

USING TECHNOLOGY FOR BED MANAGEMENT IN PUBLIC HOSPITALS – A STRATEGIC ANALYSIS AND CHANGE MANAGEMENT PLAN

by

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ABSTRACT

As healthcare organisations in New South Wales, Australia, are facing the increased demands of an aging population, new approaches to improving access to services are being sought. This project explores the potential of applying information technology to the management of beds in a large Sydney public hospital. More specifically, this project addresses the cultural and organizational aspects of hospital environments and factors them into a change management plan for implementing bed management technology proposed by New South Wales Health, the State governing body overseeing public hospitals. In the process, the strategic implications of the proposed technology implementation are considered and alternative suggestions employing more advanced information technology are made. This study, then, acts as a change management guide for information technology implementations in general in public hospitals and offers insight into healthcare service demand management strategies and how business methodology and technology might be factored into assisting in this challenge.

DEDICATION

In Dedication to my Wife, Michelle, whose love, faith and enthusiasm

Allows me to follow my dreams,

And

In Memory of my Mother, Jan, whose love and integrity

Will remain with me forever

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GLOSSARY

Access Block	Bottlenecking of patients presenting in emergency departments. Measured as the percentage of admitted patients who had to wait more than 8 hours in the emergency department for admission to an inpatient ward, usually on a daily or weekly basis.
ATS	Admissions, Transfers and Separations – refers to data pertaining to information on the admittance of patients to hospitals, transfer between wards and facilities and discharge from services including deaths.
BPR	Business Process Reengineering.
Bed Board	A bed management information technology tool developed by NSW Health for State-wide implementation and the subject of this project.
Clinical Silos	Refers to the isolation of clinical services from each other or a lack of integration between clinical interventions for patients.
Coal-Face Workers	Frontline staff with direct intervention with patients or support roles with patient care implications e.g. doctors, nurses, porters and clerks.
DI	Disease Index – refers to data pertaining to diagnostic information (clinical coding and diagnosis related grouping) and defines episodes of care for any one separation.
DRG	Diagnosis Related Group – used to aggregate disease index data into broader diagnostic groups.
ED	Emergency Department.
HIE	Health Information Exchange – A NSW state-wide data warehouse accessible by NSW Health, SESIAHS and POWH data managers and managerial staff.
Hospas	A legacy Patient Admissions System in use at Prince of Wales Hospital at the time of this project. The Bed Board will initially extract data from this information system.
ICU	Intensive Care Unit.
iPM	A new Patient Admissions System, developed and marketed by the United Kingdom company iSoft, proposed for implementation at Prince of Wales Hospital approximately December 2005. The Bed Board will be able to extract information from iPM on its implementation.

KPI	Key Performance Indicator.
LOS	Length of stay.
MRN	Medical Record Number.
NSW	State of New South Wales in Australia.
NSW Health	State governing body for public health services in NSW.
NUM	Nursing Unit Manager. Senior Registered Nurse who manages a ward.
Outlier	Refers to a patient who has been placed in a ward with a diagnostic focus other than the patients primary condition dictates.
Patient Flow	Overall efficiency and concept of moving patients through clinical care especially in reference to movement of patients through hospitals.
Patient Journey	Refers to tracking the physical movement of patients through clinical e.g. as from the emergency department to a ward including all clinical and diagnostic steps involved.
PDL	Patient Discharge Lounge.
POWH	Prince of Wales Hospital, a 480 bed public hospital in Sydney's Eastern Suburbs.
RN	Registered Nurse.
Separations	Discharges from inpatient services including deaths. Can be further defined as same-day separations, overnight or multi-day separations or total separations to indicate same-day and overnight combined.
SESIAHS	South Eastern Sydney Illawarra Area Health Service – the location of Prince of Wales Hospital and one of eight NSW Areas under the overall governance of NSW Health.

1 THE BED MANAGEMENT ISSUE

The New South Wales (NSW), Australia, public healthcare sector is currently undertaking statewide initiatives aimed at improving access to healthcare services, particularly acute care services provided through public hospitals. Central to these initiatives is recognition of the increasing demand of an aging population on Emergency Department (ED) presentations and subsequent increased admission requirements to acute ward beds. As well as increased ED presentation and emergency admission demands, length of stay (LOS) requirements associated with a more elderly and clinically complex patient population, are on the increase. These factors, combined, make the increased incidence, severity, and associated clinical risk, of bottlenecking in ED departments across NSW in recent years readily understandable. This bottlenecking phenomenon has been termed “access block” and its measurement and reduction constitutes the primary key performance indicator (KPI) for state-wide patient flow initiatives recently initiated by NSW Health, the over-riding governing body for public healthcare in NSW.

1.1 Patient Flow Initiatives

Patient flow initiatives are currently being developed and integrated into large public hospitals in NSW such as The Prince of Wales Hospital (POWH), a 480 bed hospital in Sydney’s Eastern Suburbs. These initiatives are essentially Business Process Reengineering (BPR) initiatives with development and adaptation for suitability to healthcare environments. Concepts from Lean Thinking, BPR, in general, and Eli Goldratt’s Theory of Constraints have been incorporated into a number of key clinical process models to improve the efficiency and efficacy of, what has been coined, the patient journey.

The patient journey refers to the development of key process models by tracking the journey of a patient from presentation to the ED to discharge into the community using tag-along sessions, staff and patient interviews, surveys, and data extraction and analysis. Significantly, the patient journey recognises the need to integrate patient care across many and various clinical specialties. Such specialties have, through dedicated technological and scientific development, become, although very effective in their own right, esoteric in nature with clinical silos the end result. The recognition of clinical silos and the need to develop, and leverage off, a systems-based

understanding of the patient journey has emphasised the need for systems-wide information gathering and interpretation.

1.1.1 The Need for Transparency

While data on clinical demand, service use and delivery, and clinical outcomes has long been collected in NSW healthcare settings, its interpretation beyond specific clinical area application has been limited. Arguably, the desire to attract limited resources to areas of focussed clinical practice has resulted in information being used in a divisive manner, employing a use-it-or-lose-it mentality, rather than in an integrated hospital-wide, or State-wide, fashion. With the introduction of patient flow initiatives, however, the need to understand constraints, particularly at points of clinical handover, has generated interpretation and presentation of information more specific to understanding efficiency throughout the patient journey. As such, weekly consolidated performance information for POWH now incorporates KPIs specific to points of patient entry to services, the services themselves, movement between services, exit from services and exit from the hospital all together (see Appendix 1 - POWH Weekly Dashboard).

Tracking, and planning for, the patient journey has emphasised the need not just for improved information systems, but for analysis, accountability and action using these systems, with the end result a more transparent and patient-focused service. Transparency of asset utilization between areas of clinical practice within an individual organization has been recognized as just as important as transparency between organizations under the NSW Health banner. However, in what amounts to a politically-charged environment with powerful and, sometimes disparate, managerial and labor groups, shifting toward a culture of shared organizational goals using tools that aid in the transparency of information is not without its challenges. The introduction of an online bed management tool, called the Bed Board, at POWH provides a case in point.

1.2 The Bed Board Proposal

Historically, in a human resources heavy industry, the solution to patient access problems has been to increase human resource capacity. It is now accepted, however, that this approach is only effective if a proportional increase in system wide-efficiency and efficacy is noted. In recognition of this concept, NSW Health has sought a solution to ensure the optimum use of hospital beds to accompany an increased funding of beds as a contributing factor in reducing access block.

Increasing the number of beds at POWH has the simple goal of providing greater capacity to absorb the flow of patient admissions, particularly emergency patient admissions through the ED. The efficiency of bed use equates to the flow of patients into beds, on admission, the allocation of patients to specific beds in specific areas of the hospital, the transfer of patients between beds and the flow of patients out of beds, on discharge. The Bed Board has been proposed as a means of tracking this activity. It is essentially an application server based reporting tool that extracts data from patient admissions systems to give a near real-time picture of bed usage and, in so doing, assist in the goal of matching resources to outcomes (see Appendices 2 to 5 for primary Bed Board screens).

An assumption, at a local level, is that the Bed Board has been introduced by NSW Health as a monitoring device and that it will reveal underutilized resources which will, alone, lead to improved patient flow through better resource usage. While resource utilization to assist patient access is certainly the general goal, the Bed Board also represents a stretch-goal in that this type of technology and transparency present the potential to move hospitals toward a sustainable information culture at all levels of the organization. It may be assumed that this goal will only be met through understanding the root cause of information discrepancies between clinical and managerial activities and, further, that realignment of managerial and coal-face worker activities and incentives may be a key component of better resource management.

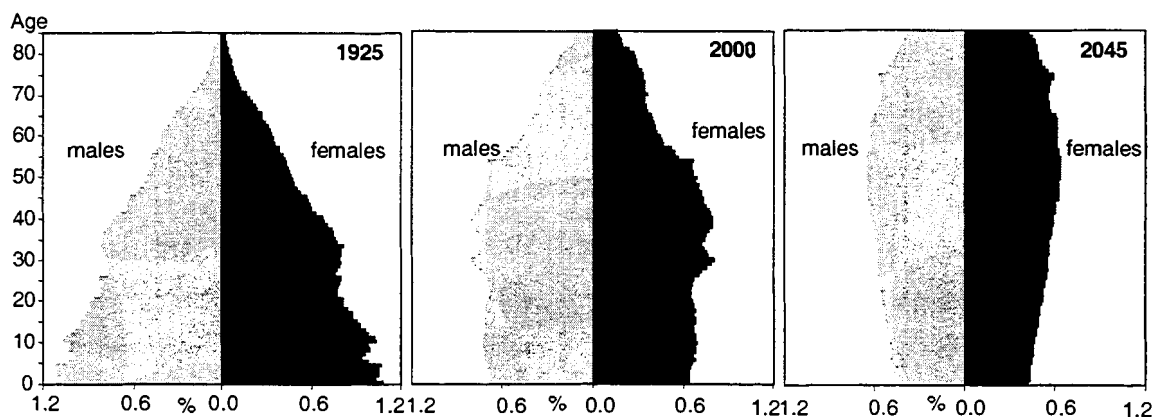
The implementation of the Bed Board at POWH, then, represents an opportunity to better understand the change implications of introducing transparency enhancing technologies into healthcare settings. In this endeavor, this project aims to: 1. better understand the strategic value behind the Bed Board at various levels of governance and at a coal-face level and the expected outcomes of its implementation, 2. further explore the potential of this tool, or similar later editions and, 3. propose change management options incorporating technology that will encourage proactive bed management and patient flow at a coal-face level.

2 A COMPLEX ENVIRONMENT – RECONCILING LEVELS OF GOVERNANCE AND COAL-FACE WORKERS

2.1 Demographic and Healthcare Product and Service Trends

Australia’s population demonstrates an aging profile indicative of an increased influence over fertility and mortality rates. As indicated in Figure 2-1, the declining incidence of deaths, in all age groups, and decreased number of births per woman is leading to a predominantly older population with an increasing concentration of people in the over 65 years of age group.

Figure 2-1 Changing Age Structure of the Australian Population 1925 - 2045



Source: Australian Productivity Commission, 2005, with permission¹

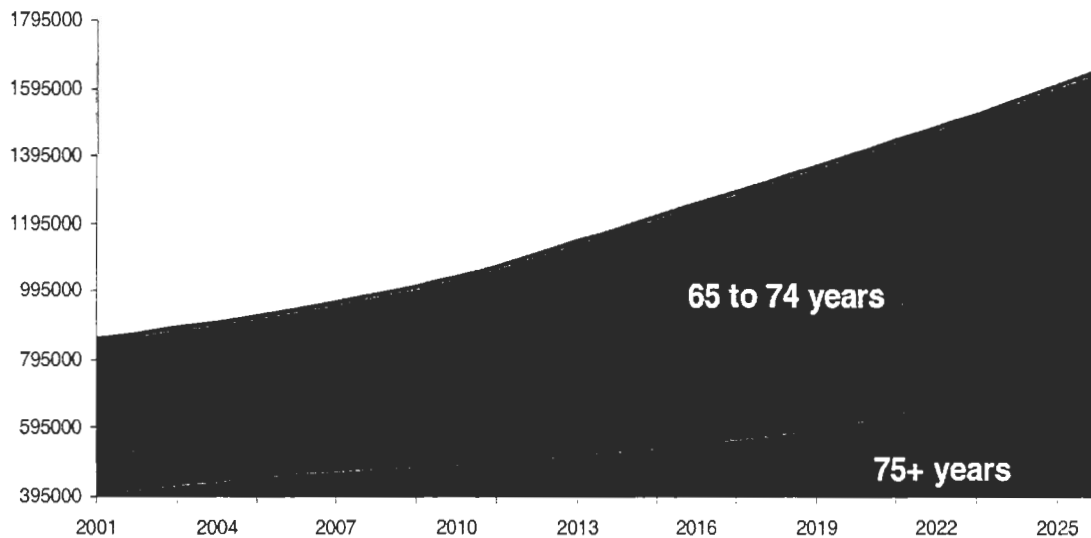
Although this aging trend is not a new phenomenon, the rate of change is expected to increase dramatically in the next two decades with the post-World War II “baby boomers” set to turn 65 between 2011 and 2031. In every year between 2012 and 2028, growth of the over 65’s group is expected to be four times the long term average². While the States of Tasmania and South Australia will demonstrate the greatest trend toward a disproportion of elderly to younger

¹ Productivity Commission, *Economic Implications of an Ageing Australia*, Research Report Canberra, Figure 1 page XIV, copyright Commonwealth of Australia reproduced by permission.

²Productivity Commission, *Economic Implications of an Ageing Australia*, Research Report Canberra, p 12 (2005)

population groups, NSW will follow a similar trend. As early as within the next seven years NSW will see a predicted extra 200,000 people in the over 65 years of age group with both 65-74 and over 75 age groups demonstrating significant growth as indicated in Figure 2-2.

Figure 2-2 Increase in 65 to 74 and 75+ Age Groups in NSW



Data Sources: Australian Bureau of Statistics, Australian Productivity Commission 2005³

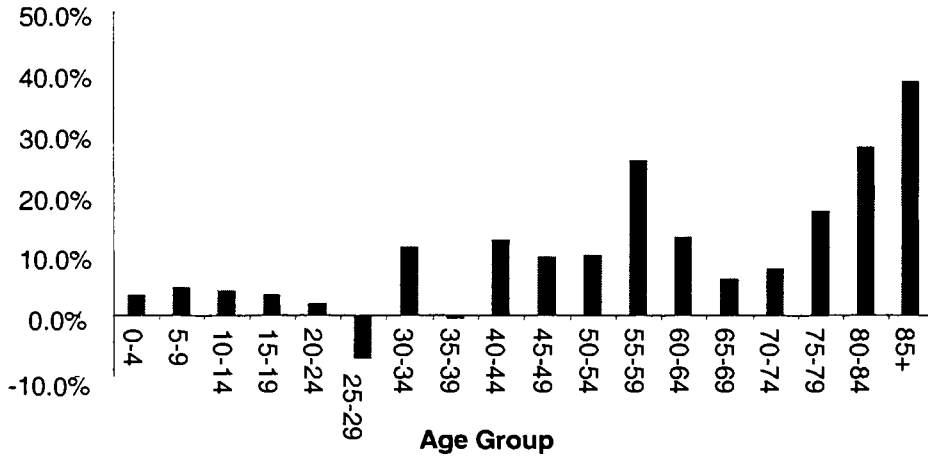
The implications of these demographic changes to healthcare service delivery have, for some time now, been a focus of policy makers in Australia and other economically advanced countries facing similar demographic trends such as Canada, the United Kingdom (UK), New Zealand and the United States (US). Increased utilization of services in these countries has been noted with the greatest increases evident in older portions of their populations. Figure 2-3, for example, indicates recent increased presentations to EDs in NSW public hospitals.

