The new Royal Adelaide Hospital – The Age of the Digital Hospital Dawns in South Australia

Allan H. Baird

ICT Consultant, New Royal Adelaide Hospital
Major Projects Office
Central Adelaide Local Health Network, Department of Health and Ageing, South Australia

AllanH.Baird@health.sa.gov.au

Abstract

The South Australian Government developed the Health Care Plan 2007-2016 to meet the health challenges of an ageing population, increasing incidence of chronic diseases, international workforce shortages and ageing infrastructure. The plan included an outline of the most significant single investment in health care in South Australia's history - the new Royal Adelaide Hospital. Efficient and effective application of the new Royal Adelaide Hospital Model of Care is reliant upon a robust ICT system which is fully integrated throughout the Facility and with primary and secondary health providers. The ICT element of the hospital is critical in ensuring that the return on the investment in such a new and complex facility will be achieved.

Keywords: new Royal Adelaide Hospital, Model of Care, Digital Hospital, Patient Systems.

1 Introduction

In May 2002 the then South Australian Minister for Health, the Hon Lea Stevens, announced the Generational Health Review (GHR) (Government of South Australia 2003) and appointment of the Review Committee, chaired by Mr John Menadue AO.

The aim of GHR was to develop a framework to guide the South Australian health care system over the next 20 years. The objectives are that the health care system, in partnerships with governments and stakeholders will:

- strive to maintain and improve the health of the population with an emphasis on addressing health inequalities
- ensure safe, accessible, efficient and effective health care

The principles and values underpinning GHR take into account the South Australian Government's health and social agenda commitment:

- improving the quality and safety of services
- greater opportunities for inclusion and community participation
- strengthening and reorienting services towards prevention and primary health care
- developing service integration and coordination

- whole-of-government approaches to advance and improve health status
- sustainability in delivery through ensuring efficiency and evaluation

Guided by the GHR, the State Government developed South Australia's Health Care Plan 2007-2016 (Government of South Australia 2007) to meet the health challenges of an ageing population, increasing incidence of chronic diseases, international workforce shortages and ageing infrastructure.

The plan included an outline of the most significant single investment in health care in South Australia's history - the new Royal Adelaide Hospital (RAH).

The new Royal Adelaide Hospital will provide world-class health care and facilities for South Australians.

Located in the CBD, construction of the 175,000 square meter facility started in September 2011 and is scheduled to be completed in 2016. The new hospital will replace the existing Royal Adelaide Hospital which opened in 1840.

The new Royal Adelaide Hospital will be the State's flagship public hospital and will be the cornerstone of the reformed South Australian health system,

The Facility will attract some 6,000 staff, have the capacity to treat over 400,000 outpatients per year and will provide overnight care to approximately 85,000 inpatient admissions per annum.

The hospital will have 800 beds (700 multi-day beds and 100 same-day beds) and all inpatient rooms will be single bedrooms. There will be more operating theatres, intensive care beds and emergency care capacity.

The new hospital will harness the latest in architectural design to create a healing environment for patients and a positive working environment for staff, all while minimising the building's environmental footprint. This will be achieved by ensuring all rooms have access to natural light and easy access to internal gardens on balconies and the roof.

The new Royal Adelaide Hospital will remain a major teaching hospital and will also be co-located with the new South Australian Health and Medical Research Institute, making the health precinct the hub of medical research in the State.

2 Technology Vision for the new Royal Adelaide Hospital

Efficient and effective application of the new RAH Model of Care is reliant upon a robust ICT system which is fully integrated throughout the Facility and with primary and secondary health providers.

The facility is being designed to incorporate a sophisticated and fully integrated ICT system including:

• incorporating an integrated ICT platform that facilitates the delivery of Clinical Services in accordance with the NRAH Model of Care;
• incorporating fully integrated ICT systems and platforms so that all departments, and each of the discrete components of the Clinical Services, Clinical Support Services and Non Clinical Support Services interface with each other
• including integrated booking systems, E-health record, clinical data and information transfer, bed management and supplies
• incorporating an ICT system that supports high levels of seamless access and use;
• incorporating ICT infrastructure which includes:
    o community interface capability (for example, communications with GPs and other service providers and hospitals);
    o a platform to interface between Clinical Services and Non Clinical Services;
    o accessibility of information, close to point of service;
    o equipment and technology that maximise care delivery and safety;
    o the ability to accommodate ongoing growth and change in the use of ICT, whilst maintaining full operation of services;
    o a platform for a range of ICT technologies such as wireless coverage for all technologies in all areas of the Facility;
    o technology throughout the Clinical Areas including at the bedside providing access to a number of systems including clinical information, communication, education and entertainment; digital health and hospital technologies, telemedicine and audiovisual systems locally and remotely;
    o integrated fire and life safety systems, data, paging, staff / patient /public management systems, building services, engineering management and security systems; and
    o provision of electronic signage, interactive information sites, options for biometric authentication, RFID and other tracking technologies

