Abundance structures its investments as debentures, which are debt-based securities that offer returns to investors from the tangible development of projects. Investment opportunities are available for every stage of a project's life. Options have been created to refinance construction finance into long-term debentures, providing full lifecycle finance and bringing investment from the public into projects at competitive rates.

It has funded three construction raises since 2015, providing investors the opportunity to diversify their existing Abundance portfolios with riskier and higher-return projects, as well as put their money to work in building new infrastructure to bring about a greener and healthier future.

Public engagement is recognised as key, both to achieve a successful finance raise and to ensure broader social objectives are met. Abundance focuses on creating local engagement through bespoke communications to ensure the key benefits for the local community are promoted, helping to ensure a smooth and inclusive approach to achieving a successful project.



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Better together: the power of collaboration in Singapore's healthcare infrastructure

In 2016, Singapore embarked on three key shifts to transform its healthcare system beyond its Healthcare 2020 Masterplan to be future-ready: moving beyond healthcare to health, to support Singaporeans to live healthier lives; moving beyond hospital to community, for Singaporeans to receive care in the community; and shifting beyond quality to value, to provide cost-effective care. In pursuit of this transformation, and with limited resources and expectations of accountability, a collective effort across and beyond the healthcare continuum is necessary.

The Ministry of Health set up MOH Holdings (MOHH) to enhance public healthcare sector performance by unlocking synergies and economies of scale. MOHH's Healthcare Infrastructure Projects Division (HIPD) brings together important stakeholders, including users, healthcare providers, policymakers and organisations, to drive infrastructure planning and development of healthcare projects.

This paper presents the HIPD's current industry partnerships, collaborative approaches and future plans to advance quality, safety and value of public healthcare development. This includes:

- developing a master productivity plan with government agencies to improve project delivery and productivity growth for healthcare infrastructure;
- establishing agreements between policymakers to allow flexibilities in funding processes and time-saving procurement methods;
- forming strategic alliances with local and international organisations, and working in close partnership with integrated healthcare clusters to develop planning norms and design tools; and
- fostering partnerships with academia and research institutes to explore technology initiatives and smart systems to transform care delivery.

Can Singapore find utopia in these multi-stakeholder collaborations, learning from each other to maximise accessibility, quality and affordability of its healthcare system? One of Singapore's largest community hospitals, providing an integrated care experience for patients, and an emerging technology-driven integrated healthcare campus, are used to illustrate the challenges of inter-professional relationships and review the collaborations needed to create a patient-centred healthcare development.

Integrated health hubs in the new healthcare economy

The emergence of a new typology of 'integrated health hubs', supported by innovative funding approaches, are integral to promoting new ways of working to build community resilience and provide the right care, in the right place, at the right time.

This paper will present several schemes where there is an opportunity to create a paradigm shift in the management and delivery of public services through their co-location, and, more importantly, the integration of services to suit local context and need. Projects are driven by a mantra of 'delivering integration not just co-locating'.

Drawing on reference projects from devolved regions, such as Greater Manchester and the wider Project ARCH healthcare economy of South Wales, projects will be presented in the context of how they fit within the new healthcare economy, and how they can support community wellbeing through the following.

- Improve collaborative working: by including a combination of stakeholders whose services complement each other, the hubs aim to improve communication between staff from the various parties and promote integrated working.
- Increase wellbeing and access to services: locating proposals at the heart of a community is intrinsic to optimising health, wellbeing and engagement.
- Optimise and reduce total area of accommodation required: bringing all services under one roof provides opportunity for sharing accommodation and facilitating collaborative working.
- Deliver flexibility of space: schemes should facilitate flexible working methods, such as mobile working and hot desking. They must also enable future change in accommodation requirements as services evolve.

Central to the proposal is a co-ordinated long-term investment strategy, aimed at creating healthcare economy savings, improved health outcomes, and greater community participation in their health.

Targeted outputs include: improved health and wellbeing of the local populace; increased use of community services to release acute capacity; improved access to primary care; increased employment and reduced dependency; community skills provision; digital inclusion; and financial balance achieved.

The presentation will use metric-based evidence outputs to demonstrate the approaches being taken, including financial information that relates to the viability of the scheme from wider stakeholder perspectives.



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Transforming the future of post-acute care models

Today, many hospitals experience capacity constraints because patients who need post-acute services remain in acute care beds for indefinite periods of time. This is often due to a shortage of post-acute beds or services available to continue their care. The compounding challenge is that as patients remain in acute care facilities, they consume more resources than necessary and create a bottleneck preventing new patients from entering acute care facilities. Such backlogs may lead to a belief that more acute care beds are needed – continuing the expensive investment. In fact, relieving the bottleneck by moving patients to more appropriate post-acute care facilities would cost less and improve patient outcomes.

If a healthcare organisation is providing or wants to provide post-acute care services, it needs a clear and consistent strategy that identifies the appropriate patient populations and services required in each setting.

The new 1.2 million sq ft Shirley Ryan AbilityLab redefines how translational research can enhance patient outcomes through a new post-acute care model. Shirley Ryan AbilityLab is working with an architectural firm to rethink the post-acute care model, as well as the facilities and experiences that best support it. They've evaluated issues in post-acute care environments and developed a rigorous strategic assessment that informs development of clinical programmes and protocols to drive better patient outcomes and improved strategic facility planning.

This involves:

- differentiating post-acute care environments, discharging patients to the right care environment at the right time;
- identifying and setting up a team approach that will allow an organisation to be most effective in different post-acute care environments, improving quality of care;
- customising the patient experience to be appropriate and supportive of the patient population being served; and
- unifying the brand message, image and experience to bolster understanding and appreciation for an organisation's culture and values.

The presenters will explore how healthcare organisations can be served by a post-acute care model and facilities that respond to: their specific populations; cultural and contextual environment; business and financial viability; and long-term goals.



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Care Pathway Blueprint: a tool that helps introduce new technologies to enable effective healthcare improvement

A care pathway is the journey that most patients will take through a healthcare system. Pathways are particularly useful if a patient's treatment crosses institutional care boundaries, such as the boundary between primary and secondary care, because these services may not be aware of the activities of the other.

Many patients and caregivers feel they are treated as a number, and that face-to-face communication with clinicians is poor. Clinicians feel time-poor while having to deal with increasing complexity of care and a knowledge base that's always increasing.

Care pathways are becoming increasingly complex:

- the social context is more diverse (eg, multicultural, less social cohesion, new types of family groups, remote caregiving);
- care is more complex (eg, screening and diagnosis processes, multiple treatment alternatives);
- the health service workforce is more fragmented (eg, between self-care, primary and secondary care, transient care teams); and
- the volume of knowledge is growing dramatically (eg, the divide between tacit and explicit knowledge, doctor Google).

Care Pathway Blueprint is a tool that helps map current care pathways, define potential improvements, and share a vision when facilitating the adoption of healthcare solutions, ensuring that human scale is always taken into consideration.

The tool is particularly helpful when we want to implement new technologies as part of changes to health and social care services. It's extremely challenging to achieve long-term sustainability of high-tech interventions, even when the technology is ready. This is because introducing a new technology implies building a system in which new knowledge needs to flow between different touchpoints – human and digital – of the system. By mapping all current interactions, we're able to intervene systemically, and identify where and how the technology can bring value to the overall system.

This paper aims at illustrating the Care Pathway Blueprint as a tool to enable effective healthcare improvement.

Western Health HealthLinks

Western Health HealthLinks is a chronic illness management programme providing support for high-risk patients with chronic and complex conditions in the community. Launched in November 2016, HealthLinks is funded by the Department of Health and Human Services (DHHS) in Victoria, Australia. It explores how flexible funding for the chronic illness group can facilitate changes in service delivery. The HealthLinks model of care has been formulated through an extensive literature review, benchmarking and consultation process.

Application: The package of chronic illness interventions at Western Health includes: identification systems; advanced discharge programme; post-discharge support programme; 24/7 registered nurse phone support; 'hospital-like' clinical care in the home; care co-ordination and navigation; primary care integration; post-discharge pharmacy review; e-health; advanced care planning; and integrated collaborative strategies.

Aim: The primary aim of the programme evaluation is to determine if the model of care affects the number of days alive not admitted to hospital. Secondary aims include examining the impact of the model of care on healthcare costs, service use and patient experience.

Methods: The evaluation of the HealthLinks programme will examine the effects of a cohort receiving the chronic illness management programme compared with a cohort receiving standard care. Data will be analysed for the intervention group and compared with the control health service, including:

1. Data set A: days alive, not admitted to hospital (episode data);
2. Data set B: economic cost (cost of services provided) and service use (episode data); and
3. Data set C: patient experience (survey and quality of life).

A 12-month detailed analysis of an innovative community chronic care programme will be presented compared with a control health service. Early analysis suggests decreased acute healthcare utilisation compared with that predicted, but the control comparison will inform the true evaluation of the programme and its potential benefit for healthcare and society.

Results: A detailed analysis of 12 months of the programme will be presented. Preliminary analysis suggests a 27-per-cent reduction in acute healthcare utilisation at 11 months.

Implications: We will present a formal evaluation of the programme.



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Creating hospitals without walls: addressing health at the level of individuals, communities and globally

Hospitals and large medical centres must be conceived both conceptually and physically without walls. They should serve as settings not only for traditional clinical care but also as role models in supporting and promoting health for:

- individuals that come to these settings;
- the communities they serve; and
- globally, through therapeutic and environmentally sound planning and design.

Healthcare services that have historically been delivered within the walls of traditional hospitals are migrating into a diverse range of settings throughout the community, as inpatient care is increasingly transitioning to ambulatory care, and ambulatory care is migrating to the home. The healthcare of the future will be delivered ubiquitously throughout the community. At the same time, a growing number of healthcare organisations are adopting a greater population health approach. Non-traditional health promotion, maintenance and prevention services are increasingly being addressed, as healthcare reimbursement is moving from fee for service to capitated reimbursement globally – even in the US.

Given the significant health, physical, social and economic impact these institutions have in their communities, and globally through their carbon footprint, hospitals and medical centres should be models of healthful design and urban planning. In the words of Robin Guenther, they should be “restorative and regenerative”. They should serve as vibrant mixed-use and transit-oriented districts with walkable streets, accessible and useable public green spaces, and meaningful connections to nature. They should be easy, legible and safe to navigate. They should include therapeutic places, places of respite, and places that support healthy lifestyles. They should consider and contribute positively to promoting and maintaining the health of individuals, their immediate communities, and globally.

A series of design strategies will be presented that enable medical centres to become positive physical settings for healthy urban life. These strategies can simultaneously serve the needs of healthcare settings to become both healthful and environmentally responsible places, more therapeutic and centred on patient, family and staff needs. These strategies will be illustrated conceptually and through best practice case studies, as well as those now being conceived globally.

What level of estate transformation is needed to enable the future multispeciality community provider (MCP) models to be implemented and deliver full potential benefits?

With the NHS facing an estimated £30m funding gap by 2020, emphasis is placed on creating efficiencies through service-model restructuring while transforming old inflexible estate to support emerging new models of care.

The NHS Five Year Forward View proposes several new community care models to create efficiencies and improve patient care, all of which involve increased integration of services and systems.

A study was undertaken focusing on the multispeciality community providers (MCP) care model, aiming to deliver integrated community-based health and social care services. This paper aims to identify what estate changes are needed to realise full benefits and optimise efficient ways of working, ensuring the estate response is cost- and time-efficient, flexible, and sustainable.

The objectives of the study were:

1. to propose a list of estate transformation requirements formulated from correlations identified in the literature, to be tested against the vanguards in operation and other professional opinions;
2. to design and carry out primary research with providers, commissioners and estate professionals involved in the MCP models, to gain first-hand insight into operations, issues and successes to date; and
3. to integrate the above learning and identify estates strategy requirements to support MCP delivery.

Semi-structured interviews provided locality-specific data. Interviewees represented MCP vanguards in operation – CHP as a leader in NHS estate management, and NHS England's New Care Models' team. A set of estate transformation proposals was developed, focusing on three main areas: governance and policy; infrastructure and provision; and management.

The study concludes that the challenges largely revolve around existing estate portfolios, funding, and lease arrangements. The findings suggest the principles of the estate model should be realigned to those of the MCP, proposing a shared estate portfolio, centrally located budgets, and removal of duplicated costs in the system and leases acting as barriers to shared usage. The study concludes that contractual governance change is needed initially to enable all proposed changes, and it calls for a review of existing estates policies.



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Carebnb concept for short-term alternative attendant care in a homely environment close to home

Carebnb is a place in your own neighbourhood, where temporal support is provided. It was initiated in response to an open call – The new Guesthouse – from Creative Industries Fund NL for new concepts for short-term light care. Research for Creative Industries Fund NL will soon be completed.

During the research, Stadsdorp Zuid (community initiative Amsterdam) made an approach for an actual pilot, the first of which will start soon in Amsterdam and Utrecht. Research on light care in a Carebnb will be continued in these pilots – a joint effort between local councils, community initiatives and researchers. Results will be available next year.

The Dutch government has delegated part of the care system to the municipality, leading to a new policy that envisages unwell people stay in their homes as long as possible while receiving care. Surveys show that elderly people sometimes remain hospitalised unnecessarily, as there is no alternative, but fewer people are now entitled to stay in professional care facilities.

People are increasingly reliant on their own social network; however, when their social network proves inadequate, there is an increased risk of loneliness and isolation that may result in an increased need for care. What if people still need care after a surgery or hospitalisation? What if their home is not care-friendly? What if the usual caregiver needs a break or is temporarily unavailable? During the transition phase from independent living to a nursing home, a need for temporal accommodation could also arise.

Carebnb is a platform that connects people who have space available in their homes and who want to accommodate people from their neighbourhood who are in need of short-term light care. They will care for their guest for approximately three weeks. The host or hostess offers accommodation, and care and support in basic needs, similar to a bed and breakfast but complemented with attendant care and social control. Carebnbs are places of accommodation where familiar caregivers, such as the district nurse or individual's GP, can also visit.

Mixed building: an inclusive environment for therapeutic activity and apartments for independent living

The Guttman-La Sagrera Center is a mixed building (clinical and residential) with apartments and a Personalised Clinical Neuroscience Institute, for diagnosis and treatment of neurological problems and specialised neurorehabilitation. The objective is a new building typology for health and an inclusive architecture, creating a curative environment centred on patients, where therapeutic activity is complemented with resources that encourage the inclusion of disabled users.

Inclusive design is the creation of an environment to be used by as many people as possible, regardless of age, gender or ability. Not only does it refer to accessibility but it must also ensure that people with disabilities can participate in their community and lead an autonomous life.

The Guttman Neurorehabilitation Hospital was located on the site where the new building has been built, and was a focal point for the growth of the local neighbourhood until 2002, when the hospital moved to a new location. Returning to occupy the same site promotes the recovery of the collective memory of the neighbourhood and integration of users in the neighbourhood collective. The 14,500m² project is also considered as a vector of growth and regeneration for the economic and social activity of the neighbourhood.

The residential part of the building covers four upper floors, where 50 apartments will be built with universal design criteria, while on the ground floor is the neuroclinic with spaces for external consultations, rooms for diagnosis and specialised treatments, and a gym and accessible therapeutic pool. Apartments are fully adapted homes that allow users to relearn daily life habits, hence the importance of participating in an urban environment that allows the development of a person's daily activities.

The building seeks to design a good environment for modern rehabilitation and incorporates sustainability criteria from economic, social and environmental perspectives. The project has been developed under ecodesign guidelines, which ensure that the building is respectful of the environment throughout its life cycle, from the design phase to its demolition. It also has a very good BREEAM rating.



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Tail wagging the dog? Using investment in facilities to support and encourage new clinical models

There are many challenges and barriers to emerging clinical models, not least of which are entrenched behaviours, vested interests and unsupportive environments. Over the past decades, a multi-billion-dollar action research project has been undertaken. Significant infrastructure investment in a range of major hospital redevelopments, including several greenfield hospitals, has tested the ability to align new health infrastructure with emerging clinical models.

Background research involved an understanding of health economic trends, both nationally and internationally. It was also linked to technology-enabled clinical care changes, and insights into health facility planning and design across the globe. These insights included theoretical understanding, along with international site visits to leading and innovative health facilities, which informed practical application.

Working with key stakeholders from both facility planning and design companies, together with clinician leaders from multiple backgrounds, we've built on the key principle of providing a supportive environment for the delivery of efficient and effective clinical care. Knowing that one of the only constants is change, we've sought to provide environments that enable flexibility over time and provide some degree of future-proofing.

The earliest examples of our investments are now approaching 20 years of operational care delivery and there are many learnings from these early redevelopments. One of the key learnings has been the difficulty inherent in systematically reviewing and documenting the outcomes of major investment in health infrastructure and its alignment with clinical models.

This presentation will highlight selective elements of multiple hospital infrastructure projects to demonstrate areas of alignment and non-alignment with emerging clinical models. It will also seek to condense several decades of involvement in hospital infrastructure planning and delivery into meaningful themes, which can be conveyed to both new and experienced researchers, policy advisors and practitioners.

Innovation in commercial design for healthcare infrastructure

This paper will outline innovative commercial models that support the planning, design, funding, construction and asset management of healthcare infrastructure projects. It will provide guidance on how to bridge public and private financing of projects, giving examples of where these models are delivering modernised healthcare environments.