Accompanying increased presentations to NSW public hospital EDs is an increased tendency for older patients to experience admission delays in EDs as indicated in Figure 2-4. Figure 2-4 introduces the percentage access block concept as a measurement of ED efficiency in assessing and treating patients and having them admitted to inpatient wards. This measurement is defined as the percentage of admitted patients who had to wait more than 8 hours in the ED for

³ Australian Bureau of Statistics, Australian Demographic Statistics (3201 Series), Population Projections - Australia (3222 Series); Australian Productivity Commission 2005 p 13

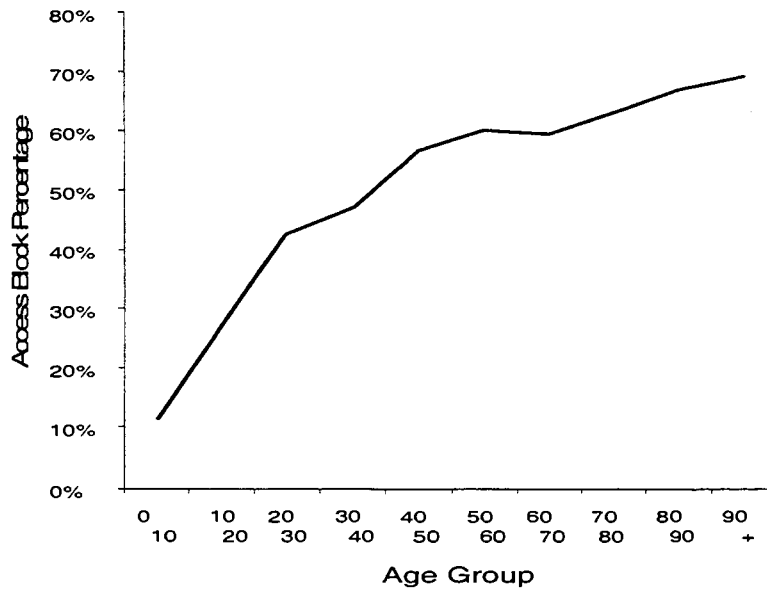
admission to an inpatient ward. The clock starts when diagnostic and treatment procedures are initiated by ED clinical staff. Access block figures are usually expressed as a percentage of daily or weekly admissions through the ED.

Figure 2-3 % Change in ED Presentations to NSW Public Hospitals between 1998 - 2003



Data Source: NSW Health, Health Information Exchange

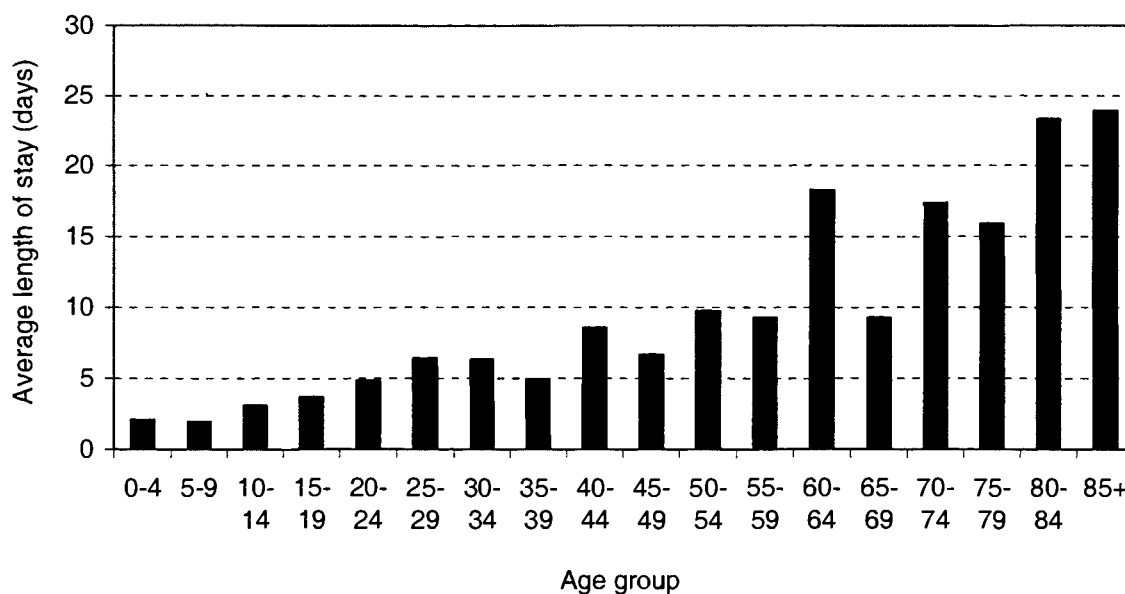
Figure 2-4 % Access Block by Age in NSW Public Hospitals Jan 2003 - Apr 2004



Data Source: NSW Health, Health Information Exchange

It appears, then, that an ageing population puts greater pressure on public hospital EDs. Of particular relevance to the implementation of the Bed Board at POWH is the significant contribution of admissions through the ED to inpatient bed utilization. At POWH, emergency admissions through the ED average around 80% of all admissions. To compound the ageing effect on bed usage, patient length of stay (LOS), once admitted, has been shown to increase with older patient groups, as indicated in Figure 2-5.

Figure 2-5 Average Length of Stay by Age in NSW Public Hospitals 2004



Data Source: NSW Health, Health Information Exchange

In contrast to this pattern of increased pressure on bed utilization in NSW public hospitals, as outlined by Figures 2-2 to 2-5, Gray, Yeo and Duckett⁴ report decreased overall bed utilization per capita and decreased mean LOS for both 65-74 and greater than 75 age groups for all of Australia between 1993 and 2002. These findings, however, need to be interpreted carefully, as they include all hospitals in Australia, both public and private. Private hospital use is significant in Australia, with approximately 50% of the population having some degree of private insurance coverage. Private hospital caseloads and patterns of use, however, generally reflect a more predictable LOS caseload. That is, private hospitals tend to target predictable, and more

⁴ Gray, L, Yeo, M and Duckett, J, *Trends in the use of Hospital Beds by Older People in Australia*, Medical Journal of Australia, Vol. 181, No. 9, 479-480 (2004)

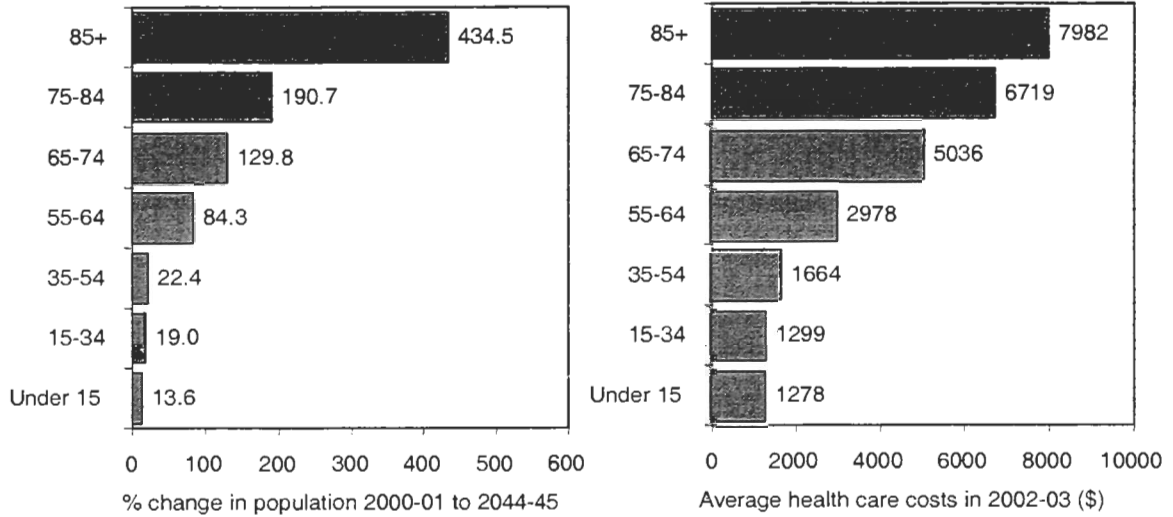
efficient, elective surgery admissions such as cataract and orthopaedic elective surgeries. Efficiencies in, and access to, these procedures has increased. The result is increased volumes of patients undergoing such procedures and overall decreases in average LOS. In contrast, public hospitals typically reflect a more complex caseload of patients presenting through EDs with multiple problems requiring longer LOSs.

Indications of increased LOS in NSW public hospitals are consistent with public hospital figures in the UK. Black and Pearson⁵ report increased LOS for patient care under the UK's publicly administered National Health Service (NHS) with rises beginning in 1999. As a precautionary aside, Morgan, Prothero and Frankel⁶ remark on the importance of defining data. They note that a single patient may present to an ED once while multiple procedures on presentation, defined as episodes, have been erroneously used as an indication of increasing presentations to NHS EDs. Although definitions and the nature of data samples complicate the true picture of demand and bed usage, there is little debate that an aging population is costing health systems more per capita every year. Combine this with the predicted aging population and a potent pro-forma cost combination results as indicated by Figure 2-6.

⁵ Black, D and Pearson, M, *Average Hospital Length of Stay, Delayed Discharge, and Hospital Congestion*, British Medical Journal, 325, 610-611 (2004)

⁶ Morgan, K, Prothero, D and Frankel, S, *The Rise in Emergency Admissions – Crisis or Artefact? Temporal Analysis of Health Services Data*, British Medical Journal, 319, 158-159 (1999)

Figure 2-6 % Change in Pop. (2000 – 2045) & Average Health Costs per Capita in Australia by Age (2002-2003)



Source: Australian Productivity Commission, 2005, with permission⁷

While it is well known that, currently, healthcare expenditure increases dramatically in direct proportion to age, healthcare cost drivers are difficult to interpret and understand fully. Chernichovsky and Markowitz⁸ note that age, in itself, has historically been a relatively minor driver of rising healthcare costs. In the past 20 years, they suggest, increased utilization of services and the use of new, and expensive, technologies may have provided the real impetus behind rising costs. Increased real per capita spending on healthcare, reflective of increased incomes and economic prosperity may, indeed, encourage expenditure on healthcare services as well as increased investment in new technologies by both government and private enterprise. A feedback loop constituting demand and technology could well be the key driver of increasing, age-proportional healthcare costs with the end result improved and prolonged lives⁹. In effect, the fiscal burden of an aging population may present as the result of economic and technological prosperity.

⁷ Productivity Commission, *Economic Implications of an Ageing Australia*, Research Report Canberra, Figure 14 page XXIX, copyright Commonwealth of Australia reproduced by permission.

⁸ Chernichovsky, D and Markowitz, S, *Ageing and aggregate costs of medical care: Conceptual and policy issues*, Health Economics, 13: p 543-562 (2004)

⁹ Productivity Commission, 2005, *Economic Implications of an Ageing Australia*, Research Report Canberra, p XXX

While healthcare economists have trialed many and various models of quantifying the net benefits of investments in medical technologies and increased access to services, healthcare managers have begun to react to an unwanted side-effect of clinical product and service specialization. With increased focus on specialty areas it becomes difficult for practicing clinicians to keep abreast of clinical advances outside their own fields of care. Combine this with increased demand trends on public resources, as discussed, and it becomes difficult to follow the course of any one patient's journey of care. In consequence, clinical silos have developed demonstrating exceptional quality of care within the silos, so to speak, but poor communication and coordination of care between them. Donald Berwick¹⁰ has hypothesized that a systems view is needed to accommodate growing demands and, simultaneously, refocus services for a more patient-centered model of care.

In economic terms, it may be stated that there is a price to be paid for treating excludable services, such as personal patient care in hospital beds, as public goods in a climate of increasing demand and diminishing supply. To date, the cost born by patients has been the opportunity cost of waiting, whether it is in the ED or on elective surgery waiting lists. What Berwick, and others, have recognised is that, just as waiting leads to further costs in the form of increased clinical risks, systemic inefficiencies, in themselves, act to compromise individual care and increase clinical risk. Berwick argues that addressing these systemic problems can act to improve both quality and access to care.

In support of this hypothesis, healthcare managers in Australia, the UK¹¹ and the US¹², point to growing inefficiencies and increased threats to quality in existing healthcare delivery models. Despite excellent records of care once services are accessed, increasing patterns of access block threaten continued quality of care due to the intrinsic risk of delayed intervention. Access block figures representing an aggregate of all NSW public hospitals have frequently approached the 40% and 50% marks on a daily basis within the last few years and demonstrated a yearly average of 28.5% in 2002/2003¹³. In response to these changing demands, NSW Health initiated Access Block Improvement Projects across NSW in mid 2004 with the goal of improving clinical

¹⁰ Berwick, D, *A Primer on Leading the Improvement of Systems*, British Medical Journal, 312:619-622, 9 March (1996)

¹¹ Alberti, G, *Transforming Emergency Care in England*, A Report by Professor Sir George Alberti, Produced by COI Communications for the Department of Health, Gateway Ref 3969, October (2004)

¹² Wilson, M and Nguyen, K, *Bursting at the Seams – Improving Patient Flow to help Americas Emergency Departments*, Whitepaper for the Urgent Matters Learning Network, September (2004)

¹³ Data Source: NSW Health *Emergency Departments Information System*

pathway efficiencies. POWH is one of ten hospitals in NSW currently implementing systems-based process changes aimed at alleviating access block.

In undertaking these projects, the possibility of using clinically modified business technologies to alleviate demand has presented itself. In so doing, the spiralling pattern of technology and demand leading to patient access problems and associated clinical risk may be addressed, to an extent, by technology itself. The significance of the Bed Board in this process is that it is one of the first of a series of business-like technologies being implemented at POWH as a means of improving patient flow efficiency.

2.2 The Patient Journey and Integrated Service Models

The patient journey concept draws on work flow mapping and business process analysis techniques that have, to date, had limited application in healthcare settings. Just as the greater service industry sector has realised the benefits of modifying analysis and process reengineering techniques from manufacturing industries¹⁴, healthcare managers are now drawing on the expertise of business analysts and modifying BPR methodology for healthcare settings. In the broadest sense, these initiatives aim to integrate services across areas of clinical specialty, clinical facilities and all other services and interventions, both clinical and supportive in nature, that effect patient care. As such, NSW Health's overall strategic plan, on introducing the Access Block Improvement Projects, is represented by Figure 2-7.

In the context of NSW Health's broad strategic plan, POWH aims to improve patient flow through the hospital and integrate hospital specific services as illustrated in Figures 2-8. Figure 2-8 also outlines broader categories of the many inputs and outputs to the ED and Wards that need to be considered in the management of bed usage.

