NEW
BENDIGO HOSPITAL
PROJECT

2010 STUDY TOUR
INTRODUCTION

The New Bendigo Hospital Project will deliver the largest regional Victorian state government funded infrastructure undertaking in the history of the state.

In June 2010 the executive director New Bendigo Hospital Project, David Walker, undertook a study tour of hospitals in Holland, Belgium, Spain and the USA.

The aim of the study tour was to:

- gain an understanding of the trends in healthcare design in Europe and the United States of America
- gain exposure to the machinations of very large health projects
- provide an opportunity to interact with healthcare professionals from around the world who had already undertaken significant health capital development projects.

This study tour contains a compilation of images, video and presentations acquired during David's tour.

For more information please visit: www.newbendigohospital.org.au.
EUROPEAN CONGRESS

The study tour commenced on 6th June 2010 with attendance at the inaugural European Congress on Healthcare Planning and Design: Innovation in Health Assets for Sustainable Healthcare, in Rotterdam.

This event, spread over three days, was divided into plenary sessions, master classes and case studies.

The opening address was delivered by Dr Nata Mendabe, deputy regional director for the World Health Organisation, Europe.

Her address had three main themes:

- Challenges in health
- Corresponding consequences on design, planning and infrastructure
- Challenges for new member (Euro) states.

All presentations have been collated and are included on this CD.

Australia currently has a very significant investment occurring in healthcare facilities across the country and there was a noticeable contingent of Australians from the private and healthcare sector attending the European congress.
ORGANISED STUDY TOUR

Following the congress, an organised tour for 40 people was arranged covering six very different sites in Holland, Belgium and Spain. Senior executives from each site provided presentations on their projects, took us around their hospital and openly answered questions from the tour group.

The study tour continued to the United States of America where I visited five sites spread across the country. These visits were either hosted by industry providers GE and Alcatel-Lucent or directly from Bendigo Health.

The sites were selected from research or were recommended by healthcare professionals. This component of the tour focused on information technology in a modern hospital.

The tour concluded on 25th June and by the time I returned to Australia, I had covered over 55,000 km and spent 84 hours flying time and countless hours in airport processing queues.

TOUR FINDINGS

OVERVIEW

Sustainability emerged as the major theme from the tour with both the Europeans and Americans striving to ensure that more affordable and efficient health care could be delivered into the future. This needed to be achieved against a backdrop of increasing costs, increasingly restricted access to investment funds and increasing demand.

The effects of the global financial crisis on hospital design and process re-engineering, although most evident in the USA, was also a strong theme at the European congress. In the USA it was forcing changes to how capacity increases were being achieved.

The congress had several speakers outline how the global financial crisis in the short-term and the escalating operating costs for governments in the longer term would make it difficult to provide health care to meet the expectation of the public using our current operating paradigms. Delegates were urged to consider that operating costs need to be reduced significantly if we are to be able to continue to provide services into the future.
The United States of America, in an era where investment capital was not readily available and hospital groups had little appetite to invest heavily in new buildings, had turned to solutions that were based around production-line methodologies taken from the manufacturing sector. These methodologies incorporated a deep lean-thinking re-evaluation of workflow coupled with real-time location systems. Bon Secours in Richmond, Virginia utilised this to redesign elective surgery using a wireless information technology platform to drive and monitor patients through stream. This resulted in a twenty percent increase in throughput capacity within the existing operating theatre suite.

Key aspects and outcomes of redesign work in the United States of America included:

1. Clinical staff being used extensively during the redesign process emphasising that patient flow not clinical as the target of the change. This approach ensured clinicians had minimal resistance to the process.

2. Real-time quality checks and processes improved clinical risk and provided automated audit trails that were ‘dropped’ straight into the patient electronic medical record.

3. These same real-time location systems (RTLS) can be used to inform clinical staff about the whereabouts of equipment and provide quality checks when equipment is moved from patient to patient ensuring cleaning processes have been completed in the interim. For example, infusion pump cleaning between patients was monitored in one hospital. The system monitored the location and care of every pump. If a pump moved from one room to another without entering the cleaning station it would SMS an alarm to the nurse-in-charge.

4. Automated communications provided by the patient tracking system resulted in inter-departmental phone calls dropping by 400 per day.

5. The ability to record, observe and model services using sophisticated computer programs, in existing hospital departments was used to inform and evaluate new designs. Two hospitals reported that using this computer based modelling resulted in major emergency department rebuilds being significantly smaller than first designed. The original larger option proved to have the higher operating cost and lower throughput per dollar than the redesigned option.