The UK Chancellor has proposed to invest up to £10 billion in healthcare infrastructure over the current Parliament. This funding will comprise three tranches: £3.2bn of additional monies as capital allocations to NHS trusts and health economies; £3.5bn raised through receipts from land and property sales across the NHS; and the remainder funded through private investment and public-private partnerships. Although laudable in aim and scope, four years is not long to deliver this scale of investment and to navigate the requirements of approvals, planning, appointment of supply chains, and to have projects operational. There is therefore a need for practical ways of delivering projects and bringing innovation into commercial design with the public and private sectors working together.

This presentation will outline how projects can be funded through 'commercialising' surplus land and generating an income stream to service debt for new healthcare buildings. Commercialising land and forming partnerships with private-sector developers to deliver housing and other commercial space can generate long-term income for NHS trusts. This revenue stream is likely to be much greater than a one-off capital receipt and can be used to support the borrowing costs for new infrastructure.

The premise is to 'rentalise' capital investment rather than wait for it to be 'allocated', as occurs elsewhere in the commercial world. Examples will be demonstrated where, working with NHS trusts, local authorities can support investment in healthy communities and new healthcare environments.

The paper will focus on two examples of this approach, in London and Norfolk. In both instances, development of surplus land for housing will provide an income stream that will fund modernised and/or new health infrastructure.

The innovative models being developed in the UK, and in the examples presented, will add much to the international development of public-private partnerships.



Richard Darch (UK)

Chief executive
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Enabling the future: funding health infrastructure for transformational change

Clinicians, patients and their communities expect to access the latest treatments when they need them. Governments require safe, cost-efficient diagnosis and treatment settings. Technological transformation predicts new ways to provide safe, effective healthcare. So how do we effectively invest in the transformation of health service infrastructure to meet the changing expectations of patients, clinicians, governments and communities?

This research has considered if diagnosis-based capital allocation can facilitate more appropriate, sustainable and innovative acute care facilities. Part of this research assessed the systems for allocating capital for public hospitals in Australia and 17 comparable health systems, investigating if they fund health infrastructure that permits patient access to efficient acute healthcare.

Drawing from literature reviews using WHO Health in Transition studies and OECD data, the review has identified which systems have most effectively funded infrastructure for patient access to efficient health services. By scoring allocative efficiency for capital, patient access, and comparative productive efficiency studies, the review has identified which capital funding systems can deliver the efficiency required to enable hospitals to be planned, built and equipped for changing service delivery needs.

This has resulted in development of a model for estimating the cost of capital required for each patient by their diagnosis group, based on clinical pathways, design and clinical guidelines, and expert clinical advice. To test the model, direct and indirect capital costs per patient have been identified for 36 per cent of Australian public hospital patients over eight diagnosis groups. The model for estimating the capital cost of care per patient links capital with documented clinical standards, their facility requirements, and patient outcomes. Major medical equipment and information technology and communications are included in the model.

Capital cost per patient estimated using this method has proven to be significantly different to older depreciation-based models estimating the capital required for contemporary care. Technological changes in healthcare, emerging service delivery options, and patient expectations encourage investment in the appropriate setting for patient, procedure and outcome. Enabling the transition requires a capital estimation and funding model that facilitates access to contemporary clinical standards for patients.



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Making health projects more commercial and sustainable – Brighton General Hospital as one such example

Over the past 20 years, the NHS estate has delivered new and enhanced facilities – but, since the market crash and post-2010, investment in NHS infrastructure has slowed. Clinical and estate teams are now facing significant challenges.

The NHS has a backlog of high and significant service improvements of more than £2.34 billion – a rise of 54 per cent on the previous year. The NHS total backlog is now nudging £5bn. The emergence of a range of policies – including growth of hospital 'chains', launch of accountable care organisations, and the sustainability and transformation partnerships process leading to more co-ordinated planning rather than individual trust sign-off – will help system sustainability and build a more long-term integrated NHS vision.

Despite several policy papers and the Naylor report, it's clear that capital requirements are significantly greater than the NHS is likely to receive, creating a need for new alternatives and deeper approaches.

This presentation will cover:

- the Brighton General site, with three trusts and stakeholders on site;
- the move away from simple book-value site selection towards developing commercial property approaches;
- ways to convert and extend existing facilities, manage residential sales and, potentially, retain long-term income;
- clear sustainable investment performance principles;
- wider masterplanning, exploring principles of maximising public value alongside disposal and re-use, and the conflicts that emerge in public policy;
- how to change staff behaviour to shift thinking in operating services and develop an estate flexible for the future;
- use of the Design Quality Indicator (DQI) and other tools to inform projects; and
- a second comparator project on an acute site, focusing on people processes, patient experience, and making buildings more efficient.

Outputs: These include: principles to underpin more commercial transactions; options for the public sector; changing processes, and looking at new ways of working, and the estate, in a holistic manner to improve environments; and examining the balance of revenue and capital allocations, sustainable development, and partnerships.

A novel Lean-designed ED-based critical care centre in the United States reduces ICU utilisation

In the United States, 2.1 million emergency department (ED) visits result in ICU admission each year. As patients live longer with more complex illnesses, and ED volumes increase, a marked rise in the amount of critical care provided in the ED has been observed, and is projected to increase exponentially.

Purpose: Given the need to provide more extensive critical care in the ED, coupled with the potential to reduce ICU admissions with the early provision of aggressive care, we created the first ED-based intensive care unit in the United States. This study examines the impact of deploying an ED-ICU on inpatient ICU utilisation.

Methods: Our goal was to set a national precedent for the provision of ED-based critical care. We used a Lean facility design process, queuing theory, and trend analysis of ED critical-care provision to determine the unit's scope of care, patient-flow patterns, and physical size and layout. Clinical end-users were used to determine aspects of design and flow critical to creating an effective, efficient and safe patient care space. Full-scale mock-ups and robust feedback led to multiple revisions of the initial design.

Results: From February to September 2015, 1579 patients were treated in the ED-ICU. Compared with the same time period in 2014, the number of ED patient visits increased by 1882 (4.1 per cent) and hospital admissions by 1152 (1.2 per cent); however, ICU admissions decreased by 149 (13.1 per cent). This translates to four fewer ICU admissions per 1000 ED visits and 13 fewer ICU admissions per 1000 hospital admissions. Accounting for ICU median length of stay of 2.6 days, this created a surplus of 1186 ICU bed days during the study period. Extrapolated over a year, potential savings of 730 ICU admissions and 1897 bed days would be realised.

Implications: Using a Lean facility design process, the ED-based critical care unit reduces ICU utilisation, and delivers earlier and more aggressive critical care in a large academic medical centre. This establishes a new healthcare model and will likely establish the precedent on which similar units within peer institutions will be based in the future.



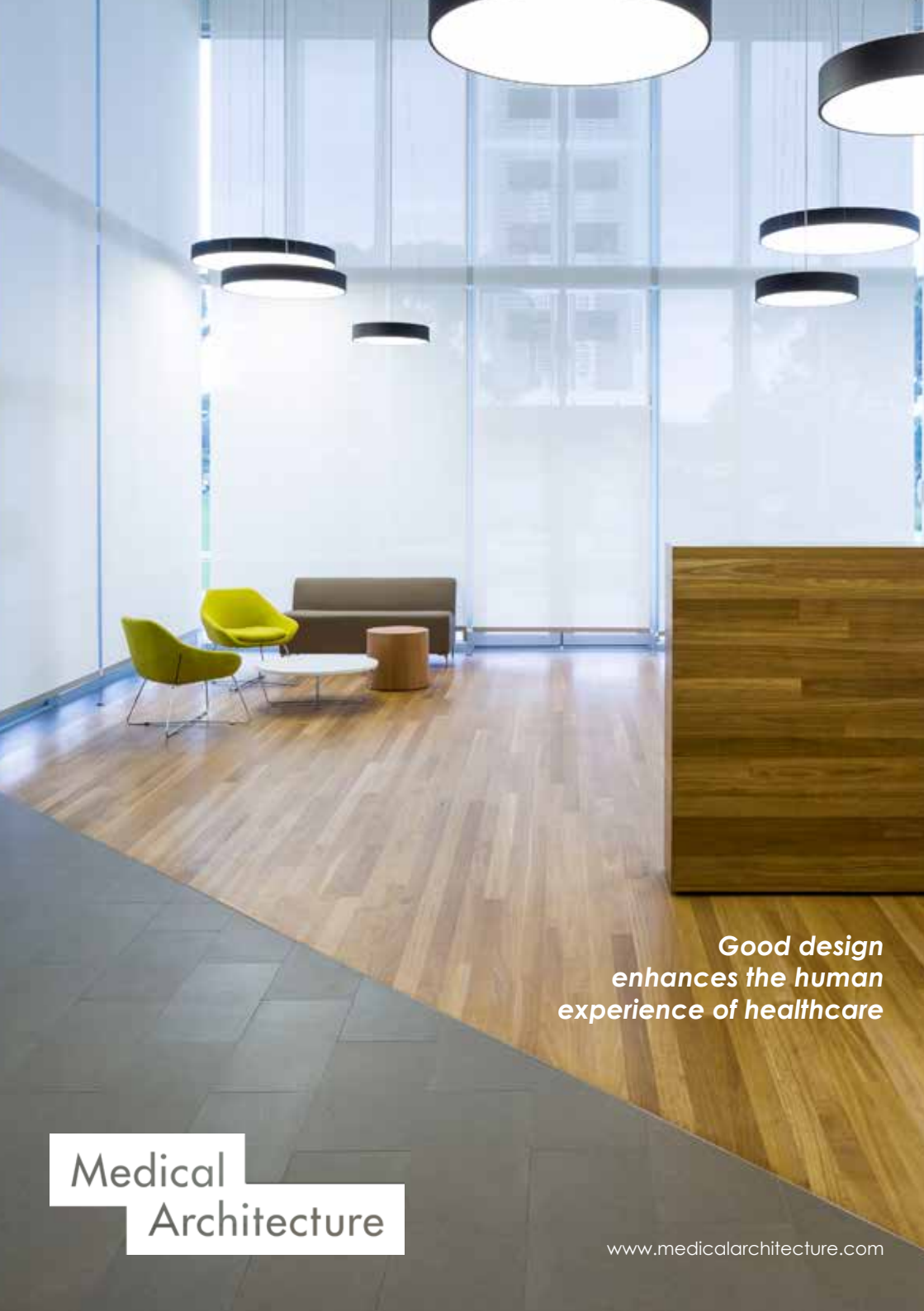
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Evaluation of design strategies for flexibility and adaptation

Design strategies for flexibility and adaptation in healthcare buildings are highly desirable because of future growth and change in healthcare activities. They're hard to evaluate, however, because future growth and change are uncertain.

There are two ways of evaluating design strategies for flexibility and adaptation:

- retrospective – evaluation during or at the end of the buildings' service life; and
- prospective – evaluation before or at the start of the buildings' service life.

Retrospective evaluation is illustrated with a case study of Northwick Park Hospital in North London. Designed in the 1960s, it embraces an ambitious strategy for flexibility and adaptation following John Weeks' theories of 'loose-fit building' and 'indeterminate architecture'. The hospital is still in use. Its life history is fascinating with many valuable lessons, but the verdict on whether Weeks' design strategies have succeeded or failed remains ambiguous.

Simulation modelling is put forward as a technique for prospective evaluation. A pioneering experiment in simulation modelling was carried out in 1973 to compare the performance of Northwick Park Hospital and other contemporary designs, but it was never developed as a decision-making tool. Today, with computer-based modelling, simulation is a powerful way of generating multiple life history scenarios, against which design strategies for flexibility and adaptation can be evaluated. This is illustrated with a worked example, which compares the performance of five alternative design strategies over a 50-year service life.

The presentation is based on a chapter to be included in the forthcoming book *Healthcare Architecture as Infrastructure*, edited by Stephen Kendall PhD.



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Circle Birmingham Hospital

Healthcare business models are renowned for rapid and disruptive evolution. The brief often evolves at a quicker rate than design teams and contractors can keep up with, while clients increasingly need opportunities to expand hospitals to minimise upfront investments, and so better respond to patient needs.

To achieve such flexibility, often the sign-off of drawings and 3D data-rich models occurs very late in the process. In the case of Circle Birmingham Hospital, we gave the client the ability to:

- define key room layouts very early;
- expand the hospital as and when required; and
- sign off additional layouts during construction.

The commercial model dictated high levels of occupancy of the building from day one, which drove the design of a nucleus facility from the early stages. This building could then expand and shape itself for any potential clinical scenarios. Planning was granted for a much larger building but construction went live with the nucleus scheme. Shortly after construction commenced, the client secured a commercial opportunity and, six months into construction, the building is being expanded from 10,000 sqm to 19,000 sqm, to allocate a new rehabilitation facility over an acute elective surgery hospital.

The building was designed to expand:

- horizontally for the clinical wing, to add more theatres and associated recovery spaces; and
- vertically for the hospitality wing, where repetition of bedroom modules allows stacking of bedrooms.

This approach was driven through a predetermined design grid, which accommodated all repeated rooms. Somewhat counter-intuitive, this has afforded the client flexibility during all design stages. This approach gave the client a platform to broaden its clinical offering and sign a joint venture with a new partner, whose services are currently being added.

Through early engagement of stakeholders, 3D modelling and virtual prototyping, we secured layout approvals from all department leads. This allowed end users to visualise the proposed designs early, ensuring a high-quality patient experience.

Outcomes: The resulting design focuses on clinical efficiency and outcomes, with a new facility that is clinically flexible, without sacrificing great architecture and patient experience.

Re-imagining the estate and clinical visions at Oxford University Hospitals NHS Foundation Trust

Oxford University Hospitals NHS Foundation Trust (OUH) is a world-renowned centre of clinical excellence and large teaching trust. Its priorities include responding to the Naylor and Carter reports on estate management and efficiencies, respectively, supporting its regional Sustainability and Transformation Partnership plans, and managing forthcoming changes in healthcare delivery, including digitalisation, robotics and personalised medicine.

Serving a growing population of 1 million, OUH operates from three Oxford-based sites and one regional hospital site across a 180-acre estate. It undertakes research with the Universities of Oxford and Oxford-Brookes to create innovations to improve the health of local and global populations. It also faces a potential funding gap of £200m by 2020–21.

The trust's strategic objectives include delivering compassionate excellence through a well-governed and adaptable organisation, providing better value-integrated healthcare, and delivering secondary and specialist care through sustainable clinical networks.

Reimagining the estate and clinical visions were essential to identify the preferred approach to deliver OUH's strategic and clinical priorities, while extracting maximum value from the estate. In 2016, OUH began the development of an overarching estate masterplan vision and subsequent masterplans for each of its city sites to ensure the continuation of high-quality patient care from its facilities. Challenges include significant estate under-utilisation, outdated buildings, split-site working, and traffic congestion.

This presentation will share perspectives on the evolving phased masterplan that aims to end piecemeal development and transform the estate into sustainable campuses. Initiatives include: city stakeholder consultation; consolidation of specialist services to enable new models of care; improved estate utilisation to potentially release land and support new development; and new transport strategies to alleviate congestion and improve the urban realm.

Tree-lined boulevards, green spaces and improved wayfinding will help create positive experiences, and high-quality spaces will encourage new partners to forge relationships with the NHS and academia, in alignment with the UK Government's Life Sciences Industrial Strategy.

This presentation will provide an exemplar of how estate and clinical visions can be translated into robust masterplans that look to the future and respond to OUH's strategy, creating opportunities to forge new commercial relationships and alignment with wider city stakeholder aspirations.



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Transformational design for translational research

In the age of 'personalised medicine', there are still children seen at Great Ormond Street Hospital (GOSH) who, owing to a lack of research, never receive a diagnosis for their condition.

The Zayed Centre for Research into Rare Disease in Children (ZCR) will be operational in 2019, enabling GOSH and University College London (UCL) to deliver their vision of bringing leading clinicians and researchers together to research and produce new treatments, and deliver outpatient care in one building.

Translational research facilities are often designed to encourage formal and informal user encounters to take place within them. The ZCR aims to go beyond this through the decision to encourage informal encounters and showcase the work going on as soon as a person approaches the building. The main lab and outpatient waiting areas can be viewed from the street, and staff and visitors share a common entrance via a bridge over the main lab with views into the building. The aims are to: show research and 'care' happening in real time; inspire and motivate staff; cultivate the public's support for research or medicine; and reassure patients of the work going on to find a cure for their personal disease profiles.

GOSH and UCL already work closely, via joint research and clinical appointments, and the close proximity of the Institute of Child Health. This project on a standalone site has, however, resulted in the need to resolve practical challenges, such as access to the two institutions' non-shared secure IT networks, and facilities issues, such as combining material and waste streams, and amalgamating security access to deliver systems that foster a culture of collaboration.

This collaborative spirit permeates the outpatient waiting experience by translating the complexity of the science going on in the building to novice audiences in an accessible way. Instead of traditional 'play spaces', engagement art pieces have been commissioned, where children and young people are encouraged to interact with exhibits. Through such means, it's envisaged that the design of this building will be both 'transformational' and translational.

Blurring boundaries: creating porous healthcare environments for teaching, learning and healing

As building typologies blur to create dynamic and sustainable cities and communities, so too do the boundaries of space in our built environments. The National University Centre for Oral Health, Singapore (NUCOHS) embodies a new building typology that obscures the lines between teaching, healing and practice.