¹⁴ Bowen, DE and Youngdahl, WE, "*Lean*" service: in defence of a production-line approach, International Journal of Service Industry Management. Bradford: Vol 9, Iss 3; p 207 (1998)

Figure 2-7 NSW Health's Access Block Improvement Projects Overall Strategic Plan

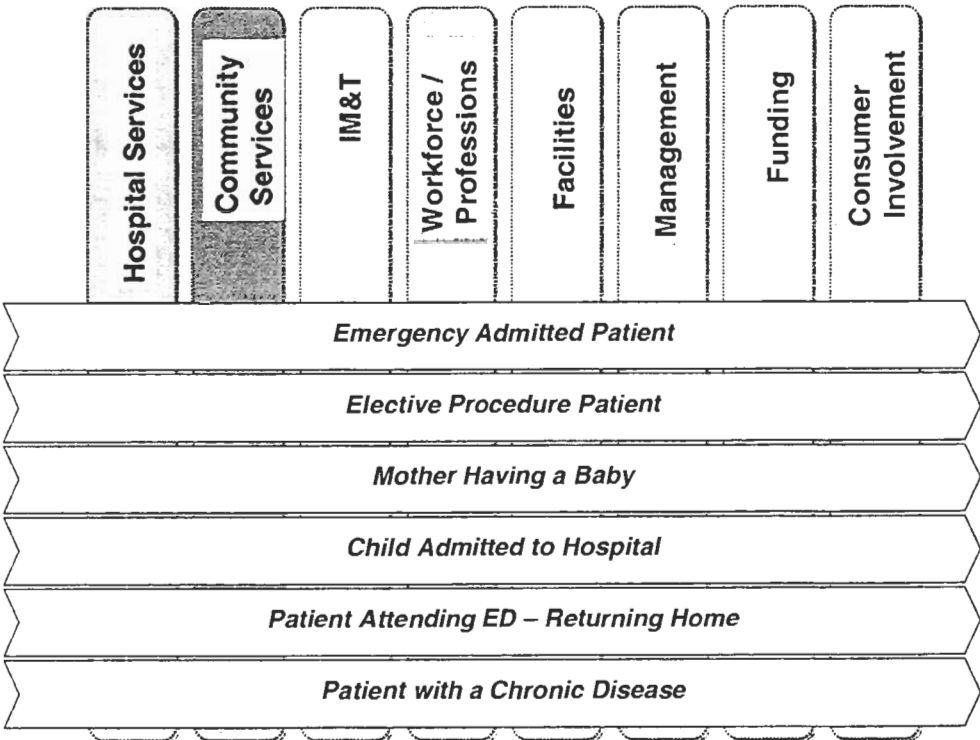
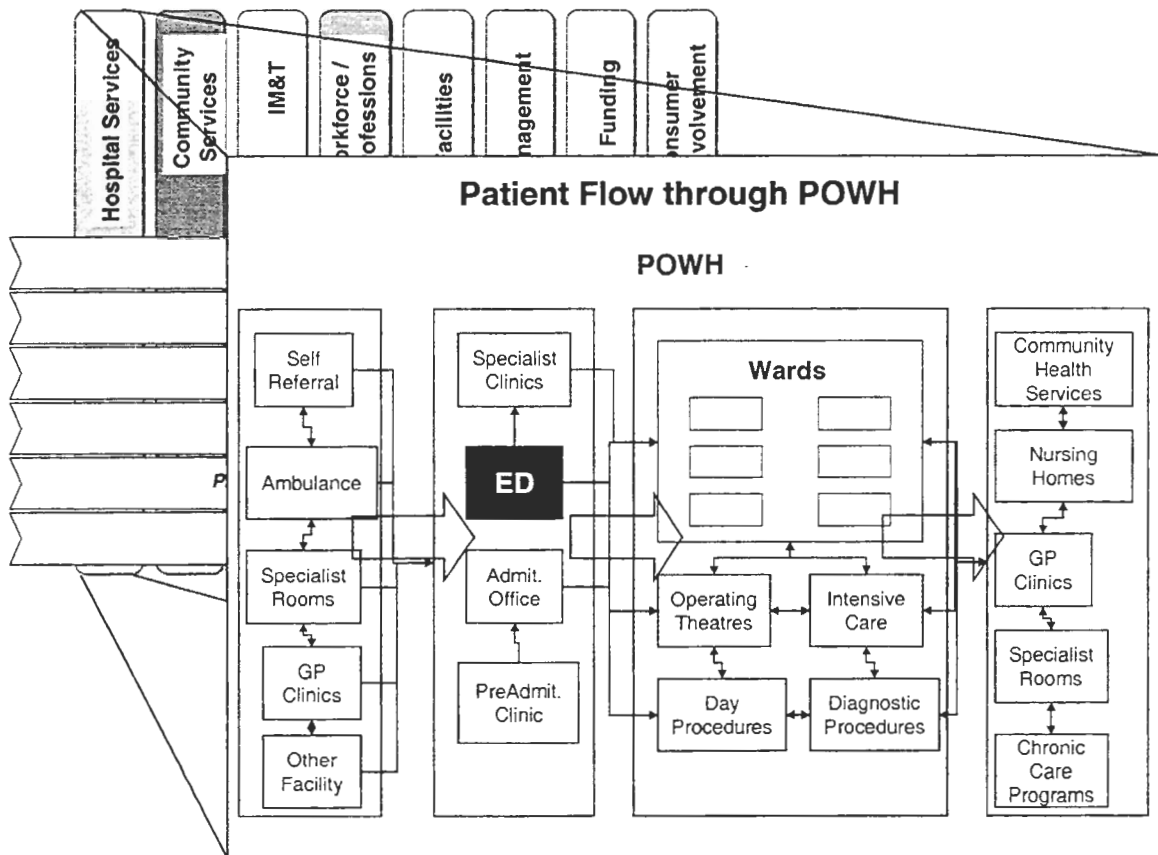


Figure 2-8 POWH Patient Flows in the Context of NSW Health's Broad Strategic Plan



In analyzing patient and work flow patterns to date, POWH and other NSW hospitals involved in Access Block Projects have identified two key conceptual needs. Firstly, there is a need to understand the location, measurement and nature of primary areas of constraint to patient flow. Secondly, there is a need to understand the requirements, measurement and utilization of resources. It is this latter concept that the Bed Board is intended to address by indicating patients in the ED awaiting allocation to inpatient beds and specific wards, as well as occupancy by ward on a real-time basis.

The concept that NSW Health has put forth with the Bed Board is that information on the availability and use of beds for any one hospital in NSW will be shared not only across all parts of the hospital but also with other hospitals, Health Area, and NSW Health Executive management. This widespread sharing of resource-use information, although in line with a general trend toward centralisation of health services governance to a State level in NSW, challenges the governance process in implementing the Bed Board as well as the traditional organisational structure of hospital settings.

2.3 Reconciling Levels of Governance and Coal-Face Workers

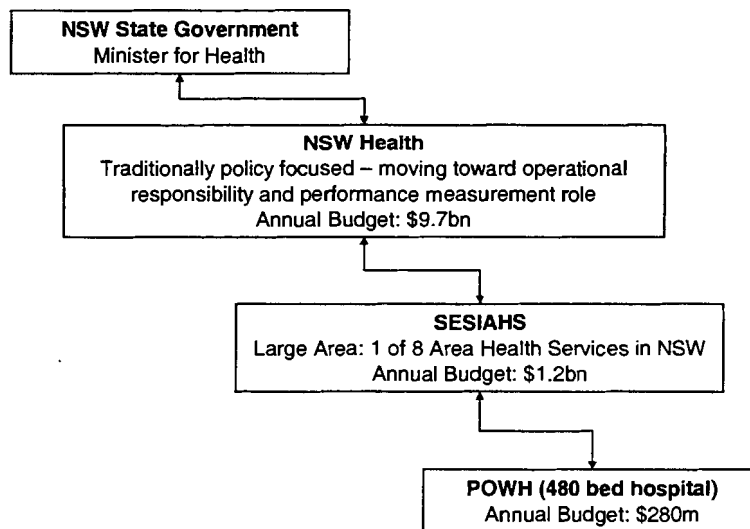
The Bed Board implementation at POWH represents three primary levels of governance. As outlined in Figure 2-9, the Bed Board will involve POWH executives, South Eastern Sydney and Illawarra Area Health Service (SESIAHS) executives and NSW Health executives. The motivation behind NSW Health's increased involvement in the performance and operation of individual hospitals across the state stems from a growing awareness of public malcontent with the public healthcare governance process. Similar to public sentiment expressed in Canada through the Romanow Report,¹⁵ the Australian public are increasingly viewing the supposed crisis in healthcare more as a crisis in governance¹⁶. In consequence, State Ministerial pressure on NSW Health for system accountability and measurable performance improvement has led to increased State governance involvement.

To encourage buy-in at an Area level, NSW Health has, with the next generation of Access Block Projects, entitled Sustainable Access Initiatives, put forth a shared-risk model. Under this model, Areas are obliged to propose local initiatives and demonstrate their benefits to patient access. On agreement of KPIs and approval of potential value, NSW Health will partially fund the project, with the Area funding the remainder. Any ongoing financial project support is contingent on meeting the agreed upon KPI targets. The incentive, then, for SESIAHS management is to generate proposals that will meet measurable patient access targets and to see them through successfully. An additional role that NSW Health is pursuing to support and foster the development of Areas is in the area of knowledge management. The intent here is to share the lessons of individual Hospitals and Areas across the State to avoid repeat pitfalls and leverage off successes.

¹⁵ Romanow, RJ (Chair of Commission), *Building on Values: The Future of Healthcare in Canada, Final Report* Commission on the Future of Healthcare in Canada, November (2002)

¹⁶ Marchildon, GP, *Canadian Health System Reforms: Lessons for Australia?*, Australian Health Review, Journal of the Australian Healthcare Association, Vol. 29, No. 1, p 105 - 119

Figure 2-9 Levels of Governance



At a local level, at POWH, the involvement of higher levels of governance in the implementation of the Bed Board represents significant implementation demands and pressures. In addition, the strategic consequence of widespread shared information on resource utilization is challenging, within itself, in an environment with traditional workforce autonomy and jurisdictional resource protection practices.

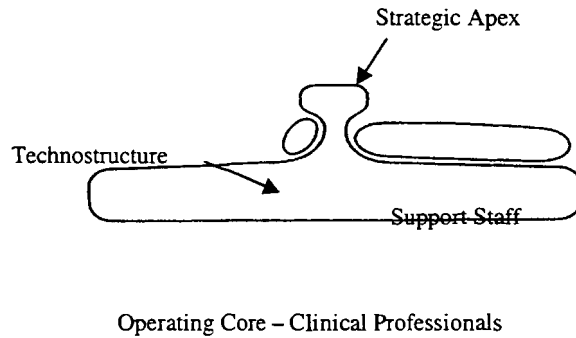
As previously discussed, increased demand on resources and increasingly specialized, and expensive, technologies and services has led to clinical individuals and groups protecting funding in a use-it-or-lose-it fashion. Add to this the traditional highly autonomous nature of a large professional operating core in hospitals and implementing technologies designed to integrate services, such as the Bed Board, represent a particularly challenging change process.

The high degree of individual specialization found in hospitals supports Mintzberg's¹⁷ argument that hospitals tend to fall into his professional bureaucracy configuration (Figure 2-10) in which the operating core constitutes highly trained professionals and considerable support staff is required to back these professionals up. Mintzberg notes that, under this configuration, the organization surrenders power not only to the professionals themselves but also to the colleges, training institutes or other governing bodies that certify their skills and legal rights to practice. Professionals work in a relatively independent fashion, each trusting the bonding process that has

¹⁷ Mintzberg, H, *Organization Design: Fashion of Fit?*, Harvard Business Review, Jan-Feb, p 8 (1981)

secured their colleagues proficiency and independent reliability. Under this organizational structure, there is a tendency toward perfection and standardization of skills which, in a hospital context, represent clinical specializations. Mintzberg notes that even though this structure is very good at perfecting what is already there, it is very resistant to innovation¹⁵.

Figure 2-10 Professional Bureaucracy Structure associated with Hospitals, after Mintzberg



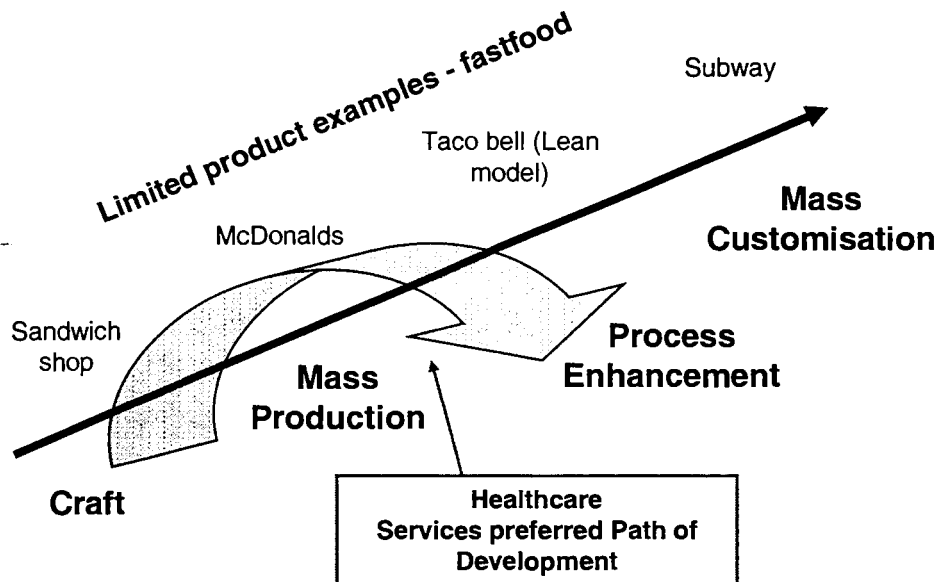
Under Mintzberg's professional bureaucracy model, the large support-staff of a hospital operates in contrast to the highly autonomic and democratic nature of the main professional body of clinicians. The support-staff typically undertake routine and simple tasks in support of clinicians and have a top-down and autocratic management structure. The Bed Board represents a step toward increasing the technostructure at POWH acting as an integrative component between support and professional activities and an information conduit to the strategic apex. For the Bed Board implementation, then, there is a need to recognise and understand these two primary coal-face worker groups, professional and support, at POWH and factor both groups into the change process to achieve the greatest overall effect.

It should be noted that a global shortage of clinical professionals leading to increased competition for staff, particularly nursing and specialized physician and surgical staff, is acting to reinforce the autonomous nature of clinical professionals in NSW hospitals. Buy-in at this level for any patient flow and integrated-service initiatives is imperative. As physicians and surgeons have, traditionally, been advocates for their patients, a logical argument is that the primary stimulus behind NSW Health's patient access initiatives comes from the same source. That is, from the public, the patients; albeit via the political motivations of the current State Minister for

Health. With this in mind, the primary selling point to clinicians should be the benefit of the Bed Board to patients.

Nonetheless, there is considerable challenge in moving clinicians away from, what could be considered, the current cottage-industry approach toward a mass customisation model of service delivery that would accommodate volume of patients, quality of care and flexibility in delivery. Fitzgerald and McLaughlin¹⁸ note the motivation of healthcare industry services to bypass the mass production stage of development, more suited to limited product industries, and, instead, move straight onto process enhancement models, more suited to complex, more personal and variable product and service industries (Figure 2-11).

Figure 2-11 Industry Development Pathways and Healthcare Services



In contrast to clinicians fears of patient access initiatives leading to a mass production model, Berwick¹⁹ and Brideau²⁰ assert that flow initiatives are effective and, in fact, necessary for quality improvements and not merely a response to demand requirements. Berwick's mandate, through his work with the Institute for Health Improvement in Cambridge, Massachusetts, promotes fundamental system reform as the only means of achieving new levels of quality

¹⁸ Fitzgerald, CQ and McLaughlin, CP, *Custom Medicine for the Masses*, Pharmaceutical Executive, p 66 December (2001)

¹⁹ Berwick, D, *A Primer on Leading the Improvement of Systems*, British Medical Journal, 312:619-622, 9 March (1996)

²⁰ Brideau, LP, *Frontiers of Health Services Management*, Summer, Vol. 20, No. 4, p 47 (2004)

improvement in healthcare settings. Performance, argues Berwick, is a system characteristic. Improved quality, therefore, is a product of patient centered systems redesign.

Although the work of Berwick and various case studies from Australia, the UK and the US provide some compelling arguments, patient flow initiatives and healthcare systems redesign are relatively new concepts on a global scale. As a small, but strategically and innovatively important, component of overall patient flow initiatives at POWH, the Bed Board presents the challenge of reconciling multiple levels of governance and frontline staff. In so doing, it is hoped and the underlying intention of this project, that the various groups involved can maximise the shared value of this resource. Ultimately, benefits to the quality and efficiency of patient-focussed services should be realised. Table 2-1, then, represents the potential value of the Bed Board to the three primary levels of governance and to the two primary coal-face worker groups at POWH.