6. The Canadian government is using these tools to evaluate competing bids in their public private partnership evaluation processes.

7. Private hospital groups are using this redesign approach to build smaller hospitals capable of delivering higher throughputs with fewer staff.
8. Hospitals reported a 100 percent reduction in rental of equipment and a 20 percent reduction in the small equipment capital budget providing a capital payback period of less than three years. The roll-out of real-time location systems is being undertaken in existing hospitals and was considered a standard item for new builds.

The health design industry in Australia is currently based on standard room sizes and schedules of accommodation that have resulted in our facilities becoming larger with each iteration of the guidelines. This results in our design discussion being around square metreage not workflow process focus. The concern is that this may result in an inefficient hospital.

During my visit to the United States of America unified communications systems were demonstrated to me. These systems used the hospital network to channel all internal and external communications into an integrated system that enabled staff to easily communicate with each other. This allowed staff to find others without the need for an overhead voice page, a beeper page or locating a staff roster.

Staff logged onto their cordless phone or other communication device at the start of their shift and this linked the trackable device to a specific role. For example, if looking for the orthopaedic registrar staff did not need to know 'who' was 'on' that night, they could interrogate the system to contact the person taking that role or physically find them if the registrar was not answering calls. The ability to find the doctor in charge at any time to ensure the patient could be attended, discharged, medicated etc was a high priority for nursing staff.

Unified communications were also noted to:

- improve the patient experience
- improve hospital throughput
- when linked with email and real time locating system, it provided hospitals with workflow improvements
- make clinical jobs much less frenetic
- be major factor in their choice of employer.

Effective communication is a key issue facing Bendigo Health. It is the number one topic raised at staff consultation meetings and generates a large amount of frustration and downtime amongst employees. As labour costs make up 78 percent of our operating budget, systems that enhance communication, improve productivity and
raise staff satisfaction will be a key enabler in managing expenses and attracting and retaining staff in the New Bendigo Hospital.

Lean redesign observed and unified communications relied on well-designed information technology infrastructure with a network sufficiently robust that it provided senior executives with the confidence to place more and more reliance on information technology solutions.

The network architecture was a topic of discussion at most of the United States of America sites. They were keen to stress that they had run into problems in areas where wireless only had been rolled out. The information technology staff suggested that a good mixture of wired and wireless is more reliable.

All the sites visited in the United States of America had an electronic medical record (EMR). Having an EMR was seen as a fundamental building block towards a digital hospital of the future. It enabled more and more applications to be added as required and automatically collated patient data for accountability.

The United States of America implemented complex information technology systems differently from Australia. They had a specialised staffing structure. This structure started with the chief medical officer and, working through the clinical lines of accountability, used clinical staff with a part-time, approximately 30 percent, clinical load who drove the implementation of information technology clinical systems during the remainder of their work time.

I spoke to a chief medical information officer (CMIO) and nursing information officer (NIO) whose roles were to scope, implement, modify and rework information technology systems. These informaticists, as they were called, worked closely with the application vendors and hospital staff and took the clinical application systems away from the traditional project management role within the information technology department and into the clinical area.

This improved clinician input and 'ownership' of information technology systems because the applications were seen to be delivered by clinicians for clinicians. The site at Eastern Maine Medical Centre in Bangor, Maine was a Cerner Alpha site and employed staff in the informatics roles with good success.

The lack of a national broadband network was their greatest concern when connecting remote sites to virtual intensive care unit systems as data transfer speeds were poorer than we currently experience in our region. The use of an intensive care unit control
room in the regional lead site enabled connection to smaller sites and the provision of remote clinical assistance similar to the virtual trauma and critical care unit project. The system utilised a control room, staffed 24/7, with three intensive care unit nurses who could connect via high definition remote controlled cameras to each intensive care unit room. From this central control room the nurse could see all the vital statistics on one of nine computer monitors and could zoom in to look at infusion bags, imed pumps and the patient.

During an intensive period of nursing the remote nurse could document all activities in the intensive care unit room leaving the busy staff to care for the patient. The nurse could also develop a clinical relationship with a patient in a remote intensive care unit prior to transfer and patients advised them it was comforting to see a familiar face after a transfer, even if it was on a TV screen in their room. The staff were rotated through the control room in order that their hands-on skills were kept up to date. A recommendation from this group of staff was to make a space for this room at the design stage because one day we will need it.