Through a convergence of spaces and porosities between programmes, treatment and learning, the facility creates an environment where healing and learning can influence and support each other in a cohesive ecosystem. The NUCOHS demonstrates how the dissolution of siloed spaces is imperative to a new approach to healthcare.

Located on an empty parcel of land, the NUCOHS will act as the fulcrum of the existing campus, linking academic and medical spaces to create necessary outreach to, and connections across, diverse practices.

A large landscaped green area will provide outdoor civic spaces to connect the National University Hospital, Singapore (NUHS) and the NUCHOS, while a network of bridges and covered walkways will link the campus and its users to public transit.

Scheduled to open in 2019, the centre will accommodate about 500 patients a day when fully operational. Construction has been phased and planned so that regular activities aren't affected. Aiming to make oral healthcare more accessible for residents of Singapore, the centre will offer subsidised dental care and is designed to serve the elderly, as well as those with special needs requiring complex dental treatments. Clinical dental services, education and research facilities will be provided all under one roof.

Treatment floors will allow for close co-operation between teaching and treating, with a combination of tutorial rooms, open concept areas for dental chairs aggregated into pods with low partition walls, private spaces, and flexible waiting areas. Interior spaces combine high ceilings with large windows, providing natural light into the building and connecting interior spaces to nature's healing influence.

The landscaped courtyard on upper levels of the building features pre-function areas and common spaces to complement connection to the outdoors. The NUCOHS will stand as a principal meeting space and central hub for students, academics and visitors on the existing campus.



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Hybrids – are research buildings the new hospitals?

In the context of the constant changes in building typologies, a far-reaching change can be observed – particularly for research buildings.

Increased requirements of a technical, economic and ecological nature have always been taken into account by architects and planners in the design process.

The greatest possible flexibility has always been the highest design goal, since the lifetime of the building far exceeds that of the laboratory equipment and technical installations. New developments, however, are emerging that have a decisive influence on the typology of research buildings. The reason for this results from the trend to promote specifically integrative approaches in medicine and research.

'Translational' or 'Integrative research' should accelerate the path between laboratory research and patient application. For research buildings, this means an expansion of the room programme around examination and treatment areas, as well as patient rooms.

The resulting interaction between the patient, physician and researcher – the now mixed or hybrid use of the building – is recognised as a positive means of working together on a medical solution.

This paper elaborates on these thoughts by presenting built projects from across Europe, including the Center for Stroke and Dementia Research (CSD) in Munich, Germany.

Would I want to work there? Stitching a successful health precinct together

It's only relatively recently that the true value of a multidisciplinary approach to health precincts has become apparent. The expertise required to design health spaces and places at an urban scale, as well as at the granular scale of clinical spaces, demands a broader range of skills than previously thought necessary. At the heart of this approach is an acknowledgement of the importance of supporting a community that encompasses not only patients and workers but also local residents and businesses.

Co-located hospitals, universities and industry research partners combine employment opportunities, ideas and people in a specific and concentrated environment. However, global competitiveness and economic performance relies more than ever on the attractiveness and liveability of cities and major activity centres. Knowledge workers are highly mobile and responsive to the characteristics of their workplace and city environment, valuing a combination of amenity and activities complementary to their work and lifestyle.

Method: The Brookings Institute identifies five criteria for measurement of the likely success of an innovation precinct: critical mass; diversity and inclusion; quality of place; competitive advantage; and culture and collaboration. Through this lens, we will compare the layout, urban realm, healthcare components, key features, evolution, and governance of three health knowledge precincts, all at various stages of development. They are:

1. Starting from scratch: Fiona Stanley Hospital, Perth, Australia. A newly built peri-urban precinct of healthcare and research buildings with an extensively landscaped public realm.
2. Building on your strengths: Velindre Cancer Centre, Cardiff, Wales. The redevelopment of a cancer delivery service and specialist hospital that provides the impetus for consolidating an emerging health precinct.
3. Evolving in maturity: Parkville, Melbourne, Australia. The constant evolution of an established world-renowned healthcare and biomedical sciences cluster in a thriving inner-city suburb.

Implications: Each case study provides lessons for multidisciplinary teams in the development of precincts that encourage more than just healthcare delivery but also attract and retain talent, support the local community, and drive economic success.



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Dolf's room: how changing the environment of a client with mental disabilities can make a difference to his life

For almost 25 years, Dolf lived in a room that offered little stimulation and brought little joy or comfort. Dolf lives with severe mental disabilities, and while he experiences no limitations physically, he often poses a danger to both himself and his environment.

Housing him involved fixed furniture and fittings, and walls and ceilings often covered with plastic panels, which have, arguably, impeded his quality of life further. It's also why we were approached for suggestions on how this might be addressed.

We began by observing Dolf and quickly noticed a repetitive behaviour. Dolf ran up and down his room, wearing Wellington boots, giving the impression of a man trapped and craving the outdoors. This gave us an incentive: to design a space that combines interior and exterior areas as a whole.

The plan we created demonstrates a continuous floor, connecting apartment and garden. As the door is often open, it's no longer possible to keep the space heated at a consistent temperature, so we applied heated spots, further enhancing sensory experiences.

To add colour and aesthetics, we covered the main wall with a large print. The image, by photographer Martin Kers, was chosen to correlate with Dolf's memories of the countryside in which he grew up. When Dolf engages with the image, it relaxes him.

In the short time following project completion, Dolf's behaviour improved significantly. Fewer staff were needed to care for him, leading to cost-savings.

The project required a collaborative and innovative approach by all involved, including architect, contractor, medical staff, family, behaviourists, and facility managers. While this led to a complex design process, the final result is a tailored environment that contributes to a much better quality of life. By tailoring physical experiences, the housing has helped create a richer environment, contributing to the patient's improved wellbeing.

The project also highlighted how a well-designed space based on carefully observed behaviour and the correct interpretation can change people's lives – not only for patients but also for those who provide care. Similar approaches are being applied for other patients throughout our client's organisation.

Designing for autism

Mitford is an autism inpatient unit on the Northgate Hospital site in Morpeth, provided by Northumberland, Tyne and Wear NHS Foundation Trust. Opened in December 2016, Mitford provides inpatient support and treatment for up to 15 adults with severely complex autistic spectrum disorders. It's the first building in the UK specifically created for this service-user group and requires client-driven design standards.

The building includes single and shared residential flats within its four 'fingers' of accommodation. There are eight single-person flats for the most complex and challenging service users. The remaining accommodation is divided into a pair of two-person flats and one three-person flat, for users who are more able to socialise and are being prepared to leave the unit. The typical care pathway for these patients involves a stay of 18 months to two years, during which individual stimuli and appropriate therapies are identified before they return to the community.

Evidence shows that those who end up in the wrong environment or wrong service find their condition exacerbated, resulting in an increase in challenging or disturbed behaviour, leading to increased risk and the inability of provider services or carers to cope. After only a few months of opening, the environment has enabled improved care provision and is having a hugely positive impact on patients.

A range of internal and external shared areas offers opportunity for sensory, therapy and recreational activity. Design drivers include attention to the graduation from public to private space, addressing the vulnerability of each patient. Thresholds from each flat to the circulation space, and progress to shared therapy spaces, are all carefully considered to encourage the patient and avoid conflicts with fellow service users. Wide, organically shaped circulation spaces encourage movement but offer privacy and 'safe' window seats.

Key design drivers were identified: active circulation space; demarcation of space; orientation; and natural light. The result is an innovative facility already demonstrating the powerful impact the environment has in helping individuals recover. The new environment has improved behaviours to the extent that many patients now have greater freedom than they had before.



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Collaboration to improve the psychiatric care environment in Sweden

The psychiatric clinic at the University Hospital of Umeå, Sweden is the largest clinic in the Västerbotten County Council and in Northern Sweden. It serves as an inpatient and outpatient clinic for about 6600 people a year with mental illnesses.

There is a big challenge in modernising an outdated psychiatric clinic built in the 1960s. Issues include overcrowding, high staff turnover and readmissions, long patient stays, and limited patient activities.

Methods: To try to solve these challenges, a novel public-private collaboration was established. Ward two of the clinic was chosen as a pilot project to test new solutions that could improve the existing environment and provide better care.

The key elements were: strategy – research and interviews; concept and process development, including experience flow mapping; value model development; and evaluation design (with Umeå University).

Results: Some of the experience insights gathered in this process showed that:

- the ward should be a safe home for patients;
- the physical environment can be improved to support high-quality care;
- each patient has specific needs, for privacy and personal space;
- security and safety can be improved;
- there is a need for social interaction and activities;
- there is a need for daily routines and a connection with the world outside; and
- staff wellbeing and job satisfaction are important.

A suitable design was agreed and well received. This will be used to create an optimal new psychiatric care facility.

Conclusions: Five focal areas were determined for this type of work:

- activities for patients;
- staff routines, culture and behaviour;
- involvement of patients and relatives;
- security and safety; and
- outcome measurement and service effectiveness.

New spatial designs have been approved and are being implemented to make the ward more attractive and suitable for patients. Next steps are being taken to address the way of working outside the ward, between the clinic and the county council.

Lessons from Aboriginal Australia

This paper will centre on case studies of the EHD award-winning projects of Wanarn Clinic and Biripi Purfleet Clinic to demonstrate how architecture is supporting organisational change in healthcare delivery in remote and regional Australian Aboriginal communities. In doing so, these buildings have become the physical embodiment of the transformational organisational change undertaken.

The framework for organisational change is models of care that focus on partnerships with community. External stakeholders focused on good governance and dual accountability is the only methodology for sustainable 'collective impact'. Likewise, the design of the buildings was born out of a collaborative design process synthesising needs of the community and vision of the CEO, resulting in facilities imbued with culture and embraced by the community.

Key to this is working in a Malparara two-way learning process in all cultural interactions. Malparara translates as a respectful way of acknowledging all the skills and heritage value in a dialogue. For remote Aboriginal people, uptake of a 'mainstream' health system will only be as significant as the level of consultation and community 'buy-in' into the architecture.

Through the case studies, lessons learnt will be presented, including:

- the impact of meaningful community engagement and consultation on transformational change and facilities design;
- the importance of the convergence of medical practice and organisation with architecture;
- incorporation of art and other measures to affect the psychological, intellectual and physical responses of Aboriginal people to Western healthcare facilities;
- building performance and sustainability findings from post-occupancy evaluations, and performance monitoring conducted on Wanarn Clinic and how this has affected the triple bottom line;
- new models of care combining traditional and mental health;
- first-paid witch doctors working with psychiatrists in complex mental health;
- an increase in aboriginal employment from 1.2 per cent to 36 per cent;
- an increase in presentation by 15 per cent a month; and
- through partnerships, Ng Health delivered the most remote haemo dialysis service in the world at Warburton Community.

This change process is evolutionary. As such, upcoming projects will be used to outline the direction of organisational change and facilities design in Aboriginal healthcare.



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Multidisciplinary design: a prototype for a mobile peritoneal dialysis unit

Thailand is currently ranked the third country with the highest chronic kidney disease statistics in Southeast Asia, after Malaysia and Singapore. According to Thailand’s Ministry of Public Health, in 2016, approximately 8 million patients, or 17.6 per cent of the Thai population, were diagnosed with chronic kidney disease – half of whom require peritoneal dialysis treatment that normally costs each patient at least £5000 a year, excluding other indirect expenses.

It’s reported that numerous problems have prevented underprivileged kidney patients in rural areas from receiving normal medical treatments recommended by practitioners. Owing to poverty and difficult accessibility to public health services, they cannot afford frequent visits to even the nearest community hospital, while the conditions of their existing dwellings don’t always allow for modifications to meet hygienic environment standards for home treatments.

This paper presents the development of a mobile peritoneal dialysis unit, which attempts to transform healthcare services and environmental conditions on human health in the rural village. After participatory design development under review by a real patient, and close supervision of various medical experts from a community hospital, a budget prototype was built and later delivered to a 25-year-old male kidney disease patient, for use on the land next to his rural village home. The mobile unit now provides a sanitised environment for the peritoneal dialysis process, with medical equipment provided by the hospital, making it convenient to facilitate family engagement. Built under a limited budget of £1000 and equipped with necessary sanitary and lighting systems, the prototype can be folded, transported and installed at any location to service another patient when no longer in use.

This mode of practice converges medicalisation and architectural design, representing multidisciplinary approaches to transform and merge healthcare services and built environments. At the same time, it provides a solution for a healthcare dystopia that cannot be solved through the conventional healthcare system.

Keynote address: How the arts, creativity and cultural participation can support health

There is growing research demonstrating the effects of arts and cultural engagement on health across the lifespan, from lullabies helping premature babies to gain weight, to magic tricks improving hand function in hemiplegia, to dance helping people with Parkinson's disease to walk.

This presentation will discuss recent research from psychobiology and epidemiology studies, and give an overview of some of the major developments in this area of work, including the publication of a report from the All Party Parliamentary Group on Arts, Health and Wellbeing and the launch of the Culture, Health and Wellbeing Alliance.

Daisy Fancourt is a senior research associate and Wellcome research fellow in the Psychobiology Group, Department of Behavioural Science and Health, at UCL. Daisy studied at Oxford University and King's College London before completing her PhD in psychoneuroimmunology at UCL. She subsequently undertook postdoctoral work at the Centre for Performance Science (a partnership of the Faculty of Medicine at Imperial College London and the Royal College of Music) before returning to UCL last year. Alongside her research, she has worked for more than seven years in the NHS, including at Chelsea and Westminster Hospital, where she has managed arts and clinical innovations programmes, working alongside clinicians to devise interventions to improve patient experience and clinical outcomes. She has also worked as a consultant for a range of hospitals and Clinical Commissioning Groups on the integration of the arts within care pathways in primary, secondary and tertiary care.

Daisy is a fellow of the Royal Society for Public Health and deputy chair of its Special Interest Group on Arts and Health. She is also a BBC New Generation Thinker and a World Economic Forum Global Shaper.



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HLM's significant experience in design and procurement of Healthcare facilities has guided our approach to healthcare design; operationally led and evidenced based, driven by our focus on People, Functionality, and Site context. Each of these are key considerations in the creation of an appropriate therapeutic and patient-centric environment. The well-being of staff, patients, and their families is fundamental to the effective delivery of healthcare services and we always aim to respond in a positive and flexible way to the varying needs of these end users, in the knowledge that good design can accelerate the healing process. We aspire to create socially relevant and non-institutional architecture which is responsive to the local context and the wider community. Our design expertise allows us to respond to the broadest cross-section of the UK's healthcare economy and the wider challenges of Global health.

Edinburgh's newest healthcare facility is a vast undertaking. The £250M Royal Hospital for Sick Children and Department of Clinical Neurosciences is set to bring the distinct services of the Children and Young People's Hospital (which includes mental health services for children and adolescents) and the Department of Clinical Neurosciences (DCN) into one state-of-the-art building.

The landmark scheme, which was design-led by HLM, is currently being constructed alongside Edinburgh's Royal Infirmary. Once complete later on this year, it will provide some 1,800 rooms across 50,000 square metres of space. Designed to create an inclusive environment for both young and older patients with all levels of physical and cognitive ability, the five-storey structure includes a large atrium, shop and café, together with a spectacular skylight that links both of its entrances. This is the largest project currently on site in Scotland, its complexity led the project team to embrace UK Building Information Modelling (BIM) Level 2 from the outset. Watch our video here: www.youtube.com/watch?v=ONyvDc9Vhkl

Keynote address: Saving doctors from themselves – designing medicine with empathy and compassion

In many areas of medical diagnoses, robotics and artificial intelligence will be the future. But while machine learning and algorithms can improve medicine, healthcare requires something else to be sustainable: compassion. In this keynote address, covering evolutionary biology, genetics and healthcare stories, Dr Sharad P Paul MD focuses on the greatest defence doctors can develop against their own unemployment: empathy.

Dr Sharad P Paul MD is a skin cancer surgeon, family physician, academic, skincare expert, evolutionary biologist, storyteller, and social entrepreneur, as well as an adjunct professor at Auckland University of Technology. Born in England, he grew up in India and considers himself a global citizen who lives Down Under. In 2003, he received a Health Innovation award, and in 2008, he was featured in international editions of Time. He has been called a Renaissance Man by New Zealand Herald's Canvas magazine and a polymath by Good magazine.

In 2012, he was awarded the New Zealand Medical Association's highest honour, the Chair's Award. More recently, he won the acclaimed Ko Awatea Excellence in Health Improvement Award for 'Leading Health Improvement on a Global Scale' and for his work in patient-centred medicine.



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Skin cancer surgeon,
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Designing future-ready healthcare in the city

The lifespan of hospitals and medical facilities built today will stretch over many decades and generations yet must remain fit for purpose and flexible to respond to significant changes in climates, technology, society, healthcare demands, demographics and resources.

Temperatures are forecast to rise to 40°C on a hot day in London by 2080; peak rainfall is expected to increase by 20 per cent by 2050, and 30 per cent by 2085; the number of older people in the UK will grow by 50 per cent between 2013 and 2030; the healthcare needs of future populations will be different; and new technology and medicines will provide new treatment and management approaches.

Purpose: This paper will demonstrate how our long-term programme to support healthcare providers to be 'future-ready' can embed innovation in the design and build facilities that are ready for tomorrow's world, as well as today's codes. The vision is to ensure durability and return on investment by creating flexible infrastructure that can adapt to new and increasing demands on healthcare services at the same time as creating operational efficiencies as energy costs rise, and withstanding the effects of climate change.