Table 2-1 Primary Areas of Bed Board Value to Governance Groups and Coal-Face Workers

GROUP	POTENTIAL VALUE of the BED BOARD
NSW Health	Accountability; Performance Measurement; An aid to Systems Redesign
SESAHS	Insight to Area-Wide Patient Flow Strategies; Potential for New Projects; Strengthened Relationships with Hospitals and NSW Health; Knowledge Sharing and Management
POWH Management	Better Capacity and Patient Flow Management; Hospital Patient Flow Strategies; Organizational Transparency; Cooperation - Clinical, Support Staff and Management
Clinicians	Better Bed Allocation Decisions; More Timely Patient Access; Improved Quality of Care
Support Staff	Ease in Locating Patients; Increased Responsibility in Timeliness of Data - Team Work

3 INTERNAL ANALYSIS – PRINCE OF WALES HOSPITAL ACCESS IMPROVEMENT INITIATIVES

3.1 Strengths - Overview of Local Initiatives

POWH is a 480 bed public hospital in Sydney's Eastern Suburbs. It has 12 operating theatres, including 2 cardiothoracic theatres and 2 urology theatres. State wide services for Spinal, Lithotripsy, Hyperbaric Medicine and Renal Transplantation are provided. Community services are also provided through the hospital with post-acute care services and hospital in the home programs. Outpatient clinics are significant in number and services with 918,000 non-admitted patient occasions of service in the 2003/2004 financial year. In the same year POWH had around 35,000 total separations²¹ from inpatient services. POWH shares a campus with two other public health facilities, the Sydney Children's Hospital, and the Royal Hospital for Women, as well as the Prince of Wales Private Hospital. POWHs ED serves patients that may enter POWH, the Royal Hospital for Women and Prince of Wales Private Hospital; only the children's hospital has its own ED. In all, these facts represent a relatively high and complex demand on ED services and inpatient bed usage at POWH.

In the broader context of environmental demands discussed in Chapter 2, POWH was, up until the introduction of access block projects in mid 2004, operating in a relatively reactive fashion. Bed occupancy rates were routinely high and frequently in excess of 100%; an occupancy in excess of 100% meant that patients were in corridors on portable trolley beds. Not surprisingly, access block figures in 2003 were consistently high with concentrated areas of constraint as indicated in Table 3-1. Redesigning services and implementing access improvement projects while sustaining services under these conditions offered considerable challenge.

²¹ Separations are defined as all discharges from inpatient services including deaths. The quoted figure includes day-only and multi-day or overnight separations.

Table 3-1 Access Block by Specialty at POWH - Primary Areas of Constraint, 2003

Specialty Area	Access Block
Aged Care	65%
Respiratory	67%
Cardiology	41%
Gastroenterology	54%
Urology	67%

Data source: POWH, Emergency Data Information System

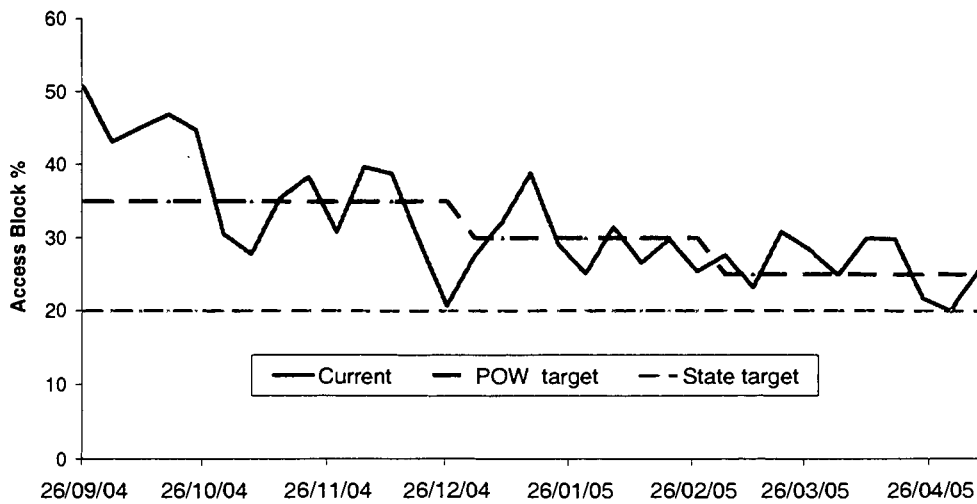
In July of 2004 POWH undertook the process of realigning the number and location of beds to accommodate patient demand more effectively. This process was shortly followed by the commencement of access block improvement projects with the backing of NSW Health and some assistance from external business consultants. A number of projects were initiated some of which are still progressing and others which are relatively self sustaining at this stage. Table 3-2 summarises some of the key projects.

Table 3-2 Key Access Block Improvement Projects at POWH

PROJECT	DESCRIPTION
Patient Flow Protocol	Development and introduction of a standardized protocol to expedite the handover of patients from ED staff specialists to inpatient specialty teams.
Data Consolidation	Consolidation of disparate patient data sources, performance tracking and the establishment of a weekly performance report (see Appendix 1 - POWH Dashboard).
Optimizing ED to Inpatient Interfaces	Establishing an ED dedicated patient transport team, reengineering the flow of patient information.
Patient Discharge Lounge	Establishment of a patient discharge lounge to allow new admissions while discharge activities are being finalised.
Ward Based Discharge Initiatives	Introduction of daily white board meetings, coordinated care planning, estimated date of discharge tools and event driven discharge protocols.
Pharmacy	Improvement of communication processes between pharmacy department and wards. Redesign of processes to expedite fulfillment of scripts.
Extension of Hours	Extension of hours for an Aged Services Emergency Team in the ED.
Support Services	Improving diagnostic turn around times and patient transport.

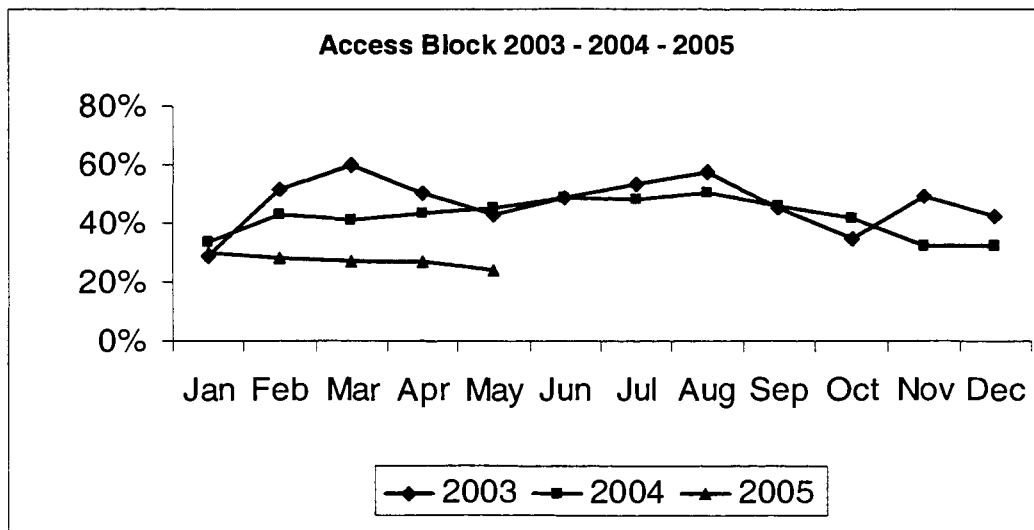
Since the initiation of access block projects at POWH, access block figures have shown significant decrease indicating improved patient access to inpatient services as indicated in Figures 3-1 and 3-2. These accomplishments are particularly impressive in the light of continued demand on ED services and admissions through ED as indicated in Figures 3-3 and 3-4.

Figure 3-1 Improvement in % Access Block at POWH Sept 04 to May 05



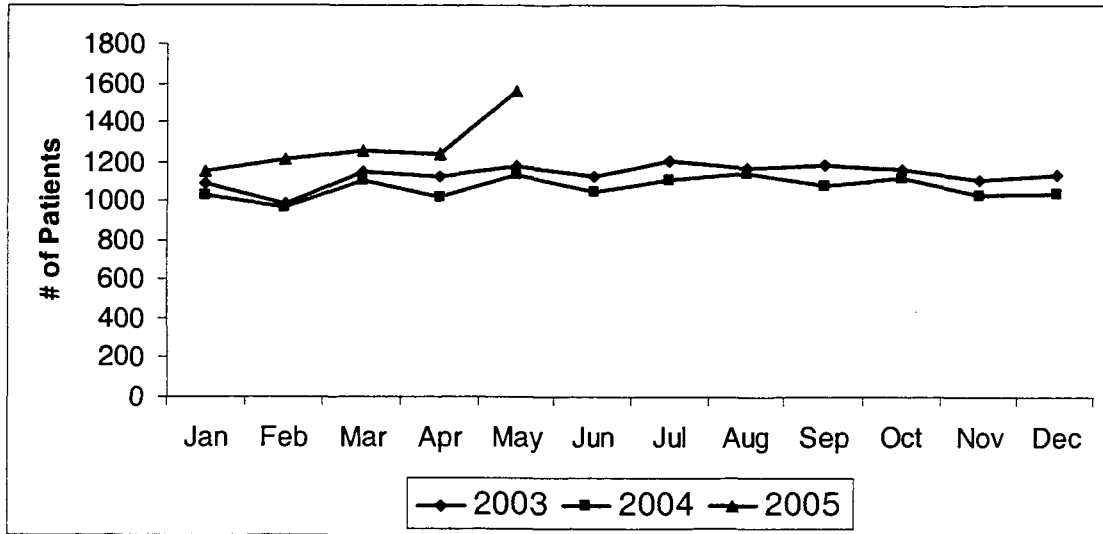
Data Source: POWH, Emergency Data Information System

Figure 3-2 Year-on-Year Access Block Data for POWH



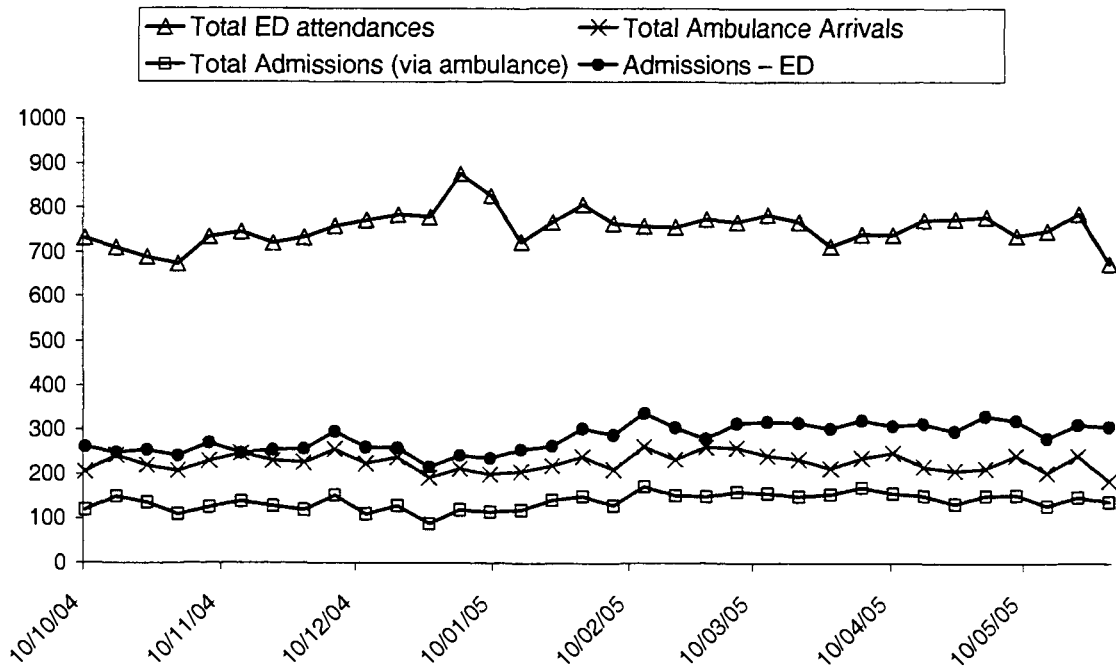
Data Source: POWH, Emergency Data Information System

Figure 3-3 Year-on-Year Admissions through the ED at POWH



Data Source: POWH, Emergency Data Information System

Figure 3-4 ED Demand at POWH, Oct 2004 to May 2005



Data Source: POWH, Emergency Data Information System

Consideration for the noted improvement in patient access at POWH is a complex and difficult evaluation process due to the many influences, positive and negative, that can increase or moderate access block on a day-to-day basis. This evaluation process does not get any easier with over a dozen projects aimed at improving patient access concurrently being implemented at POWH at the time of writing this report. There is no denying, however, the dramatic improvement in the primary KPI, the access block figures.

While evaluation processes are difficult, projects that have demonstrated beneficial contributions to overall success share some common characteristics. All of the projects, to date, have been under the same governance of the POWH Access Improvement Steering Committee with POWHs Executive Director as the Chair of this Committee. Executive staff at POWH has demonstrated significant commitment to all projects from the outset. Those projects that have shown the greatest acceptance and progression by clinical staff involved have had senior clinical buy-in, and leadership, in the early stages of their development. Projects that have been built from the ground up, with end-user (clinician and support staff) involvement have shown greater acceptance and enthusiasm in general. Projects that involved data collection by coal face workers have generally met resistance unless the immediate effects of the data collected is obvious to those involved in its collection. The more automatic any data collection processes, the more readily they were accepted. The success of projects involving new roles and positions has been highly dependent on the new individual staff member employed or team created.

The introduction of a patient discharge lounge (PDL) at POWH serves as an example of the importance of staff selection in new role creation. The PDL is a place where patients can wait for relatives, ambulance transport and any other delays to discharge such as prescription fulfillment and Doctors referrals, so that ward beds can be cleaned and prepared more efficiently for new admissions. The PDL at POWH initially saw widespread acceptance and use by ward staff. As time progressed, however, the number of discharges through the PDL waned. More recently, the appointment of a new Registered Nurse (RN) to the PDL has seen increased usage once again. This increased use is likely attributable to the proactive work practices of the newly appointed RN who spends the mornings actively seeking out patients that potentially could be discharged through the PDL. Most importantly, the new RN has bought into the PDL concept and its role in improving patient flow and, through her clinical credibility, has been able to influence her peers on the wards.

In general then, POWH has demonstrated significant commitment and strength in leadership since the commencement of access block projects. However, there is evidence to suggest that coal-face workers really are the driving force behind successful implementation of access improvement and patient flow initiatives. Furthermore, sustaining these initiatives requires a change in culture that requires careful and constant nurturing at all levels of the organisation. In consideration of these factors, POWH has established a Bed Board Implementation Working Party with broad representation across the organisation to ensure that end-user buy-in is given its best opportunity from the outset. An additional strategy worth consideration, as demonstrated by the PDL example, is the use of key clinician-champions to influence their peers and encourage widespread proactive use of this new tool.

3.2 Weaknesses - Lessons Learned

As introduced in Chapter 2, a primary strength of healthcare service organisations also represents, in line with the nature of core-competencies,²² one of their greatest weaknesses. Specifically, the professional bureaucracy organizational structure associated with these organisations is very good at perfecting existing processes, but very poor at changing, or challenging these processes.²³ POWH is no different in this respect. Innovation represents a significant challenge in an environment where lifetimes of dedication and achievements devoted to highly-specific patient care have perfected skills that, logically enough, clinicians stand by and take pride in.

