Future proofing tomorrow's health facility

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Centre for Health Assets Australasia

FUTURE PROOFING TOMORROW'S HEALTH FACILITY

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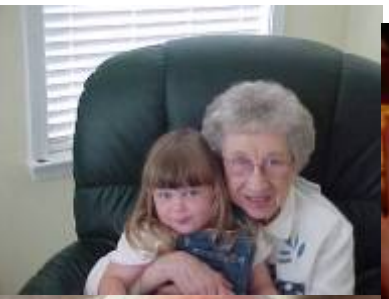
Outline

- Forecasting future patient needs and implications for the facility
- Creating health facilities that are responsive to patient needs and that help them to heal
- Planning for future (technological) innovations and forecasting how these will impact on the delivery of care – and hence on the design of health facilities
- How these approaches interact to form ‘healing environments’ – case studies

Who is the ‘future patient’ and what are their needs?

- Forecasting future patient needs and implications for the facility








HEALTH & OLDER AUSTRALIANS

- More ‘elderly patients’ = ‘older Australians’ = ‘people aged 65 years or over’
  (AIHW, *Australia’s Health*, 2006)
- 13% of the population – 2,604,900 people in 2004
- Much greater use of hospitals than younger people: in 2003-04, 2.38 million or 34% of all hospital separations
  (Table 4.7, AIHW, 2006, 216)

HEALTH & OLDER AUSTRALIANS

- Much healthier than previous generations (heart disease & strokes decreasing)
- Significant number suffer from disabilities due to ill health
- 22% or 560,000 suffer from health problems that cause profound or severe limitations to daily functioning
- ~ 50% of this group suffer from arthritis

How can facilities help patients heal?

What does the evidence show? To what extent is the built environment important?

'An optimal healing environment supports and stimulates patient healing by combining one or more of the following approaches:

- Developing Healing Intention
- Experiencing Personal Wholeness
- Cultivating Healing Relationships
- Practicing Health Lifestyles
- Applying Collaborative Medicine
- Creating Healing Organisations
- **Building Healing Spaces**

(Samueli Institute 'Optimal Healing Environments' Program Brochure, p.5, http://www.siib.org/news/news-home/publications.html, accessed 31 Jan 2008)

How can facilities help patients heal?

What is a ‘healing environment’?

Google search for this term gave **294,000 results**!!

A selection of tips/techniques for achieving a physical environment that heals:

- Supportive – psycho/socially
- Therapeutic
- Less stressful
- Natural light
- Fresh air
- Patient has control and privacy
- Family participation is encouraged
- A good place for staff to work
- Colour is important
- Reduced noise levels – help patients sleep/relax, etc
- View of nature
- Safe – fewer falls, etc
- Reduced levels of infection

How can facilities help patients heal?

Clichés versus Definable Project Goals

(thanks to Paula Buick, Healthcare Design 01.08, 39-41)

Clichés	Definable goals
We want to make the patient care space warm and inviting.	Patient satisfaction with the environment of care will increase by 3 to 5 points.
New space to increase volume/admissions.	Increase exam/treatment rooms by 25% to reduce time to appointment delay to two weeks for routine visit.
More support space for patients.	Add 10 parent rooms, doubling existing rooms.
"I want to create a **healing environment** for our patients"	"Your definable goal" (insert here)
"Your cliché" (insert here)	"Your definable goal" (insert here)

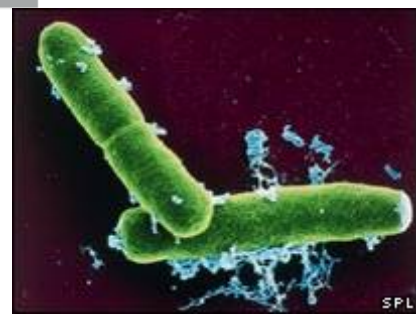
Innovations, Care Delivery and Facility Design – Key issues and developments

- Increasing impact of technology on clinical and non-clinical functions
- Re-direction of care away from the immediate hospital setting
- Integration of services for more holistic care
- New planning models impacting on design of facilities
- ‘Healing environments’ – ‘evidence based healthcare design’
- Planning for whole of life cycle costing – sustainability, energy use, flexibility, adaptability, KPI, benchmarking
- Workforce issues – clinical and non-clinical
- Responding to threats to the community – terrorism, epidemics, natural disasters, climate change

Impact of Technology on clinical and non-clinical functions

- **Clinical:**
  - Information management and sharing
  - Diagnostics & interventional radiology
  - MRI and other technology in operating theatres
  - Future technologies
  - Virtual healthcare delivery
  - Gene technology
  - Regenerative medicine
  - Nanotechnology
  - Therapeutics

Impact of Technology on clinical and non-clinical functions



Rapid detection of anthrax bacteria could be vital in a terrorist attack

- **Clinical:** Future Technologies
  - **computerised diagnosis** – e.g. use of computers to detect changes in brainwaves that accompany epileptic seizures to be able to anticipate and prevent them
  - **bacterial light detector** – custom polymer molecules that change shape and emit light when bound to bacteria; could be used for wound healing – identification of a type of bacteria, counter terrorism e.g. detection of the presence of anthrax, MRSA detection, etc.
  - **breath test for lung cancer** – lung cancer cells give off volatile organic compounds and are picked up this sensor which is the size of a large coin; can detect them with 75% sensitivity with spots changing colour depending on the chemical with which they come into contact.