Methods: Practical cases of where 'future-ready' solutions have been integrated into project designs will be examined, addressing key issues such as: How can today's new healthcare facilities be designed to ensure maximum flexibility for the future? How interconnected and interdependent are the healthcare facilities in your city? How will your hospital building function in hotter conditions? How smart and connected will your healthcare facility need to be?

Results: Long-running projects face challenges and opportunities. The redevelopment of Hong Kong's Kwong Wah Hospital is due for completion in 2025. Forecasting and preparing to integrate a new generation of technology that doesn't currently exist – but may be standard by the time the project opens for patients – is critical.

The redevelopment of Banner's University Medical Center Tower has been designed to accommodate Phoenix's increasing and ageing population, and to create a hospital that could house advanced medical facilities and a platform for future expansion.

Sahlgrenska University Hospital in Gothenburg has removable exterior wall components to bring new equipment into theatres and robust structures to support the weight of new equipment, while the IT infrastructure has spare capacity to manage increasing image data.

Conclusions: Integrating 'future-ready' into today's healthcare strategies and designs will enable cities and healthcare systems to become increasingly resilient against pressures such as growing and ageing populations and climate change. This resilience will enable optimal return on investment, durable facilities and better quality care.

Health quarters of the future

The design concept for the new hospital Südspidol in Esch/Alzette in Luxembourg adopts a campus typology and combines the rational organisation of functions with a human scale to improve wayfinding and optimise efficiency.

The design maximises daylight, optimises orientation, and provides a variety of views into the surrounding green spaces (or landscape). The hospital rooms radiate safety and tranquility and not only provide space for privacy but also for caring and communication. The main goal of the design is a highly efficient, process-orientated hospital with a focus on patients' needs.

The hospital is divided into separate building forms that are connected to the logistics accommodation beneath the ground. The exterior appearance of the hospital is characterised by its disaggregation and formal language. Its soft and gentle forms contrast with the rational clinical functionality, with the hospital perceived as an integral part of the familiar landscape.

The fundamental idea of the new hospital is that patients, staff and visitors won't be confronted by a mega structure, but they come to experience individual structures at an appropriate scale. A new model based on the additive geometric form of an equilateral triangle creates high clarity and orientation, and helps keep distances short. The campus concept ensures a functional arrangement of the building forms with clear circulation. At the centre of each unit will be open zones that enable the flexible arrangement of shared uses, supporting communication and the interaction of people and processes.

Autonomy and self-determination, differentiated zones for conversation and retreat, and clear and distinctive division between private and public interaction lie at the focus of the project.

Bright, light-flooded rooms, use of natural forms and "healing colours", as well as a leafy view, contribute to a pleasant, relaxed atmosphere. Sound-absorbing materials contribute to a noise-free environment. Supplemented by a selection of suitable artworks and bespoke gardens and roof landscapes, the result is a holistic spatial experience that optimises the atmosphere and supports the recovery process.

The concept meets all requirements of a lifecycle hospital. Particularly noteworthy is the modular design that enables a thematic usage.



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Food as medicine, farm as therapy: a multidisciplinary approach to planning a food-based social enterprise for Toronto Rehabilitation Institute

This research project explores the design and business model of an urban farm that aims to be financially self-sufficient while providing a variety of health benefits for patients, including therapeutic recreation, occupational therapy, improved mental health, and increased food literacy. The project intends to service Toronto Rehabilitation Institute patient populations recovering from spinal cord and brain injuries, as well as cardiac events.

The research uses a social enterprise-business planning framework. A literature review identified local food sales trends and proven benefits of exercise and green environments on mental and physical health. The perspectives of 17 patients were captured in 30-minute semi-structured interviews. The opinions of 124 hospital staff were compiled through surveys, and 24 of them participated in 60-minute semi-structured interviews. Six semi-structured interviews with farm operators helped assess the business and operational models.

Architectural 3D renderings provided an estimate of the capital cost involved in developing a production greenhouse adjoined by a therapeutic patient area. Food production was modelled to estimate potential revenue for the farm. The project was to be completed with a co-design workshop in January 2018, involving urban agriculture experts, architects, clinical staff and patients. The goal was to finalise the business plan by February 2018.

Early findings demonstrated the potential for developing a self-sustaining urban farm that combines hydroponically grown leafy greens in a climate-controlled greenhouse with outdoor vegetable production, to support an array of free and low-cost therapeutic activities for patients. The prototype greenhouse and patient area include a patient lounge, indoor and outdoor gardening spaces, and a demonstration kitchen – designed to provide accessibility for gardening and cooking activities. It's anticipated that the environment will provide for new research opportunities in rehabilitation, built environment, food literacy, and behavioural change. Operation of the therapeutic space will cost the hospital little, allowing the farm operator to make a sustainable living.

This model works across a continuum of community involvement, mental health and acute care. It's highly replicable and has the potential to revolutionise patient care and the patient experience in hospitals around the world.

Dumfries and Galloway Royal Infirmary – delivering a new garden hospital

The new Dumfries and Galloway Royal Infirmary, part of the High Wood Health consortium for NHS Dumfries and Galloway, is a 63,500 sqm replacement hospital on a greenfield site on the outskirts of Dumfries. The £212m hospital includes 344 beds, day case and inpatient surgical suites, an emergency care centre, ambulatory care centre, and specialist oncology, maternity and paediatric facilities. It's designed to meet the healthcare needs of the region's ageing population.

Conceived as a garden hospital, its design focuses on light and landscape made possible by its rural setting. The design creates courtyards and gardens that function as places of rest and healing, as well as providing views from inside. The emphasis on outdoor spaces is based on scientific research that shows a connection between natural elements and positive health outcomes, including lower stress levels, reduced blood pressure, the need for patients to take less medication, and faster healing times.

The hospital is person-centred, considering staff as well as patients, and promoting an uplifting, positive experience for all users. This is achieved through an emphasis on natural daylight and intuitive wayfinding throughout. The main entrance atrium is a welcoming civic space with sweeping views across the surrounding countryside. Light courts throughout the inpatient pavilions allow for clear views across wards for both patients and staff, opening up interiors and filling spaces with natural daylight, avoiding a sense of isolation for patients.

The design promotes integration between external and internal spaces. Wards are surrounded by garden spaces, some of which play an integral part in therapeutic practice, and palliative care bedrooms have their own private gardens with dedicated space for beds to be wheeled outside.

The new hospital is a brilliant example of what can be achieved by effective collaboration, a pioneering approach to technology, and a passion to deliver high quality. That approach has delivered an uplifting person-centred environment connected to its wonderful landscape setting for the effective and efficient delivery of healthcare for the people of Dumfries and Galloway.



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Healing environment: the South West Acute Hospital, Enniskillen

This case study shows how an ecologically informed and natural landscape design can create a healing environment, meet the triple bottom line, and provide sustainable green infrastructure. Equally importantly, this environment sits alongside a fully co-ordinated site plan, which provides for the highly complex operational needs of a large new hospital.

Completed in 2012 and delivered through an adapted PFI process, the £275m hospital is sited on a 20ha greenfield site on the edge of Enniskillen. It has been described as a benchmark for European hospital design. The scheme has remained true to its initial concept, which placed landscape at the heart of the hospital, evolved through several design principles. These included:

- bringing nature to the windowpane (extending the natural landscape right up to the built envelope);
- creation of the Linear Gardens (the 400m-long gardens that act as the spine to the buildings, providing vital outlook and amenity while reinforcing natural wayfinding);
- inside/outside (aiding navigation and reducing stress by designing all principal internal spaces with views over either the surrounding landscape or into the Linear Gardens);
- rewetting the wetlands (combining an extensive sustainable drainage system with the rehabilitation of endangered wetlands);
- use of local natural materials to help create a sense of home from home;
- a colour scheme that generates a sense of calm through whites and greens;
- maximising liveliness through awareness of season/weather and positively encouraging use of the site by local fauna; and
- facilitating health (assessment courtyards, trim trail, and extensive walking routes).

The public are free to access the whole site and much of the ground floor of the main building. Other initiatives consolidate interaction with the local community.

The design works with the attributes of the site and its local context, echoing and using local elements in the environment. At the same time, it maximises selective awareness of this surrounding landscape, some of which is exceptionally serene. This extended to the use of local workers and the local sourcing of materials wherever possible, helping ensure that the hospital was part of the community well before it opened. It retains that key relationship.

The hospital, a living organism – towards a biophilic design approach

Our proposal for the Ile-de-Nantes Hospital focuses on three fields that express bio-resourced materials, biomimicry and biodiversity.

Objectives and methods: Biophilic design recalls the natural environment, positively affecting building users' wellbeing. By applying examples of projects and research from other sectors alongside the hospital's design, we will demonstrate how these biophilic innovations are applied, positively affecting the total cost of care by means of shorter hospital stays for patients, reduced stress among staff, and healthier environments.

Results: The design approach sees the facility as an integral part of the urban tissue; it has strong links to the river Loire and is modelled on a neighbourhood scale with buildings connected by tree-lined boulevards and squares. Courtyards are enclosed within speciality wards. Care centres are dotted around the technical core block and are given separate architectural identities, acting as a catalyst for future development.

Biophilic features are integral to the design and include the use of bio-resourced materials, notably mass timber. This paper will demonstrate how our research and application of these materials result in shorter building times, lower costs, smarter design workflows, upcycling of resources, and improved quality of the patient environment.

Research into biomimicry explores parallels with nature's design processes. Applications include:

- passive solar shading using thermo-bimetals as a second skin, enhancing privacy levels;
- the main entrance is an organic space composed of curved wooden walls and ceilings, with daylight optimised and views to the gardens encouraged;
- large navigational 'boulders' guide patients and visitors intuitively through the hospital; and
- the roofscape of the central block is adorned with textured metal panels recalling the ripples and waves of the nearby Loire river.

Conclusions: The new hospital will constitute a welcome eco-corridor between the existing forest on the island and the river Loire. The enhanced ecosystem provides a healing and calm atmosphere, all the while providing refuge for birds and insects. The hospital of tomorrow will aspire to this new living architecture yet be profoundly human. Optimising complex flows, it will be hyper-connected, energetically autonomous and biomimetic, as well as capable of mutation.



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Children's Health Park with the New Alder Hey

In creating the new Alder Hey, the opportunity has been taken to develop the surrounding Springfield Park to create a health campus targeted at improving the health of children in Liverpool and the surrounding areas.

This will form the first major experiment in combining a new hospital programme with a large-scale park and public health development. The park is designed around themes: grow your own produce and healthy living; education; sport for all; events and festivals; and interactive play.

Growing produce and healthy living: This theme exploits the fact that the hospital has individual ward-based kitchens that allow the production and serving of fresh meals to order for children and parents. The park is being developed to provide gardens with opportunities for patients and the local community to become involved in the growing of healthy food, which will be used to service the ward-based kitchens. Additional uses for the produce will be markets and festivals, and potential food outlets/restaurants in the park. Alder Hey has teamed up with Incredible Edible from Todmorden to help create a social movement around healthy foods.

Education: The park has a learning zone that is a focus for Forest School sessions in partnership with Lancashire Wildlife Trust. In addition, local schools have partnered with Alder Hey to join up their healthy living/promotional programmes and assist in the development of the park.

Sport for all: The park is being developed to provide sports facilities designed for both the able-bodied and disability-friendly.

Events and festivals: The park will stage a series of rolling events and festivals aimed at promoting Alder Hey, and bringing life and activity into the park. The events will complement the overarching park themes with, for example, food markets and festivals, sporting events, art exhibitions, and performances such as concerts.

Play and activity: There will be a world-class play installation in the park that will draw children from the local area and beyond, incorporating play with physical exercise and digital interaction.

The park is being placed into community ownership, backed and sponsored by Alder Hey and Liverpool City Council.

Restorative design for healthcare workers: from research to practice

Many European hospitals have long excelled in design for critical factors such as daylight, views to the outdoors, and natural ventilation. Ongoing health and wellbeing research builds on these strategies to suggest that healthcare institutions would benefit from a deeper approach to designing for staff wellbeing, above and beyond standard practice. Furthermore, wellness design standards are beginning to translate this interdisciplinary body of research into a collection of ideas that design teams can directly implement on projects.

The WELL Building Standard (WELL) is now available for healthcare, and it's critical to driving the conversation beyond reduction of disease and injury, towards creating wellbeing for healthcare practitioners. WELL is the first building certification system in the world to focus on human health and wellbeing, complementing green building rating systems including LEED, BREEAM, and Green Star. WELL focuses on providing a framework for healthy environment design, construction, operations and maintenance, based on concepts around air, water, light, comfort, fitness, nourishment and mind.

This session will discuss the development of WELL, its evolution into the healthcare market, and the current applied and experimental research informing its development. Ongoing research from the Well Living Lab, a new collaboration between Delos and the Mayo Clinic, will be presented. At the Well Living Lab, the additive and multiplicative effects of environmental stimuli are tested on human health outcomes related to alertness, comfort, attention, stress load, and focus.

Finally, the session will focus on the translation of research to practice by providing examples of healthcare institutions applying concepts related to wellness design. Several project examples demonstrate the ability to integrate into healthcare design practice, including: a medical office building designed to provide "microbreak" opportunities for staff throughout the facility; a hospital designed around the WELL Building Standard; a healthcare campus that achieves the "places of respite" and acoustics requirements in LEED for Healthcare; a hospital with a biophilia-focused art programme; a healthcare system with integrated staff fitness and health education programmes; and workspaces designed with circadian lighting controls.



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Towards a quantitative sustainability assessment of hospital buildings in Belgium

Concerns about the sustainability of healthcare facilities have been reflected in a proliferation of certification schemes, such as BREEAM, LEED and DGNB. Although these schemes are easy to implement, the subjective benchmarking on which the sustainability assessment is based leaves doubts as to whether the use of these schemes leads to truly sustainable buildings. Recent years have seen a shift towards sustainability assessment in the construction sector using approaches based on lifecycle thinking.

Methods: This paper focuses on a new quantitative sustainability assessment method for hospital buildings in Belgium. The developing process was based on learnings from a previous study when the Belgian MMG+ _KULeuven tool, predominantly developed for residential buildings, was applied to the general hospital Sint-Maarten in Mechelen. The current method for hospital buildings integrates lifecycle assessment (LCA) and lifecycle costing (LCC), allowing building practitioners to track simultaneously the environmental impacts and financial implications of a hospital building. It's possible to compare up to six scenarios, taking into account the designer's choice of building element materialisation. The conceptual design parameters relevant to determine the quantity of building elements include number of hospital beds, square metres per bed, number of floors, and hospital building lifespan. The method allows for hospital energy modelling in the conceptual phase.

Results: Aside from scores per impact category for environmental impacts, the method has an aggregated single-score indicator, expressed in a monetary value (Euros). This makes it possible to couple both the environmental and financial costs, giving the total cost of the hospital building. Visualisation of the results is provided, both per square-metre floor area and per hospital bed. Graphical visualisation is included at building element level.

Conclusions: The method presented provides rough estimations of environmental and financial costs of a hospital building during the early design phase. It also serves for detailed calculations when more data become available along the design process. By coupling the LCA and LCC with the energy modelling from the early design phase, the method presents a powerful tool to optimise hospital building performance in environmental and financial costs, as well as overall energy consumption.

Sheffield Children's Hospital – the hospital as a civic building in the 21st century

During the 20th and early 21st centuries, hospitals have increasingly evolved into a non-urban typology, located outside of town and city centres in suburban or greenfield locations, disengaged from urban design principles. In part, this is a matter of practicality, as the more expansive sites that have been increasingly adopted for new hospitals provide space for change and expansion, and for ever-greater quantities of car parking.

The hospital's status as a key civic building linked to a locality has been eroded further by a parallel shift towards personalised medicine and patient choice.

But what should a hospital as a civic building be in the 21st century? This was the challenge we were presented with when selected to design a major extension to Sheffield Children's Hospital. The existing hospital occupies a prominent and sensitive location close to the heart of the city, directly adjacent to the original buildings of Sheffield University, partly within a conservation area.

The existing hospital had shirked the challenge of presenting a coherent face to the city: the buildings comprising the hospital had grown up in a piecemeal manner, with no clear relationship to the urban context and a largely hidden main entrance.

The project to extend the hospital, therefore, presented a series of challenges:

- How should a city-centre hospital express itself architecturally in an era that distrusts the old-fashioned, paternalistic connotations of the institution?
- How should this approach be adapted to reflect the fact that this is a hospital for children, without becoming patronising?
- How could the challenging site and complex functionality be reconciled without causing damage to the fragile context?
- How could this all be achieved while also delivering the required accommodation within the constraints of a tight budget?

The presentation will focus on how we went about achieving these goals, and how this process reflects our thinking about how architecture can still make an important contribution to creating a positive experience for all individuals who require care.



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Case study: creating a new hospital typology – together with the users

Copenhagen University Hospital, one of Denmark’s largest and most specialised hospitals, has a bold ambition: building the world’s best hospital for children, young people, and women giving birth. The winner of the architectural competition for the new hospital was announced in August last year, with a design that rethinks the traditional hospital typology.