Additionally, the generally cautious, and very scientific, approach to risk management in clinical practice is, for the benefit of both clinicians and patients, considered worth protecting. Nonetheless, following the work of Donald Berwick,²⁴ there is reason to believe that this highly focussed and meticulous approach to healthcare services delivery can, by design, lead to increased systemic risk to patients. Risk to patients increases, claims Berwick, as a result of ignoring the fact that patients, in most instances, partake in a system of care and are not generally under the holistic guidance of one clinician. A primary challenge, then, is broadening clinical

²² Leonard, D, *Wellsprings of Knowledge, Building and Sustaining the Sources of Innovation*, Harvard Business School Press, Boston, Massachusetts, p 28-35 (1995)

²³ Mintzberg, H, *Organization Design: Fashion of Fit?*, Harvard Business Review, Jan-Feb, p 8 (1981)

²⁴ Berwick, D, *A Primer on Leading the Improvement of Systems*, British Medical Journal, 312:619-622, 9 March (1996)

perspectives of risk from a treatment focussed, somewhat reactive, concept to incorporate a systems view.

The enormity of a public health system and the rapid development of clinically specific technologies, as discussed in Chapter 2, provide some explanation for the apparent ignorance or acceptance of systemic risk in hospitals. To further understand this problem, it is worth revisiting Mintzbergs²³ comment on lines of accountability within professional bureaucracies.

POWH, like other hospitals in NSW, surrender most of their power over clinical staff to clinicians' respective professional bodies. In line with the legalities of clinical care, these authorities typically focus on the here and now of patient care. In the extreme, doctors may be sued for negligence or incompetence in patient care but, usually, only after they have assessed and taken the patient on as part of their personal caseload. While this is obviously designed in the best interests of patients, it does little to address a public system of care as a whole, which comprises myriad handover processes and a central mandate of accessibility. Combining this concept with the global shortage of clinicians, as also discussed in Chapter 2, and it understandable that the threat of losing a licence to practice far outweighs any threat of losing a job over non-compliance with system-based reforms within any one organization.

By way of example, the development of a patient flow protocol at POWH has been particularly challenging. The patient flow protocol aims to track the flow of patients from admission to inpatient wards. Four primary sources of patients are recognised including patients admitted through the ED, patients referred by general practitioners or consultants, patients transferred from other hospitals, and planned or elective admissions. The process of coordinating ED specialists and specialty inpatient teams to improve patient flow from the ED to the wards demonstrates some key challenges. Specifically, the questioning of clinical opinions of both inpatient specialty teams and ED specialists, and the need for inpatient teams to tend to the demands of previously admitted patients as well as requests from the ED.

Traditionally, inpatient teams have had to approve the admittance of patients to their specific specialty teams and associated wards. At the heart of this practice is the assurance that patients are being correctly diagnosed and admitted under the most efficacious model of care. However, with increasing demands on services as outlined in Chapter 2, any delay in accessing inpatient specialty team consults in the ED represents significant risk. In particular the blocking of one, or a few, patients awaiting admission in the ED represents risk to subsequent ED

presentations. This is of particular concern to ED specialists. Inpatient specialty teams, on the other hand, will point to high occupancy rates and limited surgical theatre times as risks to already admitted patients should they devote disproportionate time to ED admissions.

In an attempt to recognize the concerns of both ED specialists and inpatient specialty teams, the patient flow protocol aims to recognize mutually acceptable timeframes, communication processes and admission criteria. This has become a complex endeavour as the many inpatient specialty teams have unique decision making and admission criteria. Critically, at some point in a newly designed protocol, inpatient specialty teams will have to face a choice of having a break from inpatient tasks or relinquishing their admission decision making to ED specialty staff. Of course, should they opt for the latter option, ED specialists will then adopt the associated admission risk traditionally taken on by inpatient teams.

Not surprisingly, this shared model of risk and timeframe accountability has demonstrated significant teething problems. To date, even though agreements have been reached in theory, they have not always played out in practice. As logical and efficient a model as can be designed, there are still concerns and the need for exceptions. In consequence, and as these issues are still being resolved, it has been acknowledged that the driving force behind this project has to be medical staff. Furthermore, there needs to be assurances that clinical risks will be appropriately accommodated under new, systems-based, models and that a senior physician, in this case the Director of Clinical Services – Medicine, is ultimately monitoring and guiding the process.

Though the involvement of senior medical staff is not essential for all projects, the recognition and understanding of pre-existing processes, particularly in relation to responsibilities and clinical risk is critical for moving ahead with patient flow initiatives. Additionally, a need to incorporate flexibility and appropriate ownership of responsibilities into new models of care is needed. For the implementation of the Bed Board, current bed management strategies, priorities and any associated clinical risks will need to be identified and addressed in order to facilitate patient flow and resource utilization to optimum effect.

There have been, on the other hand, examples of projects that indicate a need to have support staff drive the process or sustain the objectives of the project rather than clinical staff. A successful example of this is represented by data consolidation and reporting initiatives. A result of these initiatives, the POWH Weekly Dashboard (shown in Appendix 1), is maintained by

weekly collection and input of data. Although some clinical staff are involved in reporting waiting lists and other activities, the maintenance of the Dashboard and input of data is largely the responsibility of administrative and support staff. These staff members are disciplined in the routine requirements of reporting activities and have the prerequisite clerical and fundamental computing skills to maintain reporting tools.

In contrast, an attempt to introduce a spreadsheet-based projected patient flow tool, prior to the decision to implement the Bed Board, proved wholly unsuccessful. This intranet based Excel tool was to rely on input and interpretation of data by Nursing Unit Managers (NUMs) on the wards and in the ED. Excel is a large and very complex program for novice computer users, which, though very general, is a fair description of the aging nursing workforce in POWH and other NSW hospitals. This fact, combined with a difficult-to-interpret format and a relatively instable tool, made the possibility of this project being successful very slim and, in fact, it did fail. As illustrated, there is a need to consider the most appropriate staff group in the organisation for newly introduced jobs. As the Bed Board will involve both clinical and support staff, assigning appropriate roles should be a key feature of planning activities.

3.3 Opportunities – Moving Forward with the Bed Board

The Bed Board, as introduced in Chapter 1, is an application server based bed management tool. As shown in Appendices 2 to 4 the primary Bed Board screens provide reports on bed utilization. Information on the number and location of available beds throughout the hospital is readily summarised on the main screen (Appendix 2). The Emergency Profile Summary screen (Appendix 3) provides the number and type of admitted patients waiting in the ED for allocation to beds. As the Bed Board is a data extraction and reporting tool, only patients admitted and subsequently entered into the current patient admission system, which is a legacy system called Hospas at POWH, can be viewed on the Emergency Profile Summary screen (this is significant and will be further discussed in this and subsequent Chapters).

Further demand and supply indicators currently functional in the Bed Board include the number of booked day-only and multi-day pre-admissions (patients booked for surgery), projected historical ED admissions and projected historical discharges. The latter two indicators are derived from archived admissions system data and are designed to assist in interpreting the current situation and any escalation requirements. Additionally, the Bed Board incorporates a

transfer screen designed to assist in the process of transferring patients to and from other hospitals and factor transfers into the demand and supply picture (Appendix 5).

The proposed architecture for the Bed Board designates a server per Health Area that will extract data from each hospital's patient admission system on, to begin with, an hourly basis. Reports generated by the Bed Board server will then be accessible via a web-browser and the Area intranet. The limitation to this model is the data transfer rate dictated by the volume of data and the hardware capabilities of the Areas' telecommunications system or the size of the "pipe". This is the primary reason that refresh rates will be limited to one per hour to begin with. The origin of this model, however, is that it is a cost-efficient means of accommodating a variety of patient admission systems that currently exist within any one Health Area in NSW. Whether this refresh rate will be adequate in improving bed management practices, of course, will depend on current local bed management practices and the potential to integrate this new information tool into these practices.

As indicated in Figure 2-8, there are many demands, inputs and outputs to bed management utilization, planning and allocation processes. Figures 3-5 and 3-6 explore this issue further and break down the bed allocation processing involved in inpatient ward stays. Figure 3-6 indicates the clinical and strategic decision making involved in the bed allocation process. Allocation and movement decisions are under the direction of Bed Managers who, at POWH, are senior nurses.

Figure 3-5 Inputs and Outputs to the Bed Allocation Process

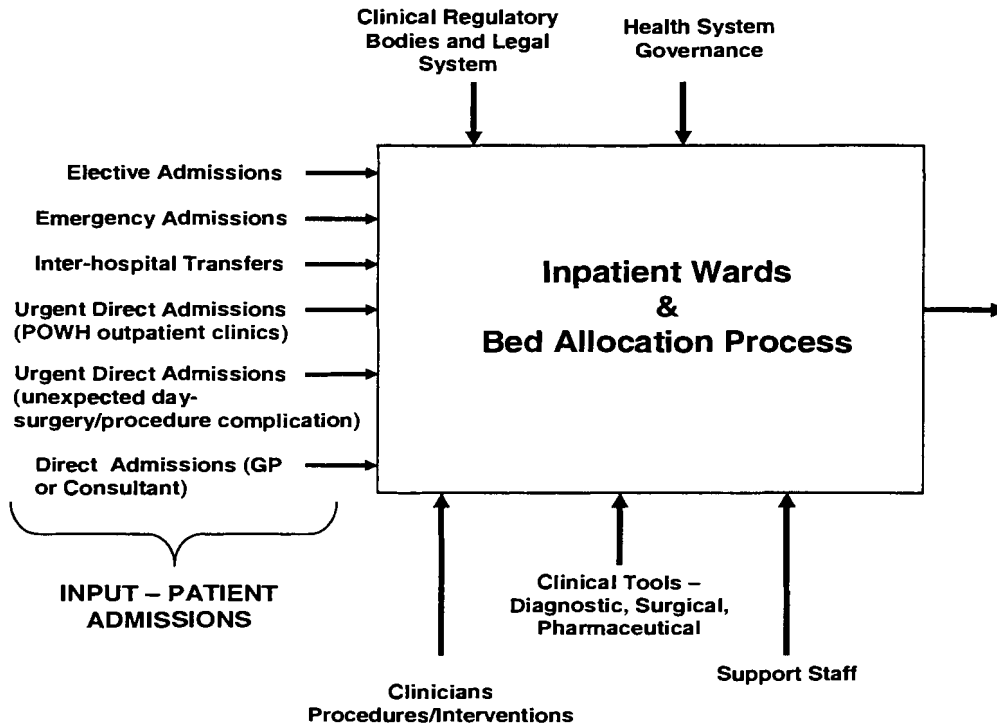
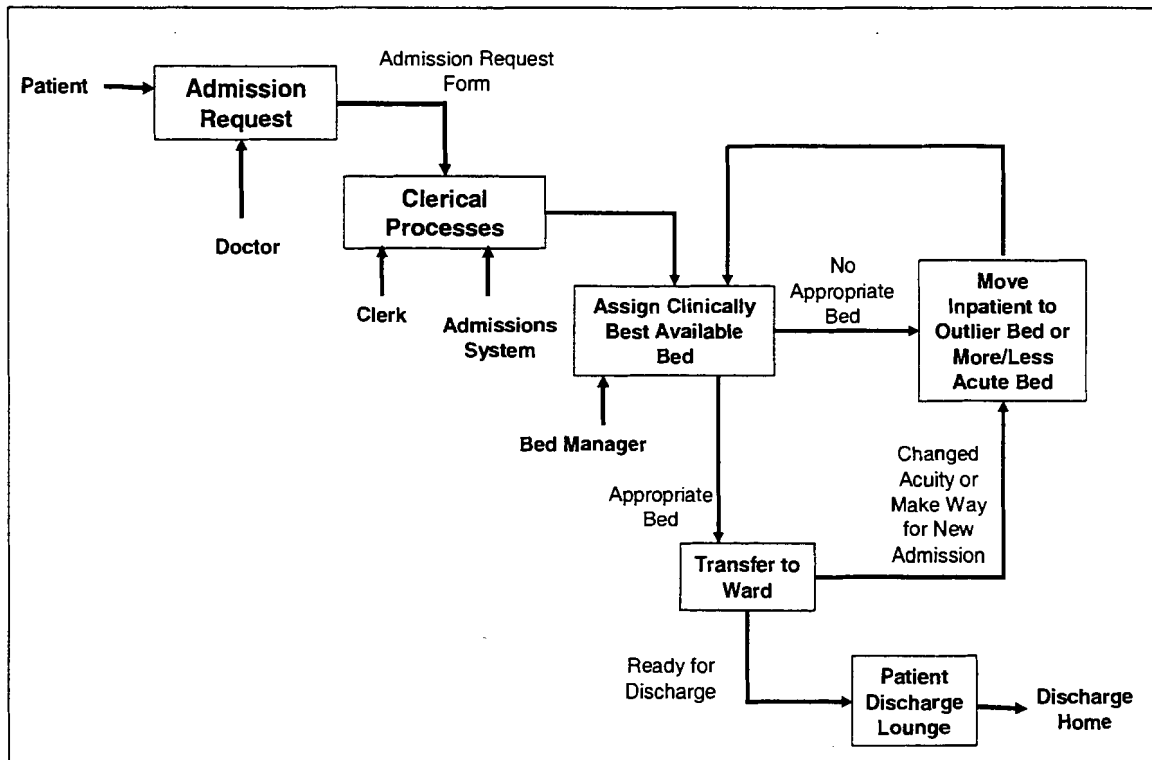


Figure 3-6 Bed Allocation Process



The primary goal of bed management is to ensure that patients are allocated clinically appropriate beds and, in the process, allow access for newly admitted patients and reduce the number of internal transfers as much as possible. The term “outlier” refers to a patient who has been placed in a ward with a diagnostic focus other than the patients primary condition dictates. For example, a respiratory patient requiring medical care may be placed on a general surgery ward if that is the only bed available. As it is more critical to have more acutely ill patients in diagnostic-specific wards, bed managers will often out-lie patients who are approaching the end of their stay in hospital to make way for the most pressing needs. Similarly, patients will be transferred in accordance to their changes in acuity. An example of this occurs when patients are upgraded from or downgraded to the Intensive Care Unit (ICU). Of course, minimizing the number of outliers and transfers is preferable, as is ensuring that beds are occupied to an optimum capacity. The feedback loops in Figure 3-6 accommodate the management of acuity and outliers and may undergo many and various iterations in achieving these goals.