3 Integration with State-wide Patient Systems and Applications

At the same time as the design and construction of the new RAH is underway, the SA Department of Health and Ageing is developing and starting the roll-out of a number of ambitious and highly complex enterprise systems, which will embrace most of the State's hospitals and primary care facilities, including the new RAH. These systems include:

• **EPAS – Enterprise Patient Administration System**: will provide the foundation for delivering South Australia's state-wide electronic health record (EHR), which will:
    o standardise and consolidate the majority of patient information system data into a state-wide system

    o lay significant foundations for the EHR, a requirement under the national eHealth strategy
    o link relevant administrative and clinical processes, and
    o replace a number of SA Health's complex network of incompatible and outdated systems.
• **ESMI – Enterprise State Medical Imaging**: will support the objectives of the SA Medical Imaging objectives which are to achieve greater efficiencies and improve medical imaging services through the introduction of uniform enterprise picture archiving and communication (PACS) enterprise radiology information (RIS) and Voice Recognition systems across public hospitals.
• **State-wide Pathology**: over time, South Australia's government run Pathology services have been consolidated into a single service, and a single system will be rolled out to support the new organization.
• **State-wide Pharmacy**: already commissioned, this system is designed to provide a platform for the delivery of medication related services in a consistent manner across most State hospitals.

The simultaneous development and roll-out of these State-wide systems provide a challenging backdrop in order to ensure that the innovation in the design of the new RAH can be supported by systems that also need to be able to effectively operate in more traditional hospital settings.

4 The Dawn of Digital Hospitals in South Australia

Legendary American football coach, Tom Landry (1924-2000) is credited with the saying: "Setting a goal is not the main thing. It is deciding how you will go about achieving it and staying with that plan."

This mirrors the experience in SA Health circles, and specifically that of the new RAH.

Whilst there are highly aspirational goals, it is the detailed planning that ensures a facility will be able to fully realise the goals of the GHR and new Model of Care.

Therefore, not all of the end goals of the physical design and supporting ICT systems, either in house of State-wide, for the new RAH below will be implemented on Day 1, but may be progressively rolled out in line with the realities of funding and available resources, and when the supporting functionality is available from the respective systems:

• **Patient Arrivals**: For outpatients and day patients arriving at the hospital, direction to their appointments and where they will be admitted will be provided from wayfinding/patient information kiosks. In the case of outpatients, should the patient arrive too early for an appointment or the clinic is running late, the patient will be advised to delay presentation.

• **Patient Admissions**: There will be no central patient admissions office. Admissions will be undertaken at the patient bedside on a multi-purpose monitor that will serve as a patient entertainment system (PES) with free-to-air and pay TV, and internet access during the patient visit.

- **Patient Meals**: On admission, the patient meal requirements will be recorded, and subsequent to admission, the patient will be offered on the PES in their room a menu tailored to their dietary requirements. If the patient is transferred during their visit to the hospital, the delivery instructions for the patient meals will be automatically updated. On discharge, any outstanding meal orders will be cancelled.

- **Patient Tracking**: Initially it is planned to only track patients for whom the State has very high duty of care, e.g. those with Mental Health conditions and orders, and patients known or discovered to wander or abscond. RFID tags will be attached to these patients and details of the tags will be added to the patients' respective electronic records. On discharge, the records will be updated to indicate the removal of the tag. Asset Tracking and Management: RFID will also be used to track valuable assets in the hospital to ensure that the nearest asset to a required location can be retrieved as quickly as required. This is a widely used technology from the logistics industry. However, taken further, RFID technology can provide vital information on the hours of operation of a biomedical device providing early advice on the need to withdraw it from operation for periodic servicing and recalibration.