The hospital has a focus on integrating play across the entire patient pathway. This is reflected in the design, which is “playfully logical”. The building symbolically features two overlaying hands, which stretch their ‘fingers’ into the light, the city and the green. The hands are, as an organisational principle, implemented throughout the building with a clearly marked communal area in the ‘palms’. Each ‘finger’ provides bays and winter gardens at their ‘tip’. These gardens offer different themes and recreational experiences for patients, relatives and staff. The finger design ensures a maximum distance of 7-20 metres from the centre of a floor to the nearest outdoor space – as in an ordinary house.

User involvement has been an integral part of the process since the project’s inception and will continue to be until completion in 2024.

The session will present the building design and focus on how user input has impacted the design. The session gives insights into how the team has facilitated user involvement, with special focus on a large ethnographic study conducted as part of the pre-programme research.

The building will make up 58,000m² distributed throughout nine floors. The architects are: 3XN A/S, Arkitema Architects K/S, NIRAS, Arkitekt Kristine Jensens Tegnestue, and Rosan Bosch.

When the hospital opens in 2024, it will include:

- 176 beds for children and adolescents;
- 43 beds for adults;
- 15 operating rooms;
- 14 delivery rooms;
- 50 pre- and post-operative beds;
- 18 day hospital beds for children and adolescents;
- 39 ambulatory rooms for children and adolescents;
- 30 ambulatory rooms for adults; and
- one diagnostic centre with nuclear diagnostics.

To learn more about the project, visit: <https://www.rigshospitalet.dk/boerneriget/english/Sider/default.aspx>

Keywords: innovative; hospital; architecture

The Alder Centre

It's said that a parent's grief after the death of a child is carried through life. So, to design a building that addresses a healing process without a conclusion is an interesting challenge. Responding to a powerful and compelling brief, the basic architectural ideas for a building that provides counselling and therapy for bereaved parents and family, explore comfort in 'the everyday'.

Established in 1987 by John Ashton, after the death of his son, the Alder Centre provides healing for bereaved parents who have experienced a child pass away. Mr Ashton found that conversations with other bereaved parents provided the most support and understanding during the grieving process. Some 30 years after the first counselling sessions at Alder Hey – held in a laundry cupboard in the old hospital – the Alder Centre held a Royal Institute of British Architects' competition for a new dedicated building and gardens.

The architecture is simple to understand, and informed by a conversational process with counsellors, users and bereaved parents. The building is arranged with a large communal space at the centre with a lounge and kitchen, from which seven counselling rooms unfold, each with their own private garden. There is a flexible training room, office and dedicated room for the 'Child Deathline', where volunteers answer phone calls from parents to a national helpline.

The layout of the building is analysed with sophisticated environmental modelling software and includes sustainable technologies. Windows and skylights are sized so that diffuse light illuminates counselling rooms; temperatures are controlled by ground-source heating; and opening vents in the walls and at the top of pitched roofs drive natural ventilation into the rooms. Naturally finished materials, such as brick walls, exposed timber ceilings and timber floors, add to wellbeing.

On 14 December, a candle service held by the Alder Centre filled the Liverpool Cathedral. The number of parents and families affected by the death of their child is overwhelming. As architects, the opportunity to help the healing process compels.



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Concept design for a new mother and baby unit at Panzi Hospital, Bukavu, DR Congo

During 2015-2017, a multidisciplinary collaboration between Panzi hospital (Democratic Republic of Congo, DRC), the University of Gothenburg, Chalmers University of Technology, and an architect resulted in the concept for a new mother and baby unit at Panzi.

In 1999, Dr Denis Mukwege and the CEPAC church established the existing hospital to improve wellbeing among mothers and their children. Today, up to 3500 babies are delivered every year at Panzi.

The team developed a building that supports the provision of evidence-based care tailored to the local context. The project comprises three parts:

- a new mother and baby unit based on a person-centred, holistic care philosophy;
- a building designed according to established principles of healing architecture; and
- a sustainable model for other maternity and neonatal care health facilities in DRC, Africa and the world.

The new building is designed to: enable zero separation of mother and child, as well as continuous support from family members in labour and birth; provide well-designed patient rooms that enhance personal integrity and safety; optimise flows; shorten distances; and create work environments that promote health and professional collaboration.

An important conclusion is that principles of healing architecture resonate across cultures. A strong emphasis is placed on designing an attractive environment that symbolises consideration for patients, families and staff. The gradient between public and private spaces supports the patient's autonomy. Moreover, there has been a focus on achieving optimal daylight, access to nature, and easy wayfinding.

The ecologically sustainable design is shaped by extensive primary research into local conditions. The modular building forms are conceived for minimal upkeep and to withstand earthquakes. Materials are locally sourced and roofs are designed for optimising solar energy production, water supply and natural ventilation. Carefully chosen architectural strategies have been developed to tackle the challenging climate conditions and insufficient infrastructure, and to create a high-performing building in a low-tech context.

As Dr Denis Mukwege says: "All women should receive quality care throughout pregnancy, labour, birth and beyond. This new facility will holistically promote the health of women and children throughout their maternity and early years."

Architecture for Alzheimer's disease

The project, Architecture for Alzheimer's disease, seeks to understand the influence of the physical and sensory environment on the lives of Alzheimer's patients and their caregivers.

Requirements include the need to: ensure safety; create flexible and adaptable environments to change wills and capacities; maximise the autonomy each patient has over their personal life; contribute to easy wayfinding; create reference spaces that lead to calm; promote stimulating activities; foster opportunities for establishing positive social relationships; and engage families, caregivers and health professionals.

The aim was to create a home space, day care, outpatient clinic, public spaces and specialised activities: the Tree House. Its design seeks to raise awareness of the need for architecture centred on real people and based on evidence.

After identifying challenging behaviours associated with Alzheimer's, physical characteristics of the environment contributing to the promotion of calm and wellbeing are analysed. The atmosphere and its connection to memory is reflected on, resulting in the creation of a familiar, comfortable, recognisable and stimulating space, appropriate to the disease progression stage of each resident.

The environment and atmosphere experienced by patients, caregivers and families have a direct influence on the lives of those who have Alzheimer's. Through contact with patients, it was possible to comprehend the difficulties that Alzheimer's presents for patients, relatives and caregivers, and the importance of such experiences.

The need to create a family environment in a special care unit is of major concern. A familiar atmosphere can be achieved by: assigning characteristics of the spaces in a house to the different spaces of a unit; stimulation of different memories associated with spaces where one experiences security, comfort and intimacy; encouragement of spiritual and religious experience; and the guarantee of privacy and easy access to the exterior. The atmosphere created must allow patients at an early stage of the disease to adapt the space in their own way, based on memories from their own home. At the same time, it should seek to stimulate patients at the later stage of the illness in spaces where memories are promoted.



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Caring for the elderly in China

China's people are ageing. About 30 per cent of Shanghai's population is already over 60 and, by 2050, 25 per cent of the national population is forecast to be over 65. Focus is therefore shifting towards disease prevention and chronic disease management. This older population, the majority of whom have only one child, will need appropriate care services and facilities, as the traditional familial care system becomes less equipped to cope with complex conditions associated with ageing.

Practical application: Evergreen Homeland, Shanghai aims to: deliver healthcare in a safe, compassionate environment; advance that care through innovative research and humanistic consideration; and improve users' health and wellbeing.

To ensure this inclusive approach, while encouraging self-sufficiency, interaction and active lifestyles, the design takes inspiration from the Chinese scroll, 'Ya.Ji'. It portrays traditional Chinese activities – ranging from tea ceremonies to games, calligraphy, meditation and music – expressing the essence of ancient Chinese culture and lifestyle. These activities translate into a variety of public, semi-public and private spaces, which aim to build a vibrant community connecting people, nature and culture.

Outcomes: Evidence-based design strategies respond effectively to the challenges of designing for both physical and memory care needs. Materials to minimise falls and the chance of healthcare-associated infections address physical health concerns, while emotional wellbeing is supported through provision of ample daylight, selection of natural materials and use of planting, and acoustic noise-reducing strategies.

To ensure the Memory Care ward is safe and nurturing, ten principles of dementia design were implemented. Bland, repetitive environments can be confusing for dementia sufferers, so variation and diversity were included in the design, as well as familiarity. Back-of-house doors are hidden to reduce unwanted stimuli, and memory boxes displaying personal items at room entrances support wayfinding.

Thought was given to bedroom furniture – open wardrobes, for example, encourage independence. Nooks for displaying mementos are also provided in the built-in units.

Implications: As China's need for these facilities increases, it's hoped that the culturally specific and evidence-based design features of this award-winning project will help inform a new wave of highly functional and culturally sensitive care facilities for the elderly in China.

Prescribing virtual reality (VRX): can exposure to simulated natural environments using virtual reality (VR) offer an alternative therapy to those living with dementia/cognitive impairment who are limited to being outside?

Depression and anxiety are common among older adults, particularly those with dementia/cognitive impairment (D/CI). These symptoms correlate with wandering, presenting safety risks to patients and challenges to caregivers. While exposure to natural environments reduces these symptoms, many dementia patients are confined indoors. Can exposure to nature through virtual reality (VR) offer an alternative?

VR presents an opportunity to transport people to a world outside of their confined spaces and into calming settings. VR head-mounted displays (HMDs) are wearable devices that make you feel as if you're present in a virtual world. As this technology becomes more accessible and affordable, an opportunity exists for therapy using VR, which may prove a more ethically desirable, less expensive means of relaxing, engaging and distracting patients, without the side-effects of current approaches (eg, sedatives, physical restraining, and tracking devices).

Objectives: The project aimed to determine: the usability and safety of VR-based therapy for people with D/CI; the optimal characteristics of VR experiences for this population; and evaluation of VR's potential to decrease depression and anxiety, and increase relaxation.

Methods: In a prospective, non-randomised intervention pilot study, seniors with D/CI were recruited from three healthcare sites. The study included a pre-intervention survey, standardised observation session, post-intervention interview, and obtaining of cognitive scoring information. Various natural settings were displayed using HMDs. Participants were assisted to use the HMD and experienced 5-15 minutes of VR.

Results: Preliminary results indicate VR to be a potential therapy for dementia patients. Most participants reported feeling more relaxed and adventurous, and less lonely post-intervention. None reported feeling dizzy or disoriented but the image focus was critiqued. Increasing the stimuli or narrative content would improve experiences.

Conclusion: Immersive VR technology is increasingly present in healthcare, but its use as therapy for dementia is a novel solution. Given the positive findings of the feasibility study, a randomised controlled trial will be conducted, with updated VR experiences and bio-physiological outcome measures collected.



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Agency in the paediatric hospital: architectural strategies to support independence and empowerment

Thesis statement: Agency has been defined as the capacity of individuals to act independently and make their own choices. Despite limited opportunities to extend agency to patients within hospital environments, best design practice accepts that such opportunities should be maximised to positively influence wellbeing. However, research available to guide designers in extending agency to paediatric patient cohorts does not yet exist to the same extent as for adult cohorts.

This paper will report on findings from a study conducted at Melbourne's Royal Children's Hospital (RCH) with a specific focus on the architectural strategies that can support the extension of agency to patients within this environment.

Methodology: The views of 246 children and young people (aged 4-18) were collected across two research themes: nature and distraction, and social space. A mixed methods approach was employed, which included: short format surveys, photo-response interviews, drawing exercises with patients and their siblings, and observations of spatial use. This data was supported by interviews conducted with five members of the architectural design team (Bates Smart in association with Billard Leece Partnership).

Results: Spatial observations confirmed that the Starlight Express Room provides an effective model for supporting patient agency in the hospital environment. The knowledge obtained from observing this space can be used to identify and evaluate the success of various architectural strategies used to promote patient agency throughout the hospital. At RCH, these include functional proximities, the particular approach taken to artwork selection in the hospital that contributes to a strong sense of place, and key 'anchor' features: a double-height aquarium and a meerkats enclosure.

Conclusions: At RCH, agency has been extended to patients through spatial strategies that promote legibility by providing a strong and coherent sense of place, that enable an atmosphere of play, and that give the appearance of abundant social opportunity. RCH thus provides a successful set of strategies to guide designers in creating paediatric hospitals capable of supporting agency.

The future of lighting design for neonatal care – Helsingborg Hospital

This paper will present the improvement of the lighting environment of the neonatal department at Helsingborg's Hospital and how it's being adapted to the needs of premature and ill newborn babies, as well as those of parents and staff.

With increased digitalisation of services and functions, elements of the hospital, such as lighting and safety, are now becoming part of its IT architecture. When lighting is designed for an entire hospital, there is rarely enough budget to analyse every occupational need, leading to inefficient lighting systems that aren't adaptable to the tasks being performed.

The lighting design concept focuses on:

- protecting the child from light disturbance by covering the incubator and the babies' eyes;
- reducing the occupants' exposure to flickering lights;
- the child's medical condition and maturity, and degree of photosensitivity;
- the ability to monitor the child's health and wellbeing;
- providing an environment that maximises babies' natural development; and
- avoiding light disturbance from surrounding equipment.

The concept involves a healthy, activity-based lighting system, installed in four intensive care rooms and nursery rooms, which are connected to family rooms and a 24-hour monitoring room. Lighting settings include: general lighting; mood/ambient lighting; precision light; focus light; and night light.

Conclusion: Premature babies or resident children in neonatal departments require additional support. It's essential that their space is adapted for an enhanced recovery and optimal environment for natural development. Babies are born with an immature circadian rhythm and their eyes are very sensitive to light. Therefore, their environment should create a sense of peace and security.

Children are highly sensitive to their surroundings and, to increase their chances of healing, it's important that they're not over-stimulated. Lighting can play a huge part here, too. With long working days or shift work, or long lengths of time inside without natural daylight, occupants can be adversely affected by insufficient daylight. Adapting hospital lighting to the time of day, work tasks, and patient and staff needs can bring major health benefits, calmer environments and better work performance.



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Maximising emergency department capacity through comprehensive design

Hospital emergency department (ED) over-crowding and extended wait times are common worldwide. As outdated EDs are being considered for redesign, refurbishment or expansion across Europe, the target for each clinical/architectural design team is the need to deliver maximised capacity and reduced length-of-stay times.

Pioneering innovations in new lean operational flow, redistribution of staffing, technology applications, and flexible architectural design solutions are all combining to deliver more capacity while expediting patients to the ED physicians and, thus, reducing length-of-stay times. Innovations such as transitioning “triage” to “care initiation” and “ambulance protocol pathways” are being implemented in EDs around the world by reconsidering traditional patient flow. The opportunity exists for clinical/architectural design teams to rethink traditional emergency department patient flow, communication patterns, technology applications, and physical environments.

Practical application: This presentation will describe the original theories behind recent patient-flow innovations and how challenging preconceived notions on workflow has led to tremendous patient-centred results. Case studies from across Europe and around the world will be presented that define the practical applications for new flow, innovative staffing patterns, and state-of-the-art environments. These case studies will include: samples of early brainstorming; creation of innovative scenarios; testing of options through predictive modelling; application of solutions; and lessons from various project sites.

Outcomes: Quantified outcomes regarding key emergency department metrics, such as time to exam space (within six minutes), time to provider/physician (within 12 minutes), time to diagnosis (within 60 minutes), and time to admit/release (within 90 minutes), will be presented and compared to international measures for best practice. Elevated room capacities from a traditional 1500 visits (per care space per year) to more than 4000 visits (per care space per year) will be presented as quantified results. The presenter will draw on experience of more than 300 emergency department projects across Europe, the Middle East, North America and South America.

Implications: The future of emergency department design challenges us to create wide-ranging solutions that will support our communities and patients who yearn for rapid, compassionate emergency care.

The effect of ward typologies on quality of care: lessons from the past to inform the future

This paper investigates three hospital ward typologies developed in the past 50 years, and suggests how ward typologies could evolve over the next 50.

Improving health outcomes is of critical importance for patient and staff satisfaction, and reductions in mortality. Improvements in health quality are of particular interest in the UK, especially after several public inquiries where leadership, management and poor communication were among the factors causing problems with healthcare. Moreover, previous studies have indicated that design features and the spatial configuration of hospitals can influence health outcomes.

The aim of this paper is to establish the link between the spatial layout of hospital wards, work processes, and exchange of information among caregivers and the quality of care provided for patients. Based on this analysis, we speculate and discuss possible future social and design changes in hospital wards that could lead to positive patient outcomes.

Intensive care units in three different NHS London hospitals were selected for analysis. The wards were chosen as they provide contrast in typology and spatial organisation. Work processes and communication patterns in each unit were compared and related to quality-of-care metrics.

Several different methods were combined in this study. Space syntax was used to study the spatial configuration of the wards. Social network analysis was employed to analyse information about communication patterns collected with wearable devices. Direct observations of activities were conducted to gather quantitative data on location, duration and sequence of work activities, and movement paths. Information on quality of care was obtained and related to results from the spatial and social analysis.

Results show that future hospitals should consider that quality of care is influenced by multiple factors, among which are the levels of visibility of the ward and the characteristics of the walking path in connection to functional spaces. Previous studies have favoured one ward typology or another. Based on our analysis, it's not possible to say which is best because some are more likely to produce certain outcomes than others.



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A healing bridge: King's Critical Care Centre

Donchin and Seagull (2002) characterised critical care as a “hostile environment”, where the combination of complex life-support technology and unfolding emotionally intense human scenarios creates a highly stressful setting that contributes to staff burnout and negative patient outcomes. Patients report a lack of control of their environment and feeling socially isolated, contributing to a sense of dehumanisation. More than 80 per cent of critical care patients suffer delirium – delaying recovery, worsening outcomes, and contributing to psychological disturbances, such as PTSD.