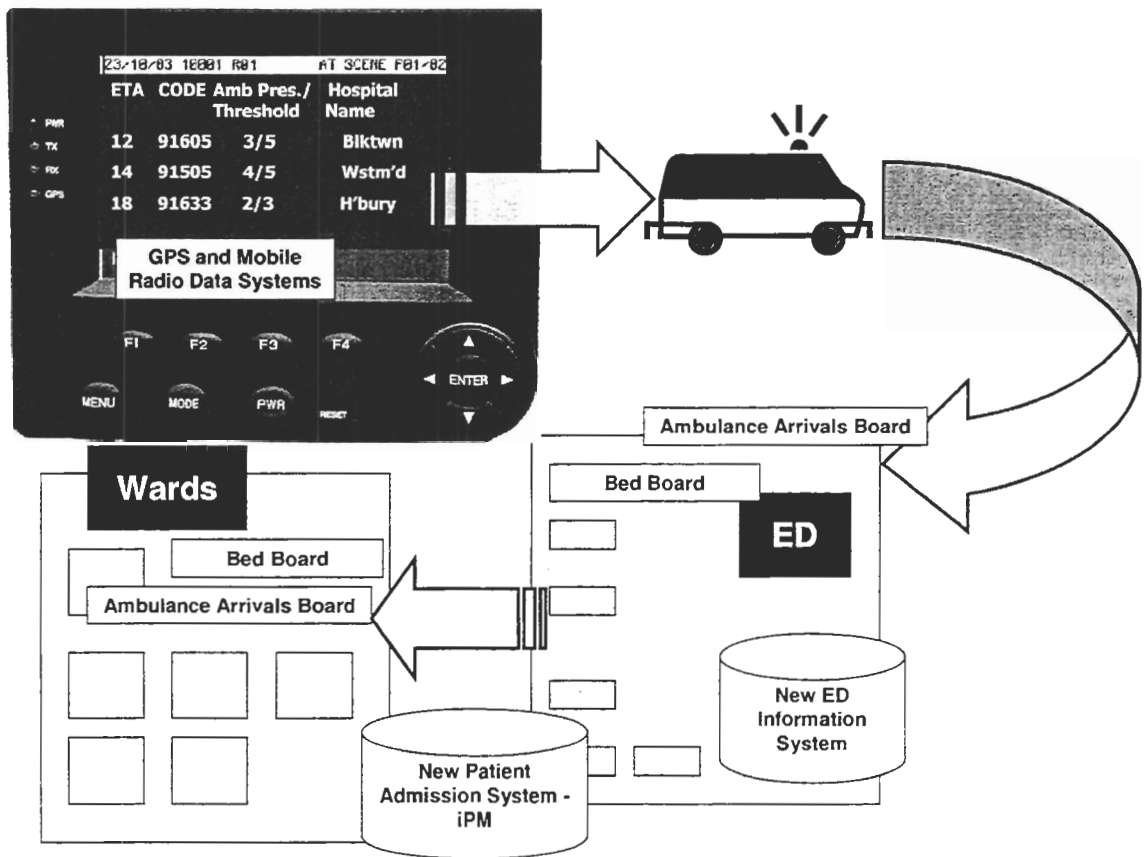
The current bed management practice at POWH is largely a manual process. One Bed Manager is on duty in the morning and one in the afternoon to early evening. Their days comprise personally visiting the ED and wards to determine bed requirements and bed availability and weighing this information up with elective admission, any unexpected direct admission and inter-hospital transfer information. Records are kept on clip-boards and post-it notes and communication is face-to-face, via telephone and via web-paging. The primary contacts on each ward are the NUMs who, in collaboration with the Bed Managers, Patient Access Manager, Doctors and other senior nursing staff, as indicated, negotiate the use of beds to accommodate daily demands.

Negotiation is pivotal to the Bed Managers role as each ward, the ED and the various staff involved have their own agendas. While these agendas are generally patient focussed, balancing them to achieve equitable access and quality of care is really what the Bed Managers role entails. For example, when a ward discharges a patient, the onus is on the wards NUM to contact the Bed Manager and report the availability of a bed. If at the time, however, nursing staff, including the NUM, are preoccupied with especially acutely ill patients, or if it is the end of a very long and arduous shift, the immediate reporting of bed availability may not be a high priority. Reporting the bed, after all, will invite greater demands on the ward. This example illustrates another reason to employ experienced nurses as Bed Managers. On visiting wards, the Bed Manager is able to provide an objective understanding of the work demands dictated by patient acuity and staffing levels and factor these into the bed allocation process.

Entirely eliminating the face-to-face component of the Bed Managers role, then, would likely be a critical planning error. However, given the daily throughput of patients at POWH and the size of the campus with a busy ED, 16 general overnight wards, 7 special overnight wards, 4 day-only wards, 12 procedural wards and 5 wards dedicated to mental health, there is a very strong case for more advanced tools to assist the Bed Managers and all staff involved in the bed management process. The Bed Board represents an excellent opportunity to leverage off relatively simple business technology and act as a pivotal tool in the process. It is, though, one in a series of proposed technology implementations that should assist overall patient flow.

A series of technologies have been proposed for POWH and other NSW public hospitals as illustrated in Figure 3-7. The proposed technologies aim to address patient flow from ambulance to inpatient ward. These initiatives recognise the need for an integrated patient flow model designed to avoid ambulance redirects, to other hospitals, and to decrease access block at EDs. A collaborative effort is possible as the NSW Ambulance Service also comes under the governance of NSW Health.

Figure 3-7 New Technology Proposals to Aid Patient Flow



Beginning with an ambulance pick up, the process of directing ambulances to specific hospitals will be simplified by using a chart to match hospitals to the inpatient services they provide. This first step aims to get patients to the right hospital the first time around and so reduce the number of inter-hospital transfers. Within the Sydney area, up to three hospitals may be identified per ambulance pick-up. The volume of ambulances directed to each hospital will be determined by a predefined maximum flow per hour derived from historical modelling of ED and hospital demand capabilities. This information combined, along with the distance to each hospital determined by GPS, is displayed on the ambulances mobile radio data system.

In Figure 3-7, for example, three hospitals have been identified as possible destinations and their demand status has been indicated by the numbers of ambulance presentations per threshold; in the example 3/5, 4/5 and 2/3. When a hospital reaches its maximum flow per hour, it drops off the screen as an option, for 1 hour, to allow hospitals to absorb the demand that has arrived so far. The significance of these initiatives is that they recognize that, historically, there is a large degree of predictability to the flow demands on the ambulance service and hospitals EDs.

Once an ambulance has chosen a destination hospital, information from the mobile radio data system and the ambulance operations centre will be forwarded to the ambulance arrivals board at the hospitals EDs. This will be viewable in both a hospitals ED and on its wards. It will look a lot like a flight arrivals board at an airport with the added information of the type of patient the ambulance is carrying as shown in a partial detailed section of the board in Figure 3-8. The general idea is to give the whole hospital a “heads-up” as to what is coming in the next hour.

Figure 3-8 Partial Detail of Ambulance Arrivals Board

PD	ETA	DETERMINANT	TRANSPORT MODE	STATUS	DETAILS
+	0	X-RAY/RADIOLOGY	NORMAL TRAVEL (CODE2, 3, 4)	ARRIVED	
+	11	DIABETIC PROBLEM 13-C-03	NORMAL TRAVEL (CODE2, 3, 4)	EN ROUTE	Abnormal breathing
+	12	CHEST PAIN 10-C-02	LIGHTS AND SIREN (CODE1)	EN ROUTE	Cardiac history

The Bed Board will also be viewable both in the ED and on the wards. This will allow the hospital, as a whole, to coordinate the information of the ambulance arrivals board with the occupancy status of the hospital and, in so doing, provide a level of transparency unheard of to date. Ambulance arrivals, of course, are just one part of the ED presentation demand picture which, in turn, is just one component of the demand on the entire hospital, albeit the greatest demand by volume.

For the week in May 2005 at POWH summarised in Appendix 1, for example, of 788 total ED presentations 243, or around 30%, arrived via ambulance. This fact highlights the significance of the patient admissions system as an overall coordination tool. Only the patient admissions system will provide the full picture of demand on wards by inclusion of all transfers in and out of the wards, inter-hospital transfers, elective admissions and any other unexpected admissions. This is why the Bed Board draws on the patient admissions system.

There is, also, a significant ED caseload that does not result in admission to wards. Looking at the same week in May in Appendix 1, around 40% of ED presentations resulted in admission in that week. This may have been a slightly conservative estimate, as only admissions to POWH are included in this figure, whereas the POWH ED also serves the Royal Hospital for

Women and the POW Private Hospital, as mentioned earlier in this chapter. Either way, widespread information about all patients waiting in the ED, not just those who have been admitted and are waiting for beds as reported by the Bed Board, would provide useful insight into the bed management process. With this information a fuller picture of potential needs could be acted on sooner than later.

To better accommodate these issues, a new ED Information System and a new Patient Admission System, iPM, produced by the United Kingdom company iSoft, have been proposed. The latter system is a large and complex implementation currently underway with an expected go-live date falling in December of 2005. The inclusion of a patient unique identifier in the iPM implementation also paves the way for bed-side point of care systems and online Electronic Medical Records (EMR). The new ED Information System will allow subsequent versions of the Bed Board to display patients waiting in the ED who have not been admitted. A fuller view of ED activity, then, will be available to the wards. The iPM system has bed management functionality built in that is more sophisticated than the currently proposed Bed Board. This functionality will be discussed in subsequent chapters. The Bed Board, however, will still be used as a benchmarking tool at an Area and NSW Health level recognizing that various admissions systems can be accommodated, including the iPM system.

In combination, the new ED Information system and the iPM system will offer superior bed management and patient flow capabilities such that the currently proposed Bed Board acts as a precursor to improved functionality. As a relatively low cost proposition, then, the Bed Board represents an excellent opportunity to iron out change management issues over the next 6 months and prepare POWH for increased patient flow capabilities.

3.4 Threats – Limitations of the Bed Board, the Timely Data Issue and Persistence of Existing Practices and Processes

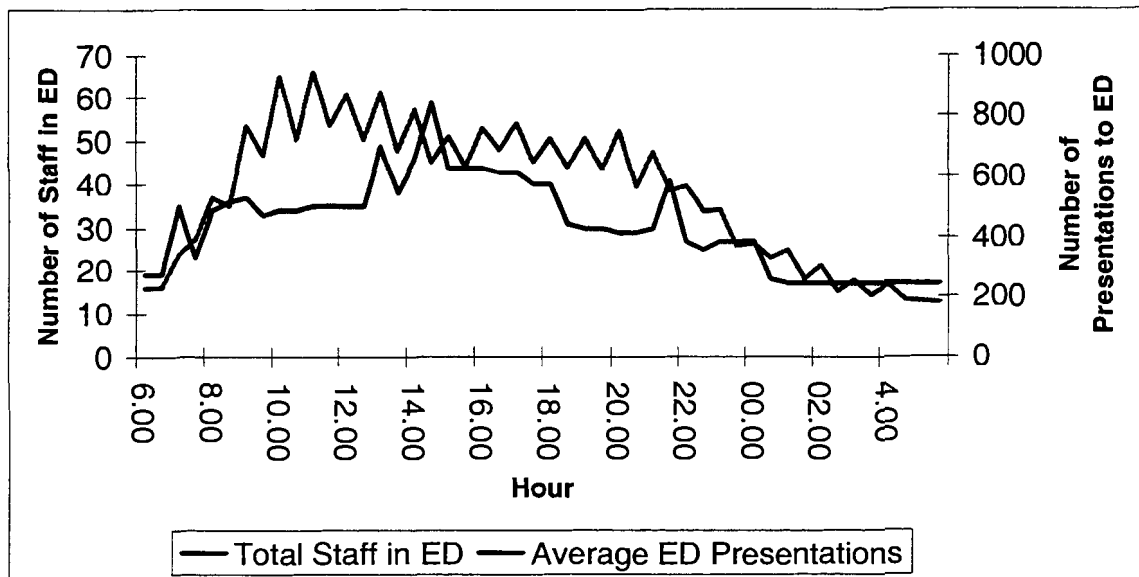
The Bed Board will only be useful to clinicians and management if the data it represents is timely and reliable. To date, although desirable, the need to enter data into the patient admissions system shortly following admissions, transfers or discharges has not been essential, as the data has always been used in a retrospective manner. With the introduction of the Bed Board, however, data in the patient admissions system will need to give an accurate picture of activity at least every hour.

The current process for entering activity data into the admissions system requires nursing staff to inform clerical staff of any admissions, transfers or discharges. During regular business hours, clerks on each ward will then enter this data into the system. In the evenings and on weekends the practice, to date, has been to call the clerk assigned to the ED, as there is always a clerk on duty in this area, who will enter the data at that location. It is suspected that the ED clerk, however, is frequently busy with other duties in the ED and the information, although entered, is often entered retrospectively. As such, a new process will need to be explored if data is going to be viewed and acted upon by bed managers and clinical staff on an hourly basis.

Another primary threat to the success of the Bed Board implementation is the potential to persist with pre-existing practices and processes. This could result as the Bed Board is assistive in nature. That is, it acts as a tool to aid the bed management process, rather than defining the process or acting as an essential step. Despite the Bed Boards convenience, there are two primary reasons it may be underused.

The first is the traditional reactive mindset in delivery of care. This stems from the belief that the demands on healthcare services, particularly emergency services, are largely unpredictable. However, although there is certainly unpredictability on many levels, historical analysis of patient presentation data indicates higher level trends that can be used to indicate proactive initiatives. Figure 3-9, for example, illustrates an analysis of ED activity and ED staffing levels undertaken to match staffing levels to the peak periods of activity through the day.

Figure 3-9 Using Historical Presentation Data to Match Staffing Levels



Data Source: NSW Health, Health Information Exchange

At a more granular level, it may be argued that even though we might predict overall daily demand, we may be unable to predict specialty disciplines or areas of the hospital that will see the most demand on any given day. There is, however, a degree of predictability in this as well. Table 3-1, for example, indicates key specialty areas that have, historically, seen concentrated demand as indicated by concentration of access block to these patient groups. Proactive early clearing of beds in these specialty areas, as a priority, to pre-empt the predictable overall daily pattern of demand is a rational approach, as is running at slightly lower occupancies in these areas.

A second reason that may see existing practices and processes persisting in preference to a more proactive approach using the Bed Board, is, as previously identified, a workforce that is largely unfamiliar and uncomfortable with business technologies. While this is a valid concern, the Bed Board is well designed in that it is easy to navigate, largely self explanatory and, importantly, it matches the needs of the clinicians that will be using it. Nonetheless, strategies to encourage widespread understanding and use of the Bed Board should be a significant part of change management planning.

Although timely data and the persistence of existing practices and processes represent the primary threats to the Bed Board, other risks are involved of a more technical nature. These include the matching of Hospas fields to Bed Board fields, ensuring that wards and data sources

are clearly defined, clarifying data entry processes, clarifying security features and practices; and user acceptance testing including functionality as well as accuracy and timeliness of data feeds from Hospas to the Bed Board Server. Table 3-3 summarises the identified risks associated with implementing the Bed Board. Mitigations for these risks will be explored in the next chapter.

Table 3-3 Identified Risks Associated with the Bed Board

Risk	Description	Potential Threat/s
Timely data	Data not reported and entered within a time window adequate to reflect patient movement on hourly refresh of the Bed Board	Inaccurate picture of supply and demand Performance skewed. Inaccurate appraisal by NSW Health, SESIAHS or POWH management
Persistence of current practices and processes	Clinical staff, bed managers and other senior nursing and management staff do not make good use of the Bed Board in the bed management process	No improvement in patient flow and bed management Poor acceptance of subsequent proposed technologies
Matching of Hospas fields to Bed Board fields	Ensuring that data sources are fed to appropriate fields in the Bed Board to accommodate accuracy in representation of hospital activity and ease of clinician use	Miss-matched data Poor user uptake
Definition of wards	Definition of the nature of wards and whether they should be included in overall hospital occupancy on the Bed Board. Some wards, e.g. day only wards, would traditionally not be included in overall occupancy counts, though monitoring their activity is important. These differences need to be segregated on the Bed Board	Inaccurate performance measurement Unwieldy interpretation requirements of bed managers

Risk	Description	Potential Threat/s
Clarifying data entry processes	Data entry sequencing considerations e.g. surgical patients spend time in the perioperative and recovery units and have a bed reserved for them on the ward. The perioperative and recovery units should not be captured in the overnight bed occupancy figure, but the reserved bed needs to be captured somehow. There is no feature for reserved beds in the Bed Board. Changing the data entry process by entering the patient as admitted to the ward from the outset is one solution, though this may put the ward over quota if the bed is occupied by a patient who is going to be discharged on the same day	Inaccurate picture of occupancy Adds to Bed Board interpretation requirements. Every interpretation caveat requires further user education and effects user uptake
Clarifying security features and practices	The Bed Board will be viewable by POWH clinicians and management, as well as SESIAHS and NSW Health Management. Any security and confidentiality requirements need to be addressed e.g. a justice health ward is used at POWH for prisoners, many of whom may be under identity protection programs	Unlawful conduct Unable to use the Bed Board if legal requirements not met
Inaccurate feeds from Hospas	Data feeds from Hospas could be inaccurate or infrequent	Unreliable tool Inaccurate picture of activities and skewed performance appraisal
Inaccurate or inconsistent functionality	End user and/or administrative functions inconsistent and/or cumbersome to deal with	Poor user uptake Inaccurate or inconsistent manual entries Poor administration of tool

4 ALTERNATIVES FOR MOVING FORWARD – TURNING THE BED BOARD INTO A PATIENT FLOW TOOL

4.1 Go-Live Alternatives

As discussed in Chapter 3, the Bed Board will not be a useful tool unless it is accurate. Although the Bed Board is running in two other greater Sydney area hospitals, it is a relatively new tool that was developed within these two hospitals. As such, implementing the Bed Board at POWH requires some consideration of go-live options. Go-live options are one aspect of the implementation that will effect the establishment of an accurate tool. The more efficiently an accurate tool can be established the more readily it will be accepted and put to use by end users.