The European approach to information technology was site specific, with electronic medical records being implemented for an individual hospital with restricted integration to the rest of the healthcare community. Deventar has developed their own bespoke software whereas Sittard had used the Microsoft and SAP platforms to provide all their clinical and non-clinical applications. The Europeans had focused on automation systems to reduce operating costs more than the United States of America, mostly likely because of the higher minimum wage.

Many sites had implemented unified communications, uniform dispensing and automatically guided vehicles (AGVs) to transport linen, supplies and pharmaceuticals around the hospital. Functions such as production kitchens and laundries were considered non-core and were not present at many sites, these services were bought in. Pharmacy and pathology services are progressively becoming automated with robot picking and automatic delivery of pharmaceuticals to wards. Reductions in pharmaceutical costs and wastage were key drivers in automation of this service.

**FOOD SERVICES**

The provision of food in hospitals is going through a fundamental change. A trend was emerging for the provision of food to be either assembled on-site from pre-cooked components for freshness and quality or purchased ready made from the airline industry. It was suggested that public expectations had moved beyond accepting
poor quality hospital food and the hospitals were not expert at providing good quality, nutritious and cheap meals.

Production kitchens were not being included into every new build. Many sites we visited had not included traditional production kitchens or space for them to be built in the future.

ARCHITECTURE

The United States of America has predominately single patient rooms however in Europe there was a higher incidence of sharing. The Netherlands had a preference for three bed patient rooms based on social interaction, but when asked they would have preferred a higher ratio of single patient rooms. Room sizes were generally smaller than in Australia with European hospitals being given a bed square metre rate ranging from 98 square metres per bed to 118 square metres per bed. This rate provided the gross square metres size for the entire hospital.

Infection control principles and standards were similar and were driving layouts towards more single rooms in Northern Europe, however in Spain this is less noticeable with the majority of rooms being doubles.

An emerging trend in the United Kingdom, and mandated throughout large parts of Europe, relates to uniforms. Staff are not permitted to take uniforms off-site, therefore change rooms and ablutions were provided all at sites we visited, along with auto uniform dispensing in some sites. Clinical uniforms are scrubs type uniforms and are provided and laundered by the hospital via a third party service provider.
SUMMARY OF FINDINGS

- Hospitals should be designed to be as small as possible using efficient workflow as a driver, the traditional reliance on schedules of accommodation tends to drive larger outcomes.

- Information technology requires changes to the organisational structure to include clinical information technology staff for effective implementation of clinical applications.

- A robust information technology network based on wired and wireless approach, coupled with an electronic medical records system is springboard to a digital hospital.

- Unified communications and real-time location systems provide the best value for money workflow improvements for staff, in particular nursing.

- The provision of non-core services should be delivered off-site, where possible, to reduce the capital build costs and lower operating costs.

- The use of automation to provide integrated logistics solutions is a cost-effective whole of life solution and is best facilitated in a new design.

- Design of the hospital should not preclude the future use of automated pharmacy and pathology on site, if these services are to be delivered on-site.

- Spaces for staff changes areas, lockers and shower/ablutions should be included in the design philosophy and be easily expandable to accommodate changes to the future provision and use of uniforms on and off site.

- Patients should be in control of their environment, such as heating, lighting and have access to an intelligent nurse call system intended to optimise two-way patient nurse communication.

- International best practice relating to the use of way-giving, natural light, public/patient separation, communal spaces and retail areas should be included.
Deventer is a municipality and city in the Salland region of the Dutch province of Overijssel. Deventer is largely situated on the east bank of the river Ijssel, but also has a small part of its territory on the west bank.

This hospital is a similar size to Bendigo; it opened in late 2008 and made a big impression on the 40 of us on the tour. Entering the place we noticed it was bright, airy, well lit, full of colour and quiet - it didn't feel much like a hospital.

We had a presentation from the hospital directors and then set off on a tour of the women's' and children's' service, outpatients and the emergency department.

There was a consensus that the building made you feel good and that's exactly what a well-designed hospital should do. The staff told us they liked working in this environment even thought they had moved from individual offices to more open plan offices. It's easy to see why it would be a pleasure to work in a facility like this.

A lot of care has gone into making the patient journey as peaceful as possible and the views from the wards were superb. I hope we can get something similar in Bendigo.