The vision of the King's Critical Care Centre (KCCC) is to humanise critical care by focusing beyond patient survival and on the quality of recovery, achieving the best possible individual outcomes, and providing an inspiring, stimulating workplace. The hospital embraces a holistic view, postulating that where a conventional medical approach may fail patients, a focus on the quality of the patient environment can enhance recovery and make significant impacts on ongoing quality of life.

This paper looks at how the KCCC aims to combine art, architecture, technology and compassionate care into a single goal that will help set a new standard across the global critical care community and beyond.

This technically challenging state-of-the-art development creates two new floors for 60 level-3 critical care patients. It uses innovative civil engineering technology to bridge over the existing operating theatre block.

Each bed space will be adaptable, meeting highly variable patient acuity and environmental needs. Emphasis is placed on natural daylight and transparency while maintaining privacy. A planned roof garden will give patients on life-support access to fresh air, creating the opportunity for pioneering research into the effect of environment on recovery. The project will involve development of an innovative informatics system, which will enhance personalised care and contact between patients and clinicians.

The successful outcome of the design process evidenced in the physical building reinforces the view that future critical care settings must minimise patients' sense of social isolation, empower them to feel in control of their environment, and underpin the vital relationship between staff, relatives and patients.

Humanising spaces: the Hepatic Intensive Care Unit of the Hospital Clinic of Barcelona

The Hepatic ICU has been a benchmark for the new model of ICU of the Hospital Clinic.

Presenting the finished project, we will outline a study comparing this project with old projects of other ICUs at the same hospital. We aim to show how the new design with a new philosophy of humanising spaces affects people who live in the space – patients, family and staff.

The factors that support humanisation of clinical areas are many: design of spaces; procedures; psychology; management; staff, etc.

Aiming to create the best space for people in this ICU, this project focuses on:

- patient-centred care design – functional distribution has prioritised the patient space.
- the warmth of space – use of soft materials, non-primary colours, wood texture;
- the power of natural lighting – how sunlight affects our brain and body, even if the patient is unconscious. In each room, we aim to provide natural light, and we've also installed circadian lighting;
- silence – acoustic control uses absorbent materials in walls and ceilings, allowing patients to rest and staff to work in a less-noisy environment;
- integration of nature and green spaces – through images spread throughout the space, patients, visitors and workers benefit from the green environment, reducing stress and nervousness, and calming their minds;
- friendly spaces – spaces with organic shapes; and
- friendly furniture – specific medical furniture has been studied in detail to achieve the best integration with equipment and technology.

In the end, what really matters is to make the patient experience as least traumatic as possible, helping quick recovery, with no stress, no noise and in a calm environment.

At the 2017 European Healthcare Design conference, we presented the beginning of this project; in 2018, we look to present its culmination and the conclusions we've reached.



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Understanding the impact of induction room versus operating theatre on child and parent anxiety during the ambulatory surgical process

The outpatient surgical experience can be stressful for a child and their parents. Up to 60 per cent of all children undergoing outpatient surgery experience significant psychological and/or physiological manifestations of anxiety throughout the ambulatory surgical process.

The operating theatre, where most children are induced alone, can further contribute to children's anxiety owing to the imposing, sterile environment. Induction rooms, which have been widely integrated into surgical environments throughout Europe, are considered to reduce patient anxiety by buffering patients from the sights and sounds of the operating theatre, thus providing a calm environment for the patient and anaesthesiologist during induction. To date, however, no empirical studies have been conducted that investigate the effect of using an induction room versus the operating theatre on child and parent anxiety, respectively, during the ambulatory surgical process. Most evidence collected to date has also focused on retrospective data, which are garnered using adult proxies from parental and healthcare professionals' perceptions of what the ambulatory surgical experience is like for children.

Purpose: This research sought to examine how the use of induction rooms versus the operating theatre for anaesthetic induction either intensifies or mitigates perioperative anxiety among children undergoing an outpatient surgical procedure, as well as their parents. It makes use of real-time data that extend equal regard to both child and parent perspectives.

Methods: A web-based photo questionnaire was developed to elicit repeated assessments of the impact of child and parent psychological responses to the physical environment during the ambulatory surgical process. It also aimed to determine which features in the environment either intensify or mitigate anxiety.

Results: Findings suggest that child and parent psychological response to the pre-operative and intra-operative environment align, while they differ in the post-operative environment. Additionally, children and parents both appraised the operating theatre as contributing to significantly higher levels of anxiety than the induction room during the ambulatory surgical process.

Conclusions: With more paediatric surgical procedures being conducted each year in the ambulatory care environment, it's imperative that the design of these facilities supports the psychological needs of the children who experience those procedures, as well as their parents.

Operating room design: characteristics and future suggestions

Extensive use of advanced technologies for monitoring, diagnosis and treatment has increased the number of instruments and the volume of signals generated and transmitted in the operating room (OR), thus imposing visual, manual and perceptual constraints on the surgical team. Introduction of novel imaging equipment, minimally invasive surgical techniques, robotic surgery and robotics stations, together with traditional open surgery, has led to further congestion in the operating theatre.

The architecture of the operating room, containing a centralised operating table with a radial configuration of equipment, hasn't changed for many years, except for some advances in introducing ceiling-mounted booms.

Our aims were: to define the main types of equipment components and monitors at the operating theatre, and follow signal transmission in the operating theatre in types of signals, their directions, and interactions; and to present design solutions and concepts for the operating room and table, leading to reduced congestion of equipment and clutter of tubes, cables and wires, and better performance of the surgical team.

Research methods included: observations at operating rooms at different hospitals, accompanied by continuous video recordings and still photography documenting spatial distribution of equipment, and information exchange between staff and equipment, and within the surgical team. Task analysis on video recordings included activity sampling and timeline checks, documenting multimodal information exchange.

Outcomes include:

1. a design concept for a self-contained operating table to overcome clutter in radial OR configuration, and which may serve as a fully integrated unit and allow management of patient flow;
2. a concept for a multimodal data display and information exchange platform at the operating room, including implications for OR planning, workflow, work protocols, and distribution of team members in the OR; and
3. architectural suggestions of bringing back the concept of intermediate (interstitial) floor above and below the OR, thus expanding use of the operating theatre area from one layer to a vertical multilayer working space, and providing options for high diversity and flexibility around the introduction of novel equipment and techniques.



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How large should the OR be? Using a multidisciplinary systems approach to designing safer operating rooms

Healthcare design teams have continued to design larger ORs in response to changes in technology and care delivery models, with little data-driven guidance to suggest how the ideal space should function. While an increase in operating-room real estate seems advantageous, this larger space may merely yield an associated increase in the steps between tasks and do little to reduce constrained pathways for clinical support staff.

Purpose: This study used a systems approach to analyse the impact of changes in the size of operating rooms and other design features on key performance and safety outcomes, such as distance walked, number of avoidable contacts between surgical team members, and avoidable movements near the surgical area.

Methods: This study is part of a four-year federally funded patient-safety learning lab (PSLL) focused on designing safer and more ergonomic ORs. This collaborative effort involved video observation and coding of 35 surgeries to understand tasks, locations and behaviours of surgical staff. This data was then used to create computer simulations of the surgeries. These simulations, combined with the historical data on task durations and staff movements, were used to analyse performance of various proposed designs based on several characteristics – room size, surgical bed orientation, door location, and functional zone locations. Design options were compared on metrics such as distance walked for team members, number of avoidable contacts between team members, and number of avoidable movements near the sterile zone.

Results: The analysis found that angling the surgical bed orientation and adjusting door location in the OR had a significant effect in reducing the number of avoidable contacts and movements near the surgical area. Larger OR designs had the benefit of reduced contacts, with the trade-off of an increase in total distance walked.

Conclusions: A systems approach enables a deeper understanding of the impact of healthcare design features on intended safety and performance outcomes. A key takeaway from this research is the ability to test countless OR designs quickly and to be able to compare the designs with quantifiable safety and performance measures.

Operating theatre integration – new efficiencies

Operating theatres are complex and demanding environments. In 2015–16, the NHS completed 40 per cent more operations (procedures and interventions) compared with 2005–06, with an increase from 7.22 million to 10.12 million and further rises predicted. Medical staff spend unnecessary time moving between multiple devices and IT workstations, checking patient information or looking up results, images and notes, detracting from quality care.

Objectives: Surgery could be more effective if all patient information were available to surgical and nursing staff in one location. This paper will demonstrate that innovations in laparoscopy have built momentum and the design of operating theatres in Health Building Note 26 now requires all medical services to be connected. This will allow more surgical procedures to be planned, improving quality of care and the productive performance of the theatre team, potentially reducing waiting lists and generating savings for the hospital.

Methods: The paper will consider case studies at: Rhein-Ruhr, Germany; Midland Metropolitan Hospital, UK; and Papworth Hospital, UK. The presentation will set out the benefits that have resulted from each investment and the need to compare these benefits internationally.

Results: Operating theatre integration is raising quality and safety, reducing cross-contamination in infection control and attracting new business. The average increase in cost of integration per theatre of £35,000–£150,000 appears significant but not when compared with a European hospital, where 40,000 operations are undertaken every year, accounting for 45 per cent of hospital revenue. Integrated theatres can also raise revenue by increasing the capacity of the operating theatre department, opening up opportunities to support or win new clinical services, and running paid training activities and events.

Conclusions: Further studies are required to evidence operating-theatre integration, as transforming how all operating theatres perform and how this can be achieved with existing theatres offer opportunities for architecture vendor-neutral solutions. Benefits include:

- improved clinical outcomes for patients;
- increased list times by at least a procedure a day;
- new business through becoming a centre for excellence;
- reduced infection control by moving equipment around theatres; and
- staff training.



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For More information contact Caroline Finlay or Ruth Strickland on 01442 216785
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Design considerations for hybrid/digital operating rooms

In a few short years, hybrid operating rooms (ORs) will become standard, with many facilities already adopting the infrastructure to become more efficient and achieve better patient outcomes. These ORs require very different design considerations owing to their mix of technology, which must fit into what is a multi-functioning room space.

A hybrid OR is an operating room that combines imaging systems with a breakable operating table installed in the operating room, allowing it to function as both a scanning room and a variable-layout operating room. The advantage of a hybrid OR is that it enables optimal imaging in an operating room through a high-end X-ray system, which can produce angiographies. These can be fused with other pre-operative images – for example, a CT or an MRI – supporting a new digital capability required for minimally invasive surgery, which facilitates reduced length of stay and better patient outcomes. An example of a hybrid OR would be a room containing an angio-imaging system coupled with an operating table. The room can be used for either angio-imaging or operating procedures.

This paper will look at the design characteristics and considerations of a hybrid OR, covering topics such as: the required space; vendors/equipment; how to make the space changeable; and how to ensure the right connectivity and digital solutions to ensure the OR is future-proof. We'll consider requirements for both renovating an existing space for a hybrid operating room and building an entirely new space. We'll look at the advantages and disadvantages of a hybrid OR. We'll also discuss space issues, taking into consideration the breakable OR table, as well as mobile and fixed equipment.

A hybrid OR can be broken into three spaces: the control room, procedure room, and equipment room. We'll discuss each area along with its space and technology requirements. We'll explore new construction procedures, such as modular design, and how this can be effective for expansion or new-build projects. We'll also consider where a hybrid OR should be located in a hospital.



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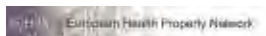
Health infrastructure workshop: investment, planning and delivery

In the morning session of this two-part workshop targeted at project and development directors and strategic health planners, participants will explore issues concerning the 'Lifecycle economy of healthcare infrastructure'.

A core focus will be how to form and evaluate business cases for capital investment that connect with informed thinking on the future direction of clinical services, and the planning and design of infrastructure.

The session will explore how to plan the estate and property to match the need, but taking into account the costs of both operating the services and capital investment. Longer-term infrastructure resilience challenges and responses to climate change, and health service impacts from population migration and major incidents will also be discussed.

Organised by:



Health infrastructure workshop: health design guidance and standards – how are we doing and where are we going?

For some time now, Architects for Health has been making the case for developing and redrafting the Department of Health's healthcare design guidance, encapsulated in the suite of documents known as Health Building Notes and Health Technical Memoranda. Over several years, significant organisational changes within the NHS have impacted on the development of this guidance, as have parallel widespread cost pressures in the service.

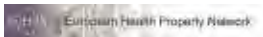
This workshop session will report and reflect on the work carried out to date by Architects for Health. We shall look at the recommendations of our 2016 round-table discussion and the results of our 2017 survey, all of which assessed the need for, and concerned the continuation and revival of, UK health guidance.

Members of AfH and UK partner organisations, together with International colleagues, will be invited to give input and share their experiences and challenges in the development of new guidance programmes and models.

Organised by:



ARCHITECTS FOR HEALTH



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European Health Property Network



Chris Shaw (UK)

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ProCure 22 Efficiency and Productivity Programme, pre- and post-occupancy evaluations toolkit

The ProCure 22 (P22) Efficiency and Productivity Programme's (EPP) pre- and post-occupancy evaluation toolkit can be used to assess realised benefits from UK healthcare projects.

Collaboration has been at the heart of the development of this tool, with all six principal supply chain partners (PSCPs) engaging with the Department of Health, NHS England, NHS Improvement, principal supply chain members (PSCMs), and NHS trusts, to develop a standardised approach to post-occupancy evaluation (POE), while responding to Lord Carter's efficiency and productivity drivers. All six PSCPs have committed to ensuring post-occupancy evaluations are undertaken and shared across all of their P22 schemes, at no additional cost to the NHS.

The P22 POE toolkit is available to all to use, without charge. P22 recognised the value in capturing benefits, through measurement and before-and-after assessment, to inform future developments. These common outputs, measured across physical measures – eg, floor areas, workload and activity, functionality and effectiveness, environmental and economic – bring together, in one toolkit, common measures enabling accurate scheme-to-scheme comparison and benchmarking. Current implementation at a national level will result in a body of knowledge and outcome measures, which have the potential to influence both national and international procurement, as well as providing direct comparison of healthcare building performance in use. A key component of the toolkit is the patient and staff surveys, which enable those at the front line experiencing new facilities to have a voice in their assessment.

The pre- and post-occupancy evaluations sit under the umbrella of the Government Soft Landings (GSL) P22 processes. They will be undertaken at appointment, and in years one, two and three following occupation. The data and commentary gathered should support the realisation of evidence benefits, as well as begin to inform and support new developments, while also assisting in identifying trends and areas requiring further design input or research. The potential of this toolkit is significant, both inside and outside of the P22 framework. It also offers an opportunity to demonstrate the UK's position at the forefront of healthcare design toolkits, guidance and innovation.

The performance gap in modern design

We were part of the professional design team responsible for delivering a new 124-bed ward block in the heart of the existing University Hospital Bristol healthcare site. Surrounded on all sides, the new development presented several challenges, not least minimising the impact on the adjacent operational buildings.

The project consisted of: an extended children's A&E department with operating theatres designed to stringent vibration performance criteria; a new structural steelwork helipad supported on the roof of the existing 1970s Queen's building; and a five-storey concrete extension to the 1960s Bristol Royal Infirmary oncology building, using DfMA (Design for Manufacture and Assembly) components, with adjacent two-storey radiotherapy bunkers buried below ground.

Design commenced in 2012. It was one of the first large healthcare projects that used building information modelling (BIM), bringing together the three main disciplines of architecture, civil engineering and building services engineering. The project was successfully handed over on time in 2015.

Approached by a university, monitoring of the building service systems was set up in the level-8 ward. Metrics for measuring energy and wellbeing were established as part of a two-phased monitoring project. Phase one focused on the standard metrics we associated with comfort and wellbeing – ie, space, temperature, lighting levels, and air quality. Phase two looks at alternative metrics not yet established as the normal means of measuring comfort.

Having monitored the ward for the past 12 months, the data have been analysed and the results are particularly interesting, especially for those involved in designing or running a hospital. The presentation will focus on the results from the survey.



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Hoare Lea



Gavin Crook (UK)

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Lunchtime panel discussion

Monday 11 June, Council Chamber
12.40-13.50

Clinicians for Design: applying medical practice and research at the interface of healthcare design

Clinicians for Design bring together an accomplished group of international physicians, medical educators and research specialists to describe their perspectives on the impact of design on their practice, performance, health and wellbeing, and their patients.

This year, co-authors from the UK, US and Canada include consultant anaesthetists, infectious disease specialists, medical educators, and clinical research specialists with direct experience in design. Their clinical roles and the spaces they occupy extend far beyond operating theatres and patient rooms. Interacting with multidisciplinary teams, their influence spans the entire hospital, including: patient bedside; crash carts in corridors; critical care units; interventional radiology; operating theatres and procedure rooms; and other spaces.

Discussion will consider how design influences their critical reasoning, introduces stress, and may influence patient outcomes. The similar but different design guidelines for each country, and the combination of perspectives across these areas of expertise, may inspire new solutions consistent with their common vision for the highest quality of care.

Presenters/Co-authors



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University of Cincinnati Gardner Neuroscience Institute
(image courtesy of Perkins+Will)

"This is an exceptional facility - we listened to patients and families about what they need and want and designed the building to be that."