One option, then, is to dedicate upfront time and effort toward ensuring timely and accurate data, as phase 1 of implementation, before widespread end-user involvement is introduced, as phase 2. This approach presents as something of a challenge, as data will be collected from all corners of the hospital and should involve a wide range of staff. Asking staff to ensure that this data is timely and accurate before it has any real functional meaning to them may yield dubious results.

An alternative to this phased approach is to go-live with data entry and functional use simultaneously in a cutover style. Under this scenario, the functional implications of the data will certainly be obvious to those involved both in updating it and putting the Bed Board to functional use. However, this approach increases the risk of technical and data-accuracy teething problems feeding into the performance of the hospital. Any prolonging of such problems is likely to result in poorer user uptake in the long run or, at worst, relegation of the Bed Board to a managerial monitoring tool only with little effect on patient flow. There may be opportunity, however, to find some common ground between these two options if the risks involved are further explored.

There are essentially two broad categories of risks that will effect the accuracy of the Bed Board. Firstly, there are risks around the extraction of data from the admissions system, Hospas, and its subsequent representation as information on the Bed Board. Secondly there are risks around the timeliness and accuracy of data associated with the work practices of reporting and

entering data. These risks have been presented in Table 3-3 however Table 4-1 indicates classification into these two broad categories. Considering mitigating factors for these risks may assist in determining the most effective go-live scenario.

Table 4-1 Risks Effecting the Accuracy of the Bed Board

Data Extraction Risks	Data Reporting and Entry Risks
Inaccurate feeds from Hospas to the Bed Board	Delays in reporting
Inaccurate matching of fields	Delays in data entry
Infrequent feeds and disruptions (less than hourly)	Inconsistent reporting and entry after hours compared to regular business hours
Breaches of identity protection features i.e. names appear on the Bed Board that are protected from view by security rules in Hospas	Breaches of protection of identity in inter-hospital transfer entries i.e. names manually entered that should be protected
	Cumbersome or inconsistent end user manual entry functions

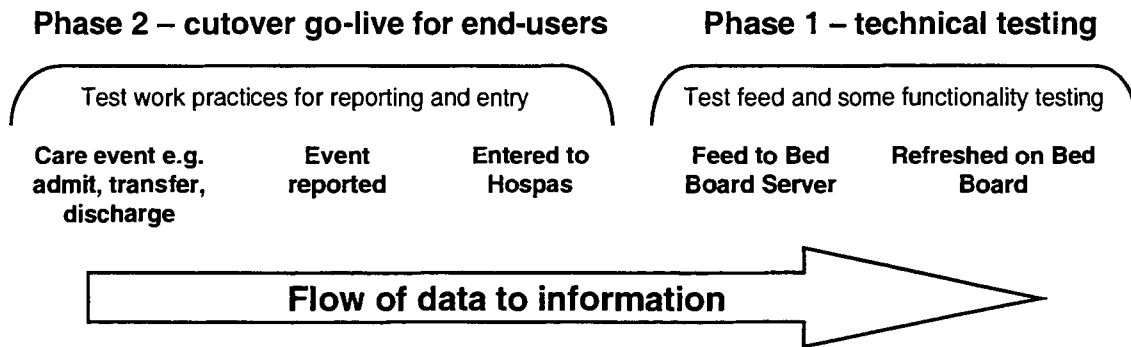
Work practices designed to encourage timely reporting and data entry could, in theory, be tested in a modular fashion. For example one ward could be used as a pilot ward to trial specific work practices designed to address timely data. Or, alternately, one or more approaches could be piloted on separate wards and comparisons made as to the effectiveness of each approach. The primary problem, however, with a modular approach to these work practice issues is that the data and resultant information would be relatively meaningless to those involved in the trial or trials. As a transparency enhancing tool, the Bed Board really only takes on significant meaning to end-users when the whole hospital is using it. As such, taking a risk on a hospital wide approach to work practice design to accommodate Bed Board reporting and data entry requirements may be the better approach. This lends credence to the cutover go-live approach.

In contrast, data extraction risks could well be tested in a modular or phased manner. As Hospas data is readily available now, the Bed Board could be implemented and data feed issues could be tested by the implementation team before end-users are granted login privileges. Once the implementation team is satisfied that data is feeding accurately and consistently from Hospas to the Bed Board server, a work practices plan could be implemented to incorporate all end-users.

This presents as a combination of the two primary options presented at the beginning of the Chapter. By breaking down implementation risks into more manageable packages, it can be seen that phase 1 could be used to test data feeds as well as functionality consistency and

manageability. In this testing phase, the testers could simply ignore the fact that data entry to Hospas may have been inconsistent or untimely. Phase 2, using this approach, would then address work practices and timely data and would be a cutover go-live in terms of reporting and functional use by end-users. This approach is illustrated in Figure 4-1.

Figure 4-1 Modified Phased Approach to Manage Risks More Effectively

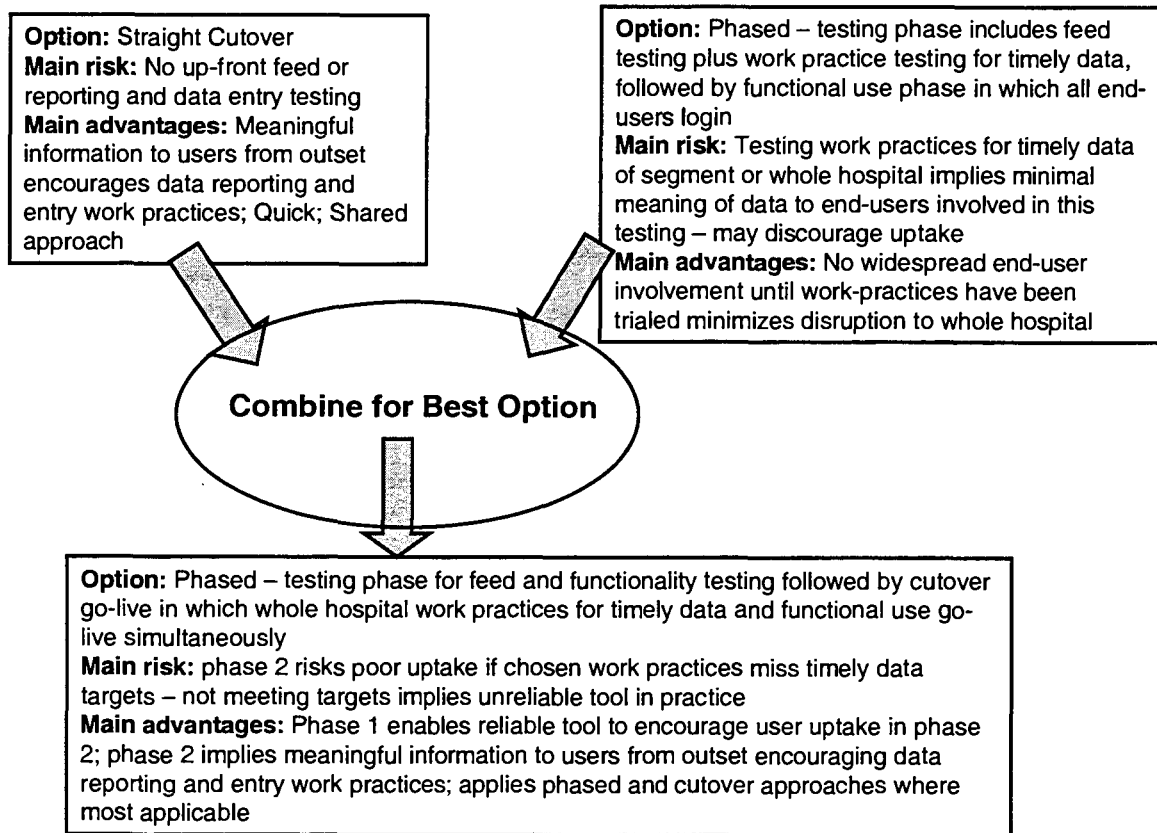


Note that phase 2 in Figure 4-1 indicates that a component of this phase involves testing the work practices around reporting and data entry. Even though a cutover approach has been used in this phase, as discussed to give the data more immediate meaning, it does not eliminate the opportunity to fine tune or modify the chosen reporting and data entry approach implemented. If the Bed Board can be of demonstrated value to end-users, through functional application, they will generate a vested interest in its success and will, subsequently, put more effort into working with managerial staff to achieve reporting and data entry targets.

Phase 1, as depicted in Figure 4-1, also includes functionality testing. Although consistency and manageability of manual entry functions of the Bed Board have been included in the data reporting and entry risks column of Table 4-1, the consistency component of these functions could be tested by the implementation team up front in phase 1. Manageability or end-user satisfaction with these functions could also be tested by inviting select end-users to interact with the test model during phase 1. Appendices 6 and 7 provide samples of user acceptance testing templates that could be employed to test functionality (Appendix 6) and the accuracy of Hospas to Bed Board feeds (Appendix 7).

Figure 4-2 depicts the rationale for promoting the modified phased approach depicted in Figure 4-1 as the go-live option of choice.

Figure 4-2 Choosing the Best Go-Live Option



As the Bed Board will refresh every hour to begin with, a target of reporting and entering data within 30 minutes of a patient transaction event presents as a practical target. Section 4.2 presents options for reporting and entering data with consideration of what it might take to encourage the user buy-in necessary in achieving this target.

4.2 Patient Transaction Reporting and Data Entry Alternatives

The current process of event reporting and data entry into the patient admissions system, Hospas, at POWH involves both clinical and support staff. Clerical staff are responsible for direct data entry to Hospas and, generally, clinical staff are responsible for updating clerical staff on patient admissions, transfers or discharges. For example, an ED physician, on deciding to admit a patient will inform clerical staff in the ED who will then enter admission information into Hospas. Similarly, if a patient is admitted, discharged or transferred from a ward, the NUM informs the ward clerk who then enters the transaction into Hospas. If a clerk is busy, the entry can be made in retrospect, though the time of data entry will also be archived. Ward clerks generally work between 7am and 4pm from Monday to Friday. After these hours and on

weekends the practice, to date, has been for nursing staff on wards to call the ED clerk, as the ED has a clerk 24 hours a day seven days a week, who will then enter the data. By comparing time of data entry to time of transaction event, it has been shown that delays in entering data are more predominant in this after-hours time than during normal business hours.

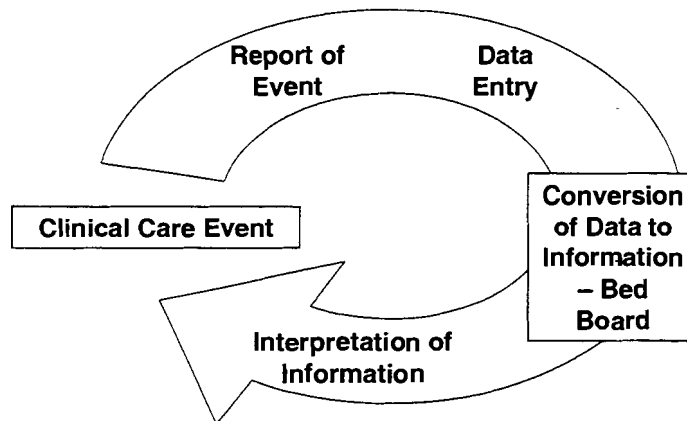
Currently, patient admission information at POWH has limited immediate use, although there are some primary functions that would benefit greatly from more timely data. The dietary department, for example, uses a separate system for the production, scheduling and delivery of meals that relies on data feeds from Hospas for patient stay and location information. As stay and location details of patients are frequently entered late into the Hospas system, dietary aides will often have difficulty locating patients and meals are often wasted. Similarly clerical staff will often check with Hospas to determine the location of patients for relatives or staff, though this needs to be followed by confirmation phone calls to wards in consideration of the current delay in Hospas updates.

As the central theme of this project, more immediate access to admissions system data by bed managers and other staff involved in managing beds and patient flow would greatly assist in these endeavours. As things are, the bed managers' current practice of keeping their own records on clip boards and post-it notes and updating them with phone calls and personal visits to wards could be viewed as a response to both the inaccessibility and unreliability of Hospas data. Potentially, bed managers could be trained to run queries on Hospas, but as a legacy administration system with limited readily accessible summarised information, this would likely prove a fruitless exercise. In addition, timeliness of data entry would still be an issue.

A primary historical use of admissions systems data has been via extraction to the state-wide Health Information Exchange (HIE) data warehouse. The HIE is used in the overall evaluation of NSW Health facilities performance as well as the strategic allocation of resources and funding. Feeds from patient admission systems across NSW to the HIE of Admissions, Transfers and Separations (ATS) data and Disease Index (DI) data, however, is limited to daily or monthly extraction dependent on local systems, staffing and infrastructure. The funding implications of this data use has put emphasis on the quality of clinical encoding and Diagnostic Related Grouping (DRG) practices which take place after patients have been discharged. Daily or monthly feeds, however, put limited pressure on the timeliness of data entry.

Although Hospas data has patient care implications, as illustrated in the examples above, there is, arguably, a disconnect between data entry, its transformation into information and its meaning and interpretation by clinical staff. Designing tools, such as the Bed Board to assist in developing a meaningful connection is one part of the solution. A more complete solution, however, requires reinforcing the clinical implications of accurate and timely data to form a feedback loop as illustrated in Figure 4-3.

Figure 4-3 Reinforcing the Implications of Timely Data



In view of Figure 4-3, it may be insightful to suggest why the current process of data entry is unreliable for some of the hospital activities discussed above. For bed management, the conversion of data tool, the Bed Board, is simply not in place yet. For locating patients, the current process may be inconvenient, but eventually clerical staff can find the patients they are searching for and searching doesn't overly challenge the nature or scope of their work. In managing meal preparation and delivery processes, a conversion of data tool is in place, but there is a disconnect between those reporting and entering the data and those who interpret and act on it. Clerical and nursing staff may be sympathetic toward patients whose meals go missing, come late, or are wasted, but their role in influencing this process through patient transaction data is not immediately obvious to them. In addition, it is left to the dietary aides to locate patients and, as such, the nurses and clerks are not personally put out by their untimely actions, the dietary aides are.

The implementation of the Bed Board, as a new conversion of data tool, could also be interpreted in light of Figure 4-3. With this tool in place, there is still limited incentive for clerical staff to enter data in a timely fashion as they do not see themselves as having a direct influence on

clinical care events. However, introducing the Bed Board does have a direct, and fairly immediate, effect on nursing staff on the wards. By providing information on the status of their beds, nursing staff can draw the most appropriate patients to their wards and minimize the need for unnecessary transfers. In effect, the Bed Board will assist in closing the feedback loop. Those reporting the events will be able to influence subsequent events that are of direct consequence to them.

Of course, in reporting available beds nurses may also be inviting more work. However, the counter-argument to the potential to game the system is that more efficient use of beds will, in fact, make working on the wards easier, despite the capacity to accommodate greater volumes of patients, by reducing the number of outliers. Specifically, if patients can be directed to the most appropriate beds for their needs, clinical staff can concentrate on their chosen specialty areas, complications of care can be minimized and patient transfers, too, can be kept as low as possible. All of which, means less work per patient and improved quality of care.