Impact of Technology on clinical and non-clinical functions

- **Clinical:** MRI and other technology in Operating Theatres

http://www.medicalimagingmag.com/issues/articles/2006-09_04.asp

http://www.childrenshospital.org/clinicalservices/Site2131/mainpageS2131P0.html

Boston Children's Hospital
Architect Shepley Bulfinch and Abbott (Boston)
MRI moves in and out of the operating room as needed into a docking bay

Design Issues:

- structure required to support the 7.4-ton magnet;
- containment of the fringe magnetic fields associated with the scanner within the room;
- isolation of vibration and sound;
- accommodation of adjacent spaces not typically found in ORs, such as the docking and control rooms.
- Secured entry and provisions for ease of circulation for the patient, equipment, and different types of clinicians involved in the intraoperative procedure

Impact of Technology on clinical and non-clinical functions

- **Clinical:** Virtual healthcare delivery
  - Robots with emotions - take sensory input from the humans around them and adapt their behaviour accordingly

The robots exhibit imprinted behaviour - following the 'mother around' (http://news.bbc.co.uk/2/hi/technology/6389105.stm)

A humanoid wearing an apron picks up a cup of tea after University of Tokyo Professor Tomomasa Sato drank it during a demonstration at the campus.
Photo: *Katsumi Kasahara*
(http://www.smh.com.au/news/technology/ageing-japanese-turn-to-robots/2007/10/05/1191091336398.html, 11 Oct 2007)

Impact of Technology on clinical and non-clinical functions

- **Clinical:** Virtual healthcare delivery
  - **Clinical simulation** – virtual world of ‘Second Life’ – use of mobile phones, messaging and chat; connect virtual people and objects to the real world via communication networks
  - **Gaming software & ‘ray tracing’** (Lord of the Rings) – special effects for games and medical simulations
  - **‘virtual people’** – 3D life-size representations can interact with real people, answer questions, etc

Impact of Technology on clinical and non-clinical functions

- **Clinical:** Gene Technology
  - Prevention rather than treatment
  - ‘personalised medicine’ tailored to a person’s genetic profile
  - Treatment for breast cancer
  - Guide the use of Warfarin and correct dose

Impact of Technology on clinical and non-clinical functions

- **Clinical:** Regenerative medicine including stem cell therapies
  - Treat brain diseases and heart disease
  - Engineer sperm from adult stem cells from male human bone marrow – research and use in fertility treatments
  - Regeneration of finger tips using regeneration powder
  - Use of adult stem cells to grow human heart valves; could be used in transplants within 3 – 5 years; eventually a whole heart may be possible – would remove the need for most heart transplants and need for donor organs.

Impact of Technology on clinical and non-clinical functions

- **Clinical:** Nanotechnology
- Nanoparticles for drug delivery have been patented (HFD, March 2007). These take the drug deep within the body to exactly where it is required before releasing the dose.

Impact of Technology on clinical and non-clinical functions

- **Non-clinical: Goods delivery and stores**
- Automated delivery systems using robotic devices e.g. AGV hospital ‘workhorses’ at St Olav’s Hospital, Tronheim, Norway
- Guided by lasers and microchips, run automatically to stations in the wards, using hospital lifts and corridors shared with patients and the general public.
- Can ‘talk’ and take themselves to a charging station when batteries run low.



Impact of Technology on clinical and non-clinical functions

- **Non-clinical: Linen management, staff uniforms**
- St Olav's Hospital, Trondheim, Norway – staff workclothes and uniforms management.
- Staff have an individual locker which contains their allocated complement of uniforms which are all implanted with an RFID chip. As items are removed from the locker, they are scanned and the locker is restocked each day automatically with items to replace those removed.