- **Video Conferencing/Telehealth**: The hospital will have state-of-the-art flexible learning and teaching facilities with extensive audio visual capabilities. The audio visual capabilities will also be implemented in operating theatres, selected procedural areas, consulting clinics and other areas like the Mortuary. These facilities will have the ability to engage health professionals within and external to the hospital for teaching and learning, or for patient consultations.

- **Biomedical Equipment**: Adequate provisions are being made in the hospital to accommodate outputs from newer biomedical equipment being fed directly into the EPAS.

- **Wireless**: The hospital will be saturated with wireless capabilities to take advantage of the new and emerging devices that support wireless in a hospital setting. These include a wide range of biomedical devices and imaging equipment. Patient data from these devices, whether wireless enabled or hardwired, will ultimately be uploaded to the electronic patient record.

- **Imaging**: in the new RAH, the concept of medical imaging has been extended beyond traditional radiology to also include any digital photography, such as that taken during plastic surgery procedures, or moving pictures such as videos capturing a patient's gait before and after therapy. These are for all intents and purposes part of the patient's record from a medico-legal perspective, as well as providing important information in subsequent patient visits for continuing treatment. Consequently, over time non-radiology images will be linked with the electronic record to provide the most complete visual as well as written record of patient treatment in South Australia.

- **Pharmacy**: the new RAH will in all likelihood be the first hospital or one of the first hospitals in SA to implement what are commonly known as Pharmacy Robots, which have become one of the preferred methods of providing unit doses (as described by Deloitte Touche Tohmatsu 2010). The process of prescribing medication for patients, including an automated check for contraindications and over/under dosing, will be handled by an EPAS front end, and then handed off to the backend dispensing systems, including the robots. Other medication will be provided from ward based automated dispensing cabinets. The administration of medication by clinical staff to the patient will recorded in the electronic patient record.

- **Pathology**: Patient samples will be labelled and tracked through the hospital to Pathology for testing, with the results being automatically written into the patient record from the Laboratory Information System.

- **Wayfinding/Public Information Systems**: the Wayfinding and Public Information systems will overlap in functionality in the direction of people to events, such as lectures, seminars, exams etc, in the hospital as well as providing general health information in targeted areas and alerts to patients, staff and visitors about evacuations. Wayfinding within the hospital for staff and visitors on mobile devices such as smartphones is under consideration.

- **Personal Devices**: There is an expectation that there will be a significant increase in the use of personal computing devices, such as iPads, tablets and the like, to source information about or in patient interactions. As such, EPAS will form the basis for clinical staff to create their own views of patients assigned to their care, to receive alerts, and to develop and execute patient care plans.

- **Large Patient Information Displays**: The old whiteboard in the nurses' station will be a thing of the past. Rather, large displays showing the patients in each pod (collection of n beds, where n can be 4, 8, or 16 beds) and the status of various tests, imaging etc can be seen through the area, and replicated on their personal devices if necessary will ensure that clinical care is accurate and up to date at all times.

5 Challenges in a Private Public Partnership (PPP) Environment

The hospital is being built and will be operated under a PPP arrangement. In terms of the new RAH this means that the design, development and construction of the hospital, which includes significant elements of the ICT is the responsibility of the private partner to deliver on the basis that it meets the functionality specified in the Project Agreement.

Once the hospital is complete, the private partner's operating organisation will take responsibility for the non-clinical aspects of the hospital, such as food services, cleaning, porters, logistics, physical security and building and engineering maintenance.

In terms of ICT, the State will take responsibility for the running of the network which the private partner has designed, procured and commissioned. The network will be virtually separated and the private partner will share the same physical network to support all of its systems.

5

Accordingly, this has resulted in some very detailed work to accommodate a private organisation running its ICT over the same physical network as the health information.

In the main most of the information that will cross from the State's virtual network to the private partner's operating organisation will comprise standard HL7 messages to ensure that services that they provide are delivered in a timely manner. The time stamps on these messages will also be used to determine whether the private partner's operating organisation is meeting its agreed service levels.

6   Summary

The new RAH will be the beginning of new and innovative ways to improve the delivery of health care in South Australia.

It will bring innovations across the whole range of elements that make for an efficient and new age tertiary hospital in design, services and patient flow.

The ICT element of the hospital is critical in ensuring that the return on the investment in such a new and complex facility will be achieved.

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