While this is a logical counter-argument, there is still likely to be resistance from some clinical staff. This resistance will manifest clinicians' fears of political and/or managerial pressure to move toward a mass production model, as discussed in Chapter 2 and illustrated in Figure 2-11. To aide in the leap of faith required to avoid mass production models and move toward a mass customization approach, managerial staff could share their knowledge of environmental pressures and the management of systems in meeting increasing demands. That is, changes in practice in response to the environment are inevitable and clinicians can make informed choices as to how they fit into these changes. Furthermore, by sharing this knowledge and insight with clinicians, it invites valuable input on further improving the system from the clinicians themselves.

The identification of ward nursing staff as key to closing the feedback loop illustrated in Figure 4-3 questions whether nursing staff should directly enter data into the patient admissions system and, in the process, eliminate one handover to clerical staff. However, the current legacy system, Hospas, is not overly user-friendly. Additionally, as discussed, Hospas will be replaced by iPM within the year. Undertaking a difficult and broad training program for nursing staff to learn Hospas use, then, is not the most practical solution at this stage. The more user-friendly format and structure of iPM, however, may see the training of nursing staff in direct data entry to this system in the future.

It should be noted that senior nursing staff frequently demonstrate resistance to nursing involvement in data entry of any type claiming that it takes nurses away from patients. With the introduction of online medical records and easier to use systems, however, it may be an inevitable, and indeed very efficient, part of nursing practice sooner than later. In addition, it is worth considering that senior nurses involved in managerial activities are generally older and more resistant to technology use. Their younger counterparts just starting their careers at the coal-face, in contrast, have more exposure and facility with technology use.

Nonetheless, entering data to Hospas, at this stage, would be better met by the staff already trained in the process. That is, the clerical staff. The issue here, of course, is that this is the method of input already in place and it has shown untimely results. While it is not entirely clear how much of the problem can be attributed to delays in reporting and how much to delays in entry, it may be surmised that physically entering the data is partly responsible. This assumption follows the observed association of more untimely results within after-hours periods when nursing staff levels are relatively consistent but clerical staffing is dramatically reduced.

While the Bed Board may encourage nursing staff to report patient transactions, incentive for clerical staff is still required to encourage timely data entry. One possible solution is to shift clerical staff priorities by making it the only priority of a dedicated clerical resource. This could be accommodated by a call centre model, with nursing staff from all parts of the hospital calling in information to a clerk whose only duty is entering this data into Hospas. The volume of after-hours transactions could be adequately accommodated by one clerk provided that entry of this data is their primary duty. It should be noted that this solution is likely unnecessary on a 24 hour 7 day a week basis. Raising awareness should be enough to improve timeliness within regular business hours when each ward has immediate access to clerical services and the call centre model could be relegated to peak after-hour periods as indicated in Table 4-2.

As Table 4-2 shows, the busiest periods after-hours occur between 4pm and 8pm on weekdays. Winter months are shown, as these months are typically the most demanding on POWH with increased presentations to the ED and increased ward utilization. Accommodating winter demand will effectively cover other parts of the year as well. Potentially, any dedicated data-entry resource could focus on these hours and current practices could be used, with re-education on the importance of timely data, beyond these peak periods. Table 4-3 indicates this option and other potential alternatives to address the combined issues of reporting and entering data in a timely fashion.

Table 4-2 After-Hours Ward Activities Indicating Peak Data Entry Needs

2003 (Winter Months)			2004 (Winter Months)		
	% of Total After-Hours Transactions			% of Total After-Hours Transactions	
	Discharge	Transfer		Discharge	Transfer
4pm-8pm (Weekdays)	68%	44%	4pm-8pm (Weekdays)	70%	47%
8pm-7am (Weekdays)	5%	27%	8pm-7am (Weekdays)	5%	27%
Weekends	27%	29%	Weekends	25%	26%

Table 4-3 Reporting and Data Entry Options to Accommodate After-Hours Periods

Option	Advantages	Disadvantages	Additional Cost
Maintain Status Quo	No change in work practices – reinforce current way process should work.	Inconsistent to date, particularly after-hours.	Nil
Nursing staff enter data	Eliminates one handover for every patient transaction.	Requires training of nurses in Hospas use – legacy system not user friendly. Hospas soon replaced by iPM – better to train in iPM. Intermittently removes nursing staff from direct patient care.	Nil
Extend ward clerk hours on all 23 overnight wards (by 4 hours Mon – Fri as indicated by peak activity)	Nurse-to-clerk reporting more immediate. Spreads data entry workload.	Non-dedicated resource risks distraction of clerks – priorities may be mixed. Expense not justified by demand volume.	\$690,000 23 ward clerks * 4 hrs Mon-Fri @ \$30,000 p.a./clerk
Add one dedicated after-hours clerk in call centre – all nursing staff phone in transactions (4 hours dedicated Mon – Fri per peak activity then call automatically reverts to ED clerk, same number used)	Dedicated resource – no priority conflicts.	Nurse-to-clerk reporting less immediate – requires phone call from nursing staff – education re call centre number needed.	\$30,000 1 ward clerk * 4 hrs Mon-Fri @ \$30,000 p.a./clerk

Of the options presented in Table 4-3, the last one presents as the most viable as discussed. Implementing this solution requires two components. One is educating the clinicians who report on patient transactions with emphasis on the value of closing the feedback loop presented in Figure 4-3. Although this will primarily be nursing staff, doctors and allied health staff are, in some instances, included in this group. Education needs to identify the timely data target, indicate the value to end-users in meeting this target and, lastly, indicate the method of reporting required in the process. The second component requires assigning an efficient means of data entry with dedicated resources, call-line and clerk, where current usage has demonstrated untimely results. Strategies for meeting the former goal will be presented in Section 4.3.

4.2.1 Other Reporting and Data Entry Considerations

As the Bed Board will see patient admission data used in new ways, the sequencing of data entry in some situations may need to be revisited or, alternately, accounted for in interpreting Bed Board information. Per the example in Table 3-3, beside “Clarifying data entry processes”, a patient who has been admitted for surgery will, after their surgery, require a bed on a ward and this needs to be factored into the demand for that particular ward and the overall demand on the hospital. There is no facility for reserved beds, however, in the Bed Board. Current Hospas entry practices for these patients will show the path of their stay from perioperative unit to surgical theatre to recovery unit to ward. These transactions, too, can be captured on the Bed Board, however they should, more correctly, be displayed on the “procedural” and/or “other” sheets, so they are not captured in the overnight bed occupancy aggregate figure displayed on the main screen. The basic problem here, then, is accounting for all demands on the system by recognizing the demand of reserved beds.

There are a number of ways this could be approached. One solution is to change the process of entering data to Hospas. Rather than separate entries to perioperative, surgical and recovery units and then the ward, patients could simply be entered straight to the ward. Their surgical procedures and a more granular view of their patient journey will be captured in medical records as well as DI data in any case. The only problem with this approach is that when patients present for surgery first thing in the morning, the beds reserved for them are frequently still occupied by patients who will be discharged later in the day. This will put the ward in question

over census. Arguably, this is not really a problem, but just requires some interpretation. When the orthopaedic ward, for example, indicates occupancy of 110% first thing in the morning and settles back to 95% later in the day, it would be indicating this very concept, rather than indicating patients on trolley beds earlier in the day.

Another approach is to leave things the way they are with Hospas entries tracing the path of the patient through the various units. This approach avoids confusing those who currently enter and analyze this data. When staff begin to manage beds with the Bed Board, however, they will need to be aware of checking perioperative, surgical and recovery units to get a fuller picture of demand. Those users who do not have access to scheduled surgery lists, however, will not know the destination wards of patients in these units. So, again, some interpretation and inside knowledge is required with this approach.

A third solution is to use a more sophisticated model of occupancy. This solution would require modification of the Bed Board. The bed management functionality in iPM, for example, clarifies demand by indicating reserved beds as “virtual beds.” Virtual beds are not counted in ward or aggregate occupancy figures but are displayed along with other ward specific information so that staff involved in bed management are aware of both occupancy and incoming demand. Patient details and where they are coming from, whether from surgery or another hospital, for example, are recorded with the virtual bed record to assist in overall understanding of the current situation and demand through the day.

Similar to the reserved bed problem, the Bed Board, at least while extracting from Hospas, will not handle beds that have been temporarily closed. Although there is a ‘closed’ column on the main screen there is no equivalent field in Hospas to feed to this column. The only way to close a bed will be to change the ward bed platform. Doing this is likely to cause confusion between POWH and SESIAHS, however, as SESIAHS closely monitors the use of all beds in the Area. Changing the platform does not indicate why the bed has been closed and would prompt immediate enquiries from SESIAHS executives. An acceptable reason for closing beds is to accommodate quarantine conditions. The closing of empty beds is not uncommon as beds are closed when an infectious patient requiring quarantine is admitted to a multi-bed room. Of course, an all single-room hospital does not have this problem, but this is not a luxury that POWH currently affords and sometimes multi-bed rooms are the only option.

As these examples demonstrate, getting data into Hospas to populate the Bed Board in a timely fashion is one challenge. However, a further, and in some ways integrated challenge, is interpretation and use of the resultant information. Chapter 5 will propose solutions that could manage these exceptions more automatically. With the current version of the Bed Board and the use of Hospas, however, reserved beds and temporarily closed beds will have to be factored into bed allocation decisions manually by the staff involved in using the Bed Board.

4.3 Putting the Bed Board to Work

4.3.1 Educating End Users

As demonstrated in Sections 4.1 and 4.2, addressing data entry requirements, user interpretation issues and user buy-in are, in many ways, an integrated process. Ultimately, users need to feel that they have been empowered by the Bed Board. Empowerment will provide the incentive to report and ensure timely data entry and the incentive to use the Bed Board as an aide to improving patient flow. In this undertaking, providing early education around the Bed Boards value as an aide to patient flow is intrinsic to putting the Bed Board to work.

Education for this purpose could work backward to effect timely data requirements. That is, start with the users who will most benefit from the desired outcomes and educate them as to the desired patient flow and bed management outcomes first. Indicate any interpretive caveats, such as reserved beds and temporarily closed beds, then guide them toward making their own conclusions about the timeliness of data being important. That is, the user education process could use an agenda that follows the feedback loop in Figure 4-3 backwards in an anticlockwise direction. The goal with this approach is, by design, results-oriented from the outset of the change process.

Following this course of action, primary beneficiaries of improved bed management are the NUMs and other nursing staff on the wards and in the ED, allied health staff and the doctors. The current primary decision makers for bed allocation purposes are, as illustrated in Figure 3-6, the bed managers. Efforts must be made to ensure that the bed managers are aware of the patient flow implications of the Bed Board and its interpretative requirements. All other staff involved will also need to be informed of these issues in order to communicate effectively with the bed managers in view of this new source of shared information.

In introducing the Bed Board to the bed managers, however, it may be prudent to reassure them that the Bed Board is an aide to their pivotal role in the bed management process and should not be interpreted as a threat to their role and employment. Re-enforcing the value of clinical insight and face-to-face assessment and negotiation skills when making bed allocation decisions, as discussed in Chapter 3, will assist in this process. Similarly, the increased insight and contribution to bed management from other clinicians that the Bed Board will enable, should be seen as assistive to the bed managers final decisions, rather than a loss of their autonomy. The reality of a large public hospital, like POWH, with a high daily patient turnover, is that a central coordinator of final allocation decisions incorporating all available information and clinical insight will likely always be necessary.

On the other hand, overemphasizing the assistive nature of the Bed Board, without due credit to its value in improving efficiency and communication, may risk bed managers reverting to their own record keeping as a more familiar practice. As other clinicians, however, will have access to the Bed Board, they will likely factor its information into their negotiations with the bed managers. The bed managers will then be encouraged to maintain Bed Board use as a common reference point and a means of communication.

On introducing the Bed Board to clinicians, then, educational efforts should emphasize the context of the Bed Board and its operation. As a stand alone tool, it is very easy to use and will not take a lot of practice to navigate. Integrating it into the overall context of the bed management process and its ability to improve patient flow initiatives, however, represents significant potential benefit. This project suggests that the bed managers and the clinical staff they work with can be empowered to effect this change given autonomic use of the Bed Board and appropriate knowledge of outcomes. In consequence, this approach also requires some education of managerial staff.

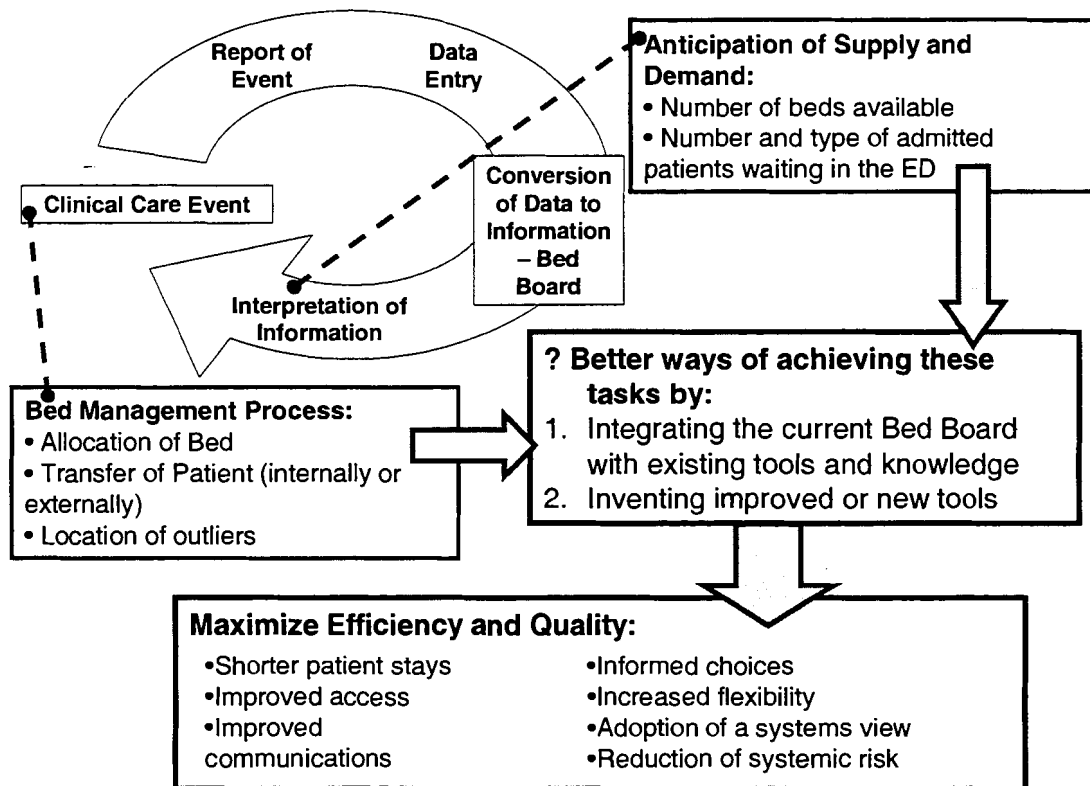
When managerial staff, whether they be at POWH, SESLAHS or NSW Health levels, gain access to the Bed Board, they have choices as to the way they re-enforce its use and desired outcomes. From a managerial perspective, the Bed Board offers much more immediate knowledge of performance results. Managerial staff, subsequently, have to decide how they will respond to this more immediate information. Responding too rapidly, without due interpretative knowledge in a clinical context, risks negatively re-enforcing the use of the Bed Board. Discouraging staff, such as the NUMs and bed managers, who can really put the Bed Board to work, increases the risk of these staff members reverting to pre-existing practices and processes.

On the other hand, managerial staff have a duty to foster a more responsive and higher performing public healthcare service. Evidently, a balance is required, and a potential way to achieve this balance lies in establishing shared performance goals with clinicians prior to the