

# A case study of centralised monitoring of hospital access performance

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## Abstract

Access to care for patients remains a concern for all parties in the provision of hospital services. It is the subject of patient complaints, large investments of funds and vigorous debate in the community, hospitals and the political arena. This is a common problem in developed nations. There has been little achievement in information technology solutions to this significant problem in Australia.

This paper presents a case study of the development and implementation of an organisational access display system intended to provide real-time, or near to real-time information and feedback on access for staff on the floor. This is believed to be one of the first times such a development has been reported in the Australian literature, albeit limited to the context of a single organisation.

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## What is known about the topic?

Information technology solutions for monitoring hospital access problems are not widely reported in the literature.

## What does this paper add?

This case study describes the early development of a web-based Access Display System that provides real-time feedback on patient access to hospital services within one large metropolitan hospital.

## What are the implications for practitioners?

Early indications are that existing systems can be harnessed as the content for the system, providing timely feedback on access performance to management and clinical staff.

WHILE THERE HAVE BEEN improvements in access to care for patients at a range of levels,<sup>1,2</sup> the frustration around timely access<sup>3,4</sup> is an ongoing problem. This is still an issue in Australia<sup>5-10</sup> Access, in this context, refers to the ability of health services to provide timely care to patients. Demand refers to the need for care imposed on health services by the community.

The health literature contains numerous references to access improvement, and there is work describing sustained improvement in access to care — from the regional level in Canada<sup>1</sup> to a national level in Sweden, although with a limited focus.<sup>2</sup> However, there is relative dearth of published work on the role of technology in providing real-time support for patient flow and assisting hospital managers to improve patient flow. In the information technology (IT) literature there are occasional references to applications supporting the management of hospital access problems but they are not being used. Examples can be seen in the work of Mahapatra et al<sup>11</sup> or Ceglowski et al.<sup>12</sup>

## I Trial participants by hospital area

Group*	Patient Access Unit	Surgical ward †	Medical ward†
Generic managers (including Associate Nurse Unit Managers)	5	4	4
Other nursing staff	n/a	17	17
Consultant medical staff	n/a	8	6
Resident medical staff (senior and junior)	n/a	10	9
Allied health staff	n/a	5	5
Bed managers	6	n/a	n/a
Clinical liaison nurses‡	12	n/a	n/a
Sub-acute care referral staff	6	n/a	n/a
Project staff	3	n/a	n/a
IT technical staff	3	n/a	n/a

n/a = not applicable. \* All figures are in full-time equivalents, no distinction available between full-time and part-time staff. † Many other staff passing through these wards. ‡ The clinical liaison nurses can visit multiple hospital locations including these and other wards.

In this paper we describe a case study of centralised hospital access monitoring and support system development in support of the objectives of a new operational unit. The unit is dedicated to the redesign of care processes and the improvement of patient access. The rationale for this work is the ongoing access problems in the organisation, and recognition of the need to re-engage frontline staff through awareness of the issue. A common organisational view of the current state of patient access should allow a sense of shared ownership of the problem.

### Setting

The setting is a large metropolitan state-wide referral centre providing trauma services through to sub-acute and residential care. This organisation had experienced years of significant state-wide political pressure on capacity and demand management, with requirements to meet new access targets. Having reached a state of severe capacity and demand mismatch, a new business unit was made responsible for overall patient access management.

### Participants

The participants in the trial are described in Box 1.

### Methods

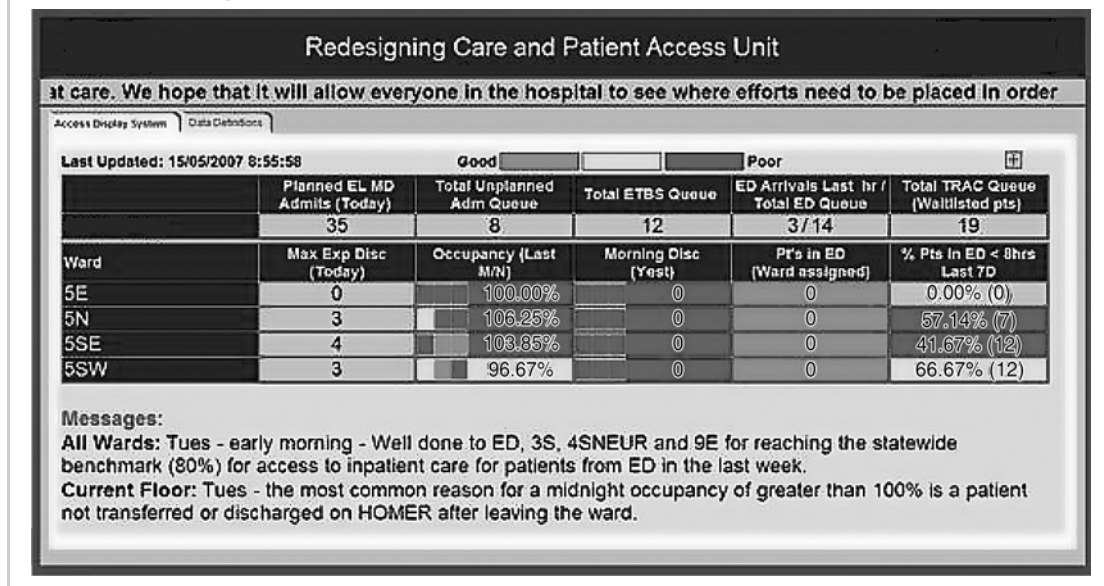
The approach was one known in the software development field as evolutionary prototyping. In this approach, an initial version of a system is created, then the system is progressively expanded and refined through cycles of user feedback, development, feedback, development and so on, until a satisfactory final version of the system is agreed upon by users.<sup>13</sup> This approach allows flexibility in development in a complex or uncertain environment, but its weaknesses include less emphasis on system documentation, absence of a pre-planned software architecture and the need for skilled development and analytical staff.