DR. JOSEPH P. BRODERICK, MD, PROFESSOR OF NEUROLOGY,
DIRECTOR, UC GARDNER NEUROSCIENCE INSTITUTE



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An interdisciplinary, research-based architecture and design firm, **Perkins+Will** shapes many global and progressive academic medical centres, research institutions, hospitals and health districts. Our **HxLab** explores the human experience of design, and proudly supports **Clinicians for Design**, an international network of leaders collaborating to enrich health and the human experience by providing a platform that engages clinical professionals, educators, and researchers.

This year, the **Clinicians for Design Panel Presentation** is co-authored by an international group of consultant anesthetists, infectious disease specialists, clinical research specialists and medical educators. Their expertise includes experience in design at Great Ormond Street Hospital, Stanford University, University of California San Diego and the University of Cincinnati Neuroscience Institute, among others.

Clinicians for Design cordially invites clinicians to contact us and to attend our presentations at the **European Healthcare Design Congress** at the Royal College of Physicians in London this June 2018.



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Lunchtime design workshop

Tuesday 12 June, Council Chamber

12.40-13.50

How prepared is healthcare for the future?

The Helen Hamlyn Centre for Design at the Royal College of Art is conducting research in partnership with WSP that aims to establish a set of metrics to measure/baseline how prepared global cities are for the challenges and opportunities of future healthcare provision, and to help them deliver and strengthen their healthcare systems and services.

The workshop is an opportunity to discuss and debate what the future of healthcare looks like for cities around the world, answering such questions as:

- What are some of the big challenges facing healthcare now and into the future? And what are the biggest transformation opportunities?
- How is healthcare predicted to change and which changes are considered most desirable/important?
- What are the key criteria that a healthcare system must meet to address the needs of a city's population? How might these criteria change?
- What factors in the building industry and other parties should be considered that have a substantial impact on healthcare provision?

The workshop's aim is to identify the content for a future-ready healthcare index that is both relevant and useful to a broad spectrum of organisations in healthcare design – in particular, healthcare providers, government bodies, architects, contractors, and healthcare commissioners.

This workshop will combine learning, peer-to-peer discussion and creative activity. By the end of the workshop, delegates will have: contributed their thinking on focus areas for a new index; learned from diverse opinions from other thought leaders in the room; and debated the relative merits of different metrics.

The findings from the workshop will include: a breadth of views of what to include/discount from metrics; a breadth of views of what to focus on in further research; the degree of representation of viewpoints in the room; and contacts for further research.

Presenters



Nolan Rome (USA)
Global healthcare lead,
WSP



David Symons (UK)
Future Ready global
leader, WSP



Jonathan West (UK)
Research fellow, Helen
Hamlyn Centre for
Design, Royal College
of Art



Gail Ramster (UK)
Senior research
associate, Helen Hamlyn
Centre for Design, Royal
College of Art



Dr Gerard Briscoe
(UK)
Research associate,
Helen Hamlyn Centre for
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Brian Golding,
Director of Estates & Facilities,
York Teaching Hospital NHS Foundation Trust



Architects for Health

Architects for Health (AfH) is the UK forum for healthcare design.

Design of hospital or clinic environments is important for the wellbeing of patients, their friends and families, and people who treat and care. Good design enhances the experience of care and has a positive influence on clinical outcomes. AfH promotes design of better settings for healthcare by providing a forum for the exchange of ideas, promoting best practice, and recognising and rewarding excellent examples of healthcare design.

We work to bring about strategic change to the complex processes of planning and development. Drawing on the practical experience of our expert membership, we aim to make a difference through our work streams on procurement, guidance, strategic planning and design quality. We engage with and influence wider health institutions and communities.

As a non-profit organisation, with about 500 members, we build knowledge networks that inform and support the design of high-quality healthcare environments. We share ideas, experiences and examples through our growing membership links across the UK and Europe.

Membership

We welcome members from both health and design professions who share our values across healthcare planning, design and delivery. We bring together ideas from clinical practice and architectural design. Our members benefit from displays of our projects at national conferences, discounts to events, information exchange and collaboration, CPD opportunities, and support for ideas for AfH activities and projects.

Programme of events

Our annual programme of activities promotes a better understanding of health planning and design issues, and keeps members informed across the whole range of healthcare topics. All activities are wide-ranging and include joint events with clinical societies and Royal Colleges, or with representatives of organisations active in health facilities procurement.

Innovation and best practice

New methods of treatment and emerging technologies mean that health environments are constantly facing new challenges. Cultural, workforce and qualitative expectations drive change in design. To understand this evolving health infrastructure and reflect best practice, we arrange study visits to health facilities at home and abroad, which keep our members appraised of the latest ideas and innovations.

Nurture and learning

Designers care for the future. AfH is collaborating with schools of architecture and design to proactively support the inclusion of healthcare-sector buildings in the curriculum. We have a well-established programme of Student Design Awards, which is now in its 12th year.

You can follow AfH on Facebook and LinkedIn. For more information, please visit: www.architectsforhealth.com/join/



ARCHITECTS FOR HEALTH

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SALUS Global Knowledge Exchange

SALUS is an entrepreneurial global media, research, publishing, events and training organisation with a vision to improve human and planetary health through the global exchange of knowledge.

Our mission is to create, share and disseminate knowledge about the relationship between human health and the natural, built and social environments – with a focus on SALUS (Science, Architecture, Lifestyle, Urbanism, Sustainability).

We believe that the two great challenges of our age – the need to maintain and improve human health in the face of ageing populations and chronic disease, and addressing climate change through more sustainable management of the earth's finite resources – are inextricably linked.

SALUS aims to build interdisciplinary professional communities and networks that will facilitate collaborations through a range of media, publishing, events and training activities, which promote the application and interaction of art, science, research, culture and innovation.

Conferences, seminars and workshops

The focus of all SALUS events is on the development of knowledge and sharing of ideas, since we believe that interesting and inspiring content attracts leaders and innovators. By bringing researchers, policy advisors and practitioners together to tackle the key health and sustainable development issues facing the world, we aim to build bridges across geographic, cultural and socio-economic divides, promote and disseminate the latest scientific and research findings, and inspire the commercial development of innovative products and solutions.

On 15-16 October, we return to the Royal College of Physicians for the second Healthy City Design International 2018 Congress & Exhibition (HCD2018), after last year's successful launch event. HCD2018 (www.healthycitydesign.global) is a cross-sector, multidisciplinary congress looking at the role of design in creating healthy cities and communities.

Education and training

We also organise bespoke training courses and study visits in the design, health and wellbeing sectors. Courses can be combined with study visits to leading UK hospitals and are primarily provided for delegates from the health infrastructure divisions of Ministries of Health, as well as public-sector and commercial practitioners.

Media and publishing

All talks at our congresses are filmed and published on the SALUS Global Knowledge Exchange. Launched last year, this dedicated network for the healthcare design and healthy cities communities provides an online environment for sharing knowledge in these fields. Available at www.salus.global, it features conference videos, posters and papers, an online journal, and a fully searchable projects database, alongside a variety of innovative community tools.



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Alder Hey Children's NHS Foundation Trust

Providing community and hospital care, Alder Hey is based in Liverpool and is the UK's largest children's NHS trust.

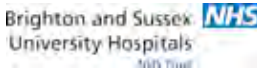
The new Alder Hey in the Park hospital opened in October 2015. The original hospital was built in 1914. Alder Hey was the first hospital to: test penicillin, saving a child from pneumonia in 1944; establish a neonatal unit in the UK; cure the UK's most commonly encountered congenital heart defect; pioneer a range of splints and appliances, including the Thomas Splint; introduce 'liquid glass' to reduce infection; and gain accreditation for public health promotion from the World Health Organisation.

On the back of this pioneering work, Alder Hey has developed into: a centre of excellence for cancer, as well as spinal, heart and brain conditions; a Department of Health centre for head and face surgery; a centre of excellence for muscular dystrophy, and the first UK centre of excellence for childhood lupus; one of four national centres for childhood epilepsy surgery, a joint service with the Royal Manchester Children's Hospital; a designated children's major trauma centre; a leading diagnostic centre, including intra-operative 3-T MRI scanning; and a centre for research, innovation and education.

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Brighton and Sussex University Hospitals NHS Trust

Brighton and Sussex University Hospitals (BSUH) is an acute teaching hospital working across two sites: the Royal Sussex County Hospital in Brighton, which is our centre for emergency, specialised and tertiary services, and the Princess Royal Hospital in Haywards Heath, which is our centre for elective surgery. These sites include the Royal Alexandra Children's Hospital, the Sussex Eye Hospital, and the Sussex Orthopaedic Treatment Centre.

BSUH provides district general hospital services for 450,000 people in and around the city of Brighton and Hove, mid Sussex, and the western part of East Sussex. Our specialised and tertiary services treat patients from across Sussex and the South East of England. These include neurosciences, arterial vascular surgery, neonatal, paediatrics, cardiac, cancer, renal, infectious diseases, and HIV medicine. We are the major trauma centre for Sussex and the South East. We work closely with our educational partners, Brighton and Sussex Medical School, Health Education Kent, Surrey and Sussex, and our local universities.

The trust is planning a £480m redevelopment of the Royal Sussex County Hospital site (the 3Ts Programme), which is the largest publicly funded hospital project in a generation.

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Eve Edelstein PhD, F-AAA
and Diana Anderson, MD
Co-founders

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Clinicians for Design

Clinicians for Design (CfD) is an international network of leaders with a vision to inspire and accelerate the design of environments and systems, enriching the healthcare interface.

CfD offers a forum for clinicians to apply their insights and experience to the design of settings and systems that serve medical practice. Its mission is to engage clinical professionals in research, education and practice, to inform the design of healthcare spaces, delivery, technologies, systems and policies to enhance patient outcomes.

By tapping into the knowledge created by healthcare and research professionals, we may facilitate the next tipping point in medicine, and challenge the stated norms for health and care design. Through the creation of shared knowledge, we inspire the emergence of a new mode of practice. The integration of healthcare, science and design perspectives will inform the development of tools and a knowledge base that will help shape the future of hospitals, medicine and healthcare. Both design and healthcare teams may together serve each other and our patients.

Clinicians for Design was co-founded by Drs Anderson and Edelstein. As a board-certified healthcare architect and internal medicine physician, Diana Anderson MD, a “dochitect”, combines educational and professional experience in medicine and architecture. Eve Edelstein PhD, F-AAA, a “neuro-architect”, applies her research with the University College London, and clinical service with the National Hospital for Neurology and Neurosurgery, among others, in her work as director of the Hx Lab at Perkins+Will.



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Design Council

The Design Council champions great design: design that improves lives and makes things better, improving our built environment and tackling complex social issues.

As an enterprising charity, our work places design at the heart of creating value by stimulating innovation in business and public services. We inspire new design thinking, encourage public debate and inform government policy, to improve everyday life and help meet tomorrow's challenges today.



Essentia at Guy's and St Thomas' NHS Foundation Trust

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Essentia designs, builds and maintains healthcare infrastructure that is vital to the smooth running of healthcare services. An essential part of Guy's and St Thomas' NHS Foundation Trust, we combine high standards and public-sector values with commercial focus, innovative thinking and modern technology to create a fantastic patient experience.

Through our commercial arm, Essentia Trading, we help clients, mainly in the public sector, become more efficient and effective. We provide consultancy and services in areas ranging from strategy and estates development, to sustainability and IT. We use our experience and expertise from many years in the NHS to support other organisations.



European Health Property Network

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The European Health Property Network exists to share information and expertise on how best to plan, design, build, maintain and finance all forms of health property – from hospitals to health centres. The network was established in 2000, in the Netherlands, as a non-profit trust to promote excellence in health property provision and management.

EuPHN holds an annual workshop, hosted in a different country each year. The network also organises regular regional seminars across Europe.



Great Ormond Street Hospital for Children NHS Foundation Trust

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Great Ormond Street Hospital (GOSH) is an international centre of excellence in child healthcare.

Together with our research partner, the UCL Institute of Child Health (ICH), we form the UK's only academic biomedical research centre specialising in paediatrics.



North Bristol NHS Trust

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North Bristol NHS Trust provides hospital and community healthcare for the residents of Bristol, South Gloucestershire and North Somerset. The trust is also a regional centre for neurosciences, plastics, burns, orthopaedics and renal.

Completed in 2014, the new Southmead Hospital PFI was completed at a cost of £430m. Designed by BDP, the project presents a high-quality public face using a semi-randomised façade aesthetic, which gives a non-institutional character to the bedroom wings.

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Sykehusbygg HF (Norwegian Hospital Construction Agency)

Sykehusbygg was founded in November 2014 and is owned by Norway's four regional health authorities, which, in turn, derive their funding from the Norwegian Ministry of Health.

The aim of the agency is to ensure national know-how for hospital planning, design, engineering and construction at the highest international level. Sykehusbygg seeks to facilitate and contribute to progressive hospital development projects through innovation, experience, standardisation, project management and best practices.

Sykehusbygg looks to ensure that experience from management and operation of hospital property is taken into account in new hospital development projects. The agency must be used by all major Norwegian hospital development projects (over NOK 500 million).



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Lecturer, programme leader,
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The Bartlett Real Estate Institute,
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real-estate](http://www.ucl.ac.uk/bartlett/real-estate)
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The Bartlett Real Estate Institute, UCL

The Bartlett Real Estate Institute, UCL is a new global institute that is rethinking the traditional view of real estate. The BREI MSc programmes, short courses and research critically evaluate real estate within its wider societal, economic and environmental context.

The MSc in Healthcare Facilities is the first of its type in the UK and Europe, and one of only a few in the world. It covers all aspects of the process of creating, designing, renewing or managing healthcare facilities. The programme aims to provide a means of transforming the wider healthcare stakeholder community's view of the role, design and operation of built forms that support health activities. The programme is targeted at professionals such as engineers, architects and designers, in addition to healthcare policymakers, professionals, clinicians and managers.



Royal College of Art
**THE HELEN HAMLYN
CENTRE FOR DESIGN**

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The Helen Hamlyn Centre for Design

Founded in 1991, the Helen Hamlyn Centre for Design in London is the Royal College of Art's largest and oldest centre for design research, and is a global leader in people-centred and inclusive design.

Endowed by the Helen Hamlyn Trust, our purpose is to conduct design research and projects with industry that contribute to improving people's lives. Our interdisciplinary approach is based around three research labs – Age & Ability, Work & City, and Healthcare. Each lab has developed its own empathic and innovative research methods, working with a wide range of business, industry, government, academic and third-sector partners.

Our expertise in healthcare has extended from design policy and information to the development of systems, services and products.



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University of Greenwich

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The University of Greenwich was founded in 1891 as Woolwich Polytechnic. Over the years, it's incorporated several other institutions, including Dartford and Avery Hill Colleges. It became a university in 1992.

The university offers a wide range of undergraduate and post-graduate degrees across the digital arts, education, nursing, business, engineering science, the built environment and architecture. The university's Department of the Built Environment provides education from HNC to PhD. Our degree programmes include MSc Construction Management and Economics; Facilities Management; International Project Management; Sustainable Building Design and Engineering; Safety, Health and Environment; and Occupational Hygiene. At undergraduate level, our offering includes BSc Quantity Surveying and BA Property Development and Management. We also have international collaborations with mainland China, Hong Kong, the Netherlands and Trinidad.



ViewPoint

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Across 21 countries, ViewPoint technology is gaining feedback in efficient and innovative ways, including through: patient experience surveys; service quality feedback; employee engagement; post-occupancy evaluation; contract performance evidence; performance monitoring; event feedback; and many more applications.

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Media partner: HealthManagement.org

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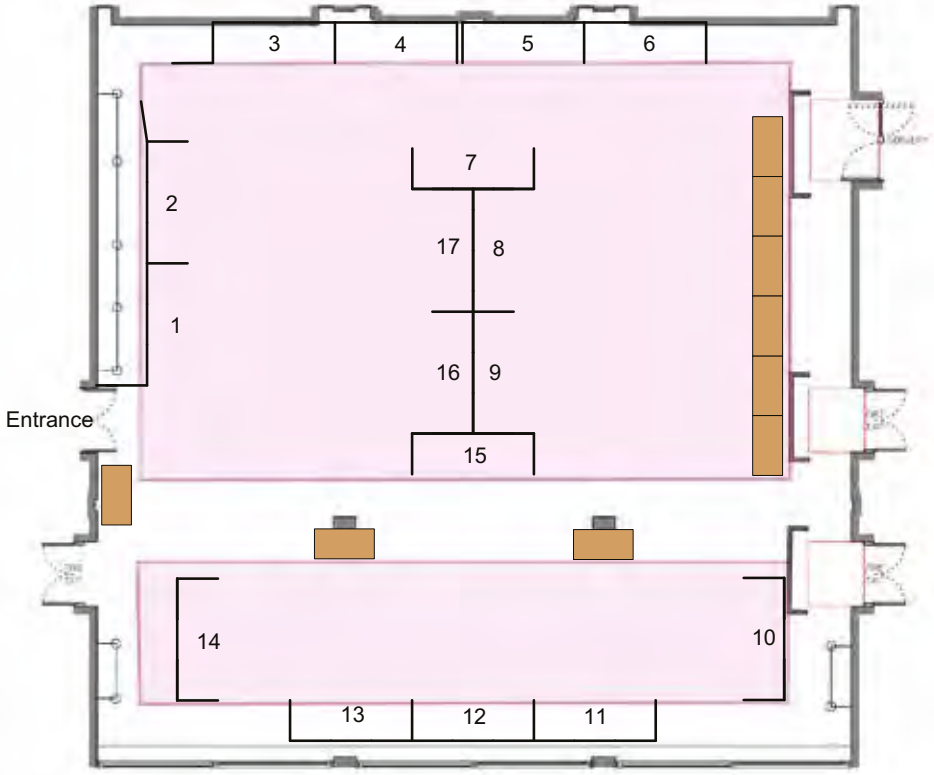
The HealthManagement.org leadership community engages in cross-collaboration and promotes management, leadership and successful practices in healthcare.