FEATURES

- 80 percent bed occupancy
- No reuse of dirty water
- 1.5T and 3.0T MRI
- Heat/cool using underground aquifers
- One or three bed wards are preferred, two bed wards not preferred
- Public expectations are increasing which skews satisfaction
- Food is assembled from buy-in components
- No laundry
- 10 delivery/post natal rooms
- Five bunkers, four linear accelerators
- 20 day oncology chairs
- More one person beds if done again
- Restaurant promotes cross conversation
- Learning centre open 24/7 for staff.
ORBIS MEDICAL PARK : SITTARD

FEATURES

• Occupied on 31 January 2009
• 1,050 car parks
• 55 Psychiatric beds
• 90 bed rehabilitation
• 320 acute beds
• Consolidation of four smaller hospitals
• 'Take responsibility as a patient' was the main project principle
• Processes not departments
• Eye room is always special in consult suites, rest standardised
• Standardise process x 34, define exceptions
• Buffet for patients
• Knowledge centre for staff open 24/7
• Connectivity to other people
• Strategy of bed reduction in consolidation of four hospitals to one
• 400 core pathways standardised
• Project team went to car firm to understand logistics
• 99.5 percent downtime
• Reduction of FTE by 10 percent (86 FTE last year)
• Handover building six months prior to use - Tested every part of it from Sept to Jan using existing staff and had three functional tests
• No post occupancy evaluation.
• Ambulatory same as Deventer
• Information communication technology direct involvement with Microsoft and SAP not consultants.
AZ GROENINGE : KORTRIJK

New building for hospital merger with 1000 beds on a 14 ha area outside the city of Kortrijk.

FEATURES

• Consolidation four to one hospital
• 1,000 bed
• 98m²/bed allowed total
• 60 percent Belgian government funded, 40 percent Flemish government funded
• Meeting space air-conditioning not designed well
• Four hospitals in town of 80,000 population serving 500,000 in the region
• Economy of scale, better quality, pooled in existing and co-located as per masterplan, today 380 bed and three existing hospitals
• Complete by 2015
• 1,000 beds = 2,200 car parks, two parks funded for every one bed
• No storage of equipment in central sterilising services department, all stored at point of use
• Patient safe in every bedroom for valuables
• Pre-prepared meals are heated in microwave banks on each ward.
HOSPITAL DEL MAR : BARCELONA

FEATURES

- Reuse old pavilions c1900
- Public - staff separation
- 400 bed rebuild all pavilions
- Outpatient stays and intensive care unit stays 2008-2017
- More clinical services
- External view
- Phase one 15,877 sqm
- 103,527 sqm build
- 532 beds
- Three linear accelerators
- 60 cubicle emergency department
- 100 consulting rooms
- Focus on reducing average length of stay so less beds
- Go home early transport in each day for treatment
- 70 consultation rooms open mornings 8 am to 2 pm, some open all day, 1,200-1,500 patients/day
- Had to upgrade a smaller hospital to make capacity for this staging, last photo 1960 hospital block
- Biomed research centre included
- Olympic anti-doping laboratory was later used as part of the Barcelona University of Medicine.
HOSPITAL DEL LA SANTA CRUE i SANT PAU

FEATURES

OLD HOSPITAL

• World Heritage site built in 1905 replaced the hospital built in 1401
• Orientation 45 percent for light!
• ‘Music Palace’ faith, hope, charity and work pavilions connected by tunnels
• Female/male separation
• Floral style in central entry
• Central building = operating room
• Ventilation is for wellbeing of patients
• Nightingale ward
• Waste/dead stream separated from supplier/food stream
• Light shafts into basement

NEW HOSPITAL

• 650 carparks with more to be constructed
• Metro station next door
• 30 percent Catalan govt funded 100 percent
• 30 percent church and 30 percent city
• Care for ‘soul’ and nature
• 600 bed new hospital
• €2,000 sqm
• 109,000 sqm build
• Serves 450,000 people: 34,000 inpatients, 130,000 emergency department presentations, 350,000 consultations and 77,000 same day operations
• 3,300 staff, 250 graduated resident doctors
18 operating theatres and 27 recovery spaces
- Ophthalmology has three more theatres
- 81 intensive care unit, high dependency unit, neonatal intensive care unit and paediatric cubicles
- 61 cubicle emergency department with separate paediatric area
- Four linear accelerators and information communication technology simulator
- Staff canteen
- 520 beds
- 202 outpatient consulting rooms
- University teaching hospital
- Consulting room for outpatients
- Separate mental health
- Three labour delivery rooms
- 106 care points in day hospital
- Faculty of Medicine - University of Barcelona