### Outcomes

The resulting system is known as the Access Display System (ADS) (see Box 2). The key features of the system are:

- Web delivery supports a range of relevant delivery devices, and is available over the corporate Intranet to all stakeholders.
- That it draws on data centralised from a number of web-based systems, including:
  - Emergency department patient flow and status tracker
  - Emergency operating theatre booking system

## 2 An Access Display System screen



- Sub acute care and rehabilitation referral system
- Admission request system for inter-hospital transfers or for patients awaiting non-urgent, non-elective inpatient care.
- Simple actionable and educative content increases the chances of incorporation into workflow.
- A configurable escalation mechanism, with trigger points that can be set for key access parameters (eg, numbers of patients exceeding 20 hours length of stay in the emergency department), and appropriate notifications can be made to the screen via the ADS, to email messages and/or to mobile phones (via SMS) of key staff.

In summary, the ADS offers utility for all stakeholders in the management of patient access to the hospital. The uniqueness of this application is its ability to allow live, whole-of-organisation feedback to staff regarding their performance in relation to patient access to care, while also highlighting current system bottlenecks. In addition, the system allows the dissemination of suggestions for resolution of the bottlenecks, as well as the commencement of

escalation pathways without additional burden on operational staff.

The ADS has had benefits for the key stakeholder groups. This is the first time the managers and executives have had a live “dashboard” to see the current state of the hospital in real time, with numerous views (ward, division/business unit/entire hospital), and in association with an escalation mechanism. For clinical staff, information can now be presented in a direct way in the workplace, so that they do not need to spend time searching for it. Clinical staff can then place in the broader context the access and flow impacts of clinical processes they are actively involved with.

For patients and families, although not yet specifically used in this way, the ADS may give a picture of the demand facing the hospital. Queue position feedback is used in other areas of the hospital, such as pharmacy dispensing, and is growing in a range of industries (for example computer-generated verbal feedback in a phone queue into a call centre).

While there has been no formal evaluation to date, the potential benefit of the system has been readily seen by the various stakeholders and

initial feedback from trial wards has been very positive — particularly in relation to the single point of access to otherwise disparate information. While there were concerns over the potential cost of a distributed delivery model, this has been addressed by the use of the web platform, and hence otherwise decommissioned PCs can be used as long as they have a web browser and access to a hospital network point. Initial concerns over the invasiveness of frequent SMS messages was addressed by allowing the escalation mechanism to be very flexible and configurable rather than fixed. Finally, stakeholders had concerns over the development of appropriate operational escalation processes, and the escalation prompt functionality has been built to deal with whatever business processes are put in place in relation to escalation.

In summary, although not perfect, the developed system has begun a process whereby the hospital's access performance can now be seen by all concerned, actions to be taken to address bottlenecks can be highlighted and initiated, and immediate feedback can be provided on the effect of management interventions.

### Challenges and constraints

There have been a number of challenges involved in delivering the ADS, both technical and organisational. Technically, the major challenge was access to, and integration of, disparate data sources. These ranged from paper-based collection systems, to operational databases, and warehoused data at the other end of the spectrum. Another technical challenge was the delivery mechanism. The ideal model would be to have the ADS visible in all clinical and administrative areas of the hospital using a ceiling or wall-mounted display, but funding prohibited this. At the time of writing, the decommissioned PCs were a cheaper alternative. In addition, the speedy development and implementation required to meet a tight delivery schedule was a significant technical challenge, but one that was overcome through the appropriate allocation of human resources.

In relation to organisational challenges, our organisation recently had a new CEO appointed, a significant change to its executive membership and a significant financial challenge. Anecdotally, the organisation had a history of repeated efforts of failed structural and functional change with ongoing poor financial and access performance. Staff engagement and lack of final consensus on how data should be used to support decision making were both significant organisational challenges.

### Discussion

While the issue of patient access to care occupies a large part of the health management literature, this is one of the first times that the development and implementation of a central hospital access monitoring system has been described in the Australian context. There are a number of commercially available applications, such as Stat Com<sup>14</sup> and CapPlan<sup>15</sup> evolving in this domain, but the key distinguishing features of the ADS are:

- It is lower cost than commercially available licenses.
- Existing systems have been harnessed as the content for the system, eliminating the need for a large, whole-of-hospital platform having to be created or purchased.
- The work has been done by staff with the necessary technical, clinical and local organisational knowledge.
- The system can be further improved in functionality or content depending on user preferences, technological availability (such as new end user devices such as tablets) or organisational need.

The development and implementation process has been difficult given the context; paradoxically this environment suggests the greatest need for such an application. The challenges of cultural change in relation to key redesign projects are significant. Our experience mirrors that seen previously.<sup>1</sup> Walley et al<sup>16</sup> describe similar issues in the National Health Service in the United Kingdom. Therefore, the effectiveness of this system

requires evaluation over a longer timeframe and should be the subject of further research.

In summary, while the system is limited to this particular hospital context at this stage, and has not yet undergone a formal evaluation, there are significant indications from the trial participants that the system fills a gap, and that it will help in addressing a chronic problem in this institution. Importantly, the core approach (building a “portal” on top of existing systems) is not new, and the principles embodied in the system can be adopted elsewhere.

In conclusion, much can be achieved in this problem area quickly and at low cost, if the environment is supportive and the business drivers for change are present. Web technologies offer promise in the public health care environment given the low cost support for distributed delivery. IT solutions to hospital wide access problems are not widely reported in the literature, and more work needs to be done in this area.

## Competing interests

The authors declare that they have no competing interests.

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