With the active engagement of thought leaders and almost 100 well-respected national and international associations and congresses, HealthManagement.org provides comprehensive information relating to executive management, imaging, healthcare IT, cardiology and intensive care units.

OPENING TIMES:

Monday 11 June 10.00-17.00
Monday 11 June 18.00-20.00
Tuesday 12 June 10.00-17.00

Please take time during the coffee and lunch breaks set aside for networking to visit the exhibition and explore some of the innovative and creative design solutions featured by organisations from the commercial, non-profit and media sectors that are making a significant contribution to healthcare design across Europe and the world. The exhibition will also be open during the Welcome Drinks Reception on the evening of Monday 11 June.



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AECOM

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AECOM

Consistently ranked as one of the world's leading healthcare and science designers, AECOM is sought after to provide its services for highly respected providers worldwide. The vision of our healthcare practice is to create smart environments and systems that are people-centred and focused on improving health outcomes. Across the UK and Ireland, our 150-strong team has supported healthcare projects with a total value of over £6 billion over the past five years alone.

Our inter-disciplinary healthcare expertise spans the entire asset lifecycle, from strategic, outline and full business case advice, through to estate and asset management strategies. Our teams are engaged across the entire health economy, from scientific research, to primary care centres, acute hospitals, mental health facilities, and aged care.

ARCHUS

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KNOWLEDGE PARTNER

Archus

Archus is an advisory, investment and development partner with a focus on health and social infrastructure clients. Our proposition, culture and philosophy are based on the core principle of adding value and delivering quality services to our stakeholders and customers. We offer an integrated approach to health and social infrastructure projects, and have working relationships with, and access to, some of the country's top advisors and institutional investors.

Taken as a total, our team has a track record of funding, developing and delivering approximately £200 million of health infrastructure projects. We've project managed a further £500 million of capital projects, managed public-sector property portfolios of £350 million-plus, and provided strategic healthcare planning for many of the largest new hospital builds in the UK over the last 25 years.

Armitage Shanks

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EXHIBITION PARTNER

Armitage Shanks

Armitage Shanks is the commercial arm of Ideal Standard with a major focus on healthcare products. The new Contour 21+ and Markwik 21+ offer an advanced solution for hospital sanitaryware, taps and mixers. The range was designed with the aim of reducing the opportunities for pathogenic bacteria growth in healthcare facilities, and features a number of new innovations, including a new clinical basin that reduces splash by more than 90 per cent.

Taps and mixers are often good havens for bacteria. To address this, the new Markwik 21+ range has been designed to hold less water, comes with a higher content of brass, and has a number of built-in features that allow engineers to cleanse fittings quickly.





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Art in Site

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 EXHIBITION PARTNER

Art in Site

Art in Site was founded in 2003 to help change the culture of care. We transform the way art is incorporated into healthcare spaces. We know that improving the hospital environment improves patient outcomes. We make space for the patients to feel included in the building. We embed in the fabric of the hospital a feeling of reassurance and being looked after.

We're an expert team of consultants, artists, designers and production managers completing each aspect of the work in-house. Our early involvement with architects and our clients' design teams in developing effective art and wayfinding strategies helps build strong foundations, on to which our creative designs can be based. This collaborative approach enables us to develop truly embedded schemes.

Bryden Wood

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 EXHIBITION PARTNER

Bryden Wood

Bryden Wood is an integrated design and operations consultancy for the built environment. We're able to improve outcomes and anchor design in delivery by using data to design and visualise the future of a healthcare asset at the start of the design process. We've developed projects that respond to evolving business plans of healthcare organisations, owing to flexibility and adaptability in the design and construction of our solutions.

Bryden Wood's activities range from analysis and business strategy, through to architecture and engineering. The business is operated on a solution-based strategy and a fascination with construction methodology and detail-derived aesthetic. The firm's client base has increased to include many blue-chip clients across a range of sectors.



Guldmann

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 AWARDS PARTNER

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Guldmann

V. Guldmann A/S was established in 1980 by Viggo Guldmann, with the concept to develop, manufacture and market technical aids for the disabled and working tools for their carers. Today, we supply products and services in two main areas and under two trademarks:

Guldmann – Time to care: We provide a full modular range of lifting and moving solutions, drawing on years of experience supplying assistive technology products designed to help people live their lives to the full.

Stepless – Accessibility for all: Stepless offers a broad range of products in the field of accessibility. Stepless ramps and lifting platforms give the walking-impaired and wheelchair users physical access to the outside world. These products make life easier for users and their caregivers.



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KNOWLEDGE PARTNER

HDR

We use the power of design thinking to re-imagine space, environments, programming, planning, operations and function. We blend our deep knowledge of healthcare delivery with our understanding of how environments can shape behaviours and outcomes to create solutions for clients that respect the human impact of their work – solutions that champion human-centred design, solve real problems, make lives better, and advance wellness, wellbeing, healing and cures.

Through design and consideration of three important elements – patient care, context and community – we're working to reshape the way healthcare is perceived and delivered. Advancing health and wellness on a global scale and in local communities is at the heart of our endeavours.



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KNOWLEDGE PARTNER

HKS

HKS is a team of more than 1350 architects, interior designers, urban designers, scientists, artists, structural engineers, anthropologists, and other professionals, working together across industries and the globe to create places that delight, heal and stimulate peak performance.

HKS' EMEA office is based in London, employing 82 design, technical and advisory staff in the following sectors: education; health; hospitality; sports and entertainment; urban design and masterplanning; consulting; corporate workplace; and commercial interiors.

The largest specialist team in HKS is the hospital design group. This team has designed and developed large hospital facilities around the world, including North America, Europe, Middle East and China.



Contact:
Chris Liddle
Group chairman,
Covalent Group; director, HLM

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SILVER PARTNER

HLM

HLM is a leading design practice headquartered in the UK, offering a rare combination of design skills from the four strong and integrated elements of our business, HLM Architects, HLM Landscape & Urban Design, HLM Interiors and HLM Environment.

HLM is a creative organisation with significant experience in the design and procurement of healthcare buildings in the UK and internationally. We recognise the importance of design quality, sustainability, and innovation in the creation of truly therapeutic environments. We have a proven track record in the design and procurement of all types of healthcare buildings, from the masterplanning of large hospital sites to the configuration of individual rooms in acute, primary care, and mental health settings.

Interior Designer: Willis Newson
Artist: Julia Allum



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EXHIBITION PARTNER

Inpro Europe

Based in Italy, Inpro Europe is owned by Inpro Corporation US and is responsible for the sale and development of Inpro products for all European countries. Our location in Orvieto acts as our main office for customer care and service, as well as a stock warehouse. We use local suppliers for the production of aluminium and vinyl components; however, the product accessories are imported directly from the US.

We're obsessed with protecting buildings and the people who use them, and we offer safe, durable and sustainable products such as handrails, wall guards, corner guards, as well as wall and door protection. Our products are available in a wide variety of colours and patterns to meet the needs of customer branding and design.



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AWARDS PARTNER

Integrated Health Projects

Integrated Health Projects (IHP) is a leading provider of outstanding healthcare solutions. A fully integrated joint venture, IHP combines the stability, capacity, coverage and experience of Vinci Construction UK and Sir Robert McAlpine. Both are major organisations working in the UK and abroad, focused on development, construction and facilities management.

IHP was formed in April 2003, specifically to act as a principal supply chain partner (PSCP) for ProCure21/21+/22. We've delivered on 140-plus projects, valued at more than £1.2bn, for 59 NHS clients. We're committed to achieving the benefits available to NHS clients through ProCure22, working with them to provide better value for money through imaginative and sustainable solutions, which offer capital, operational and life-term efficiencies. We bring the technical expertise, robust cost control and programme management skills needed to safely deliver good value, high-quality facilities on time and within budget.



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KNOWLEDGE PARTNER

Kier Construction

Kier Health is a dedicated sector-focused team within Kier Strategic Frameworks and Alliances, part of Kier Construction. We're responsible for creating and delivering design and construction healthcare facilities throughout the UK for the NHS and private healthcare providers focusing on clinical outcomes. We deliver projects through the ProCure22, Designed for Life Wales, Prime Investors Contractors (PIC), London Procurement Portal (LPP) frameworks, as well as traditionally.

Our healthcare portfolio comprises over 200 projects, totalling £2bn since 2003. We've partnered with more than 100 NHS and Foundation Trusts, and delivered 130 different clinical services, from light-refurbishment outpatient clinics to new hospitals with high-tech imaging and theatre suites.

KWICKSCREEN
MAKING SPACES

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 EXHIBITION PARTNER

KwickScreen

KwickScreen's portable, retractable, printable, medical partition screens enable you to adapt your space to fit changing healthcare requirements. KwickScreens not only allow you to create private, dignified spaces adaptable to multiple uses but also make them personal. You can choose from a wide range of images and bring the healing benefits of art into your patient experience. KwickScreen medical screens are infection-control approved, and provide a hygienic and easy-to-clean alternative to hospital curtains. The medical privacy screen allows for effective isolation of patients, which both enhances infection control and allows for greater privacy and dignity for the patient.

LLEWELYN DAVIES

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 SILVER PARTNER

Llewelyn Davies

The original partnership of Llewelyn-Davies Weeks was founded in 1960 by (Lord) Richard Llewelyn-Davies and John Weeks, both innovators in the design of flexible, highly serviced environments. Llewelyn Davies has since pioneered new thinking in the planning and design of health and science buildings, delivering more than 250 health projects in 75 countries. At the same time, Llewelyn Davies is one of the UK's leading masterplanners. From Milton Keynes to the urban renaissance agenda of the 21st century, through policy guidelines and development strategies, the company has influenced the UK Government's vision for planning and design.

Medical Architecture

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 AWARDS PARTNER

Medical Architecture

Medical Architecture is a multidisciplinary healthcare architectural firm. Founded in 1991, we have a special focus on the health sector, providing a full range of services, including: envisioning; strategic and clinical planning; estates development planning; architecture; interior design; and post-occupancy evaluation. The practice is based in the UK with offices in London and Newcastle upon Tyne, but we work both locally and globally, with projects in Australia, North America, Africa and Europe.



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 KNOWLEDGE PARTNER

MTS Health

MTS Health is the UK's leading provider of equipment asset management, advisory and procurement services, and is supported by biomedical engineers, clinical scientists, radiographers, and CIP-qualified procurement specialists. MTS is working with NHS and private-sector hospital clients to oversee the strategic management of their medical equipment assets. The firm provides advice and implementation on cost reductions, cost avoidance, CQC compliance and governance, and provides interim and permanent staff for projects. Services include: business cases; cost advisory; medical device management; room data-sheet management; specification and technical advisory; procurement; and CIP savings.

PERKINS+WILL

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KNOWLEDGE PARTNER

Perkins+Will Hx Lab

Perkins+Will is an interdisciplinary, research-based architecture and design firm established in 1935. We have over 2000 professionals across more than 20 global offices, including some of the brightest minds in architecture, interior design, branded environments, urban design, and landscape architecture. Our work has helped shape many of the world's most progressive academic medical centres, research institutions, and hospitals. The breadth and quality of our diverse portfolio have consistently placed us among leading healthcare design firms globally. Through our Human Experience Research Lab (Hx Lab), Perkins+Will supports Clinicians for Design (CfD), an international network with a vision to enrich the healthcare experience. Its mission is to provide a cross-disciplinary platform that engages leaders with expertise in clinical practice, education and research.



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EXHIBITION PARTNER

Sky Factory

Sky Factory designs evidence-based, virtual skylights via a process informed by neuroscience. Our award-winning Luminous SkyCeilings and Luminous Virtual Windows are designed to engage areas of the brain involved in spatial cognition and depth perception.

Our artistic framework, 'Open Skies Image Technology', has been the subject of an award-winning fMRI study. The company's process includes designed 'Open Sky Compositions' woven into an architectural context. By generating a deeper multi-sensory response, we alter the observer's psycho-physiological assessment of interior space. Our research-verified 'Illusions of Nature' technology is used in virtual skylights, which have been recognised by several bodies, while our line of digital cinema products, and 'I R I S', a new circadian SkyCeiling, are designed to enliven biophilic engagement.



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KNOWLEDGE PARTNER

Stantec

Designing places for people in healthcare is a passion for our London healthcare studio. Recognising the diversity and complexity of healthcare bodies, we're committed to direct engagement and tailored solutions. Our London team is part of an integrated international healthcare group based in the UK, Canada, the USA, Middle East and Asia. This virtual studio operates on principles of knowledge exchange and mutual support.

Our teams are supported by our proprietary health research, experience in Lean design, and expertise in alternative project delivery systems. Through our designs, we place our clients at the forefront of best practice, innovative technology, and new healthcare delivery. Placemaking, sustainability and adaptability are central to our approach. Our achievements in increasing efficiency, reducing costs, and facilitating connections among staff, patients and families are a continued source of benefit and improvement to caregivers and patients alike.

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*Splash reduction recorded during development testing



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EXHIBITION PARTNER

Static Systems Group

Static Systems Group is well known for the provision of bedhead services solutions for the acute healthcare sector, with products incorporating trunking, lighting, and nurse-call and other associated systems. The recent addition of a concept ward to the company's Design & Innovation Centre, at its West Midlands head offices, seeks to foster greater industry collaboration in ward design and showcase future healthcare innovation.

Supported by leading suppliers and specialists, the facility can be used by the wider industry to test and develop conceptual ideas and solutions. It aims to encourage closer collaboration among suppliers, nursing management teams, patient representatives, healthcare planners, design groups, and constructors to advance the delivery of world-class buildings and facilities, and help improve healthcare outcomes for all.



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EXHIBITION PARTNER

Teal HealthCare

Teal HealthCare is an award-winning solutions-based provider of innovative, high-quality patient seating, ward furniture and specialist products for healthcare. The firm is the largest supplier of ward and residential furniture to the NHS in England and Wales. With substantial production, design and testing facilities in the UK, Teal is research-driven, working closely with healthcare professionals to meet a diverse range of client needs and commissioning work from external designers of international repute.

Teal has a reputation for service, quality and new product investment, as well as a passion for design using technologically advanced materials and bespoke products. It has a full project management service and a commitment to continually improve all environmental aspects.



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EXHIBITION PARTNER

Vanguard Healthcare Solutions

Vanguard has pioneered the development of flexible healthcare delivery, drawing on 17 years of excellence to provide mobile healthcare facilities. Our roots are in bringing additional capacity to hospitals, but we have become an industry leader and trusted partner in providing an array of facilities, products and services to expand the boundaries of healthcare.

We partner with healthcare providers across the globe, providing superior clinical environments and supporting staff in five core areas: refurbishment management; capacity management; emergency response; service redesign; and community healthcare. Our range of products and services enables hospitals to answer refurbishment and capacity pressures while maintaining control of the patient pathway. Our mobile facilities can meet demand for operating theatres – including laminar-flow theatres – endoscopy, day surgery, clinics, intensive care units, and ward space.



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 EXHIBITION PARTNER

Veritas Medical Solutions

Veritas Medical Solutions manufactures pre-engineered radiation shielding systems for fast modular construction of radiotherapy centres. Equipment-specific shielding designs are available for all major machine types and use the firm's innovative VeriShield radiation shielding modules and SmartDoor radiation-shielded entry-door systems. Veritas shielding includes proprietary VPAC shielding packs, which dramatically increase construction speed.

VeriShield is a proven alternative to mass-concrete construction and has a 100-per-cent attenuation guarantee. Our new SmartVue Shielded Window System brings natural light into a radiotherapy treatment room without affecting radiation shielding integrity. Also available are pre-packaged modular radiotherapy facilities for temporary or permanent installation.



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 EXHIBITION PARTNER

Visualite

Hospitals and dental practices can often look bare and sterile, with patients feeling anxious and distressed. But add an illuminated night sky or a beautiful outdoor landscape to a patient ward or treatment room, and that space transforms into a more pleasant, relaxing environment. All this can be built into the light source and become the main focal point of any room.

Visualite's clinical lighting solutions are powered by spectacular edge light technology, use non-ferrous fittings, and can be combined with a vast array of bespoke stunning visuals. Reports indicate that MRI facilities with a Visualite Sky Ceiling can reduce instances of claustrophobia, as well as increase efficiency. The outcome is an amazing lighting effect, which significantly reduces anxiety and enhances the wellbeing of the patient.



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 SILVER PARTNER

WSP

One of the world's leading professional services firms, WSP provides technical expertise and strategic advice in: property and buildings; transportation and infrastructure; environment; industry; resources (eg, mining, and oil and gas); and power and energy. We also offer specialised services in project delivery and strategic consulting. Our experts include engineers, advisors, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design and construction management professionals. In total, we've around 42,000 people in 500 offices across 40 countries.

WSP's expertise in healthcare has built a world-class reputation for innovative solutions in: advisory; building services engineering; structural engineering; specialist systems; smart technologies; and commissioning. As specialists in high-performance design, we've delivered two out of only three LEED Platinum hospitals in the world.



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