Re-direction of care away from the immediate hospital setting – assisted by technology, telemedicine, remote diagnosis

- Virtual Critical Care – VCCU at Nepean Hospital, NSW
- Queensland Tele-hospital link – Cooee Project
- Tele-paediatric robots – Queensland rural hospitals
- Tele-rehabilitation projects in Queensland
- Robot doctors
- Robotic surgery

Re-direction of care away from the immediate hospital setting – assisted by technology, telemedicine, remote diagnosis

- **Tele-paediatric robots** – Queensland rural hospitals
  - Lack of staff paediatricians or sub-specialists in rural and some regional hospitals result in many patients travelling up to 3000km to Brisbane
  - Wireless and mobile, taken to patient's bedside for consultation
  - General paed support, sub-specialist support + professional education
  - (http://www.uq.edu.au/coh/index.html?page=43012&pid=43012&ntemplate=457 , 11 Oct 2007)

Re-direction of care away from the immediate hospital setting – assisted by technology, telemedicine, remote diagnosis

- **Tele-rehabilitation** projects in Queensland
- speech pathology, physiotherapy, occupational therapy and multidisciplinary projects; Parkinson's Disease, childhood issues, brain injury, etc. (http://www.uq.edu.au/telerehabilitation/physiotherapy-projects, 11 October 2007)

Physiotherapy project (gait assessment)

Re-direction of care away from the immediate hospital setting – assisted by technology, telemedicine, remote diagnosis

- **Robot doctors**
- Robotic units are being used in the US and Canada to provide consultations or ward rounds in some US hospitals. The doctor can be located in any part of the world but can still see his patients and check on their progress. A simple joystick enables navigation of the room even with obstacles
- (http://www.nationalreviewofmedicine.com/issue/2007/06_15/4_advances_medicine01_11.html, 11 Oct 2007)

Dr Mendez, Dept of Neurosurgery, QEII, Halifax, Canada

Re-direction of care away from the immediate hospital setting – assisted by technology, telemedicine, remote diagnosis

- **Robotic surgery**
  - Surgeon is located at a console that provides 3D intuitive visualization
  - The surgeon's hands are scaled and filtered within the console that then permits precise surgical manoeuvres to be undertaken
  - The surgeon is remote from the operating table and the patient
  - Through an intuitive interface, the four robotic arms are manipulated to conduct the surgical procedure

Image taken from 2007 Weill Cornell Prostate and Robotics Symposium online enrolment form

Integration of services for more holistic care

- Networking of facilities
- Specialist facilities
- Community based facilities
- Home based care
- Patient hotels
- Step down facilities closer to the patient's home

Maggie's Centre, Edinburgh, Scotland

Specialist Facilities
Evelina Children's Hospital, London, UK

- First new children's hospital in London for 100 years

http://www.guysandstthomas.nhs.uk/services/managednetworks/childrens/evelina/about/gallery.aspx

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Evelina Children's Hospital

http://www.guysandstthomas.nhs.uk/services/managednetworks/childrens/evelina/about/gallery.aspx

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Evelina Children's Hospital

http://www.guysandstthomas.nhs.uk/services/managednetworks/childrens/evelina/about/gallery.aspx

Community-base Facilities
Leith Community Centre, Edinburgh Scotland

- http://www.nhslothian.scot.nhs.uk/news/publications/Leith_CTC.pdf

Front door

Paed consult room

Public waiting area

Community-base Facilities
Leith Community Centre, Edinburgh Scotland

- http://www.nhslothian.scot.nhs.uk/news/publications/Leith_CTC.pdf

Corridor

Rehab gym

Planning models for general hospitals that promote a 'healing environment'

- **Case studies – overseas hospitals**
  - Rikshospitalet, Oslo, Norway
  - St Olavs Hospital, Trondheim, Norway
  - University Medical Centre, Groningen, The Netherlands

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Case study -
Rikshospitalet,
Oslo, Norway

Case study - Rikshospitalet, Oslo, Norway






Case study - Rikshospitalet, Oslo, Norway







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Case study -
St Olavs Hospital Trondheim, Norway

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Case study -
St Olavs Hospital Trondheim, Norway

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Case study - St Olavs Hospital Trondheim, Norway







Case study – University Medical Centre, Groningen, The Netherlands






Case study – University Medical Centre, Groningen, The Netherlands

Emerging Issues: ‘Healing environments’ – ‘evidence based healthcare design’

- Lighting levels – natural and controllable
- Control of noise – acoustic privacy and impact on sleep
- Air quality – natural ventilation, opening windows, need for airconditioning in every space?
- Privacy – sense of control
- Pleasant distractions
- Space for families to be with patient and to obtain respite
- Access to nature – views and physical access
- Rooms – size, layout and décor including materials, colours, furniture and equipment
- Case study – Maggie’s Cancer Support Centre

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Case study –

Maggie's Centre, Edinburgh, Scotland

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Case study –

Maggie's Centre, Edinburgh, Scotland

Planning for whole of life cycle costing – sustainability, energy use, flexibility, adaptability, benchmarking performance, etc

- Almost incomprehensible list of trends to be addressed – including clinical advances, patient acuity, decentralisation, ICT, ambulatory care, patient education, etc, etc
- Many facilities are obsolete long before their physical life span is spent
- Need to anticipate where change is most likely to happen because it is certain to occur!
- Consider incorporating flexibility at all stages of the planning, design, construction and post occupancy phases

Thank you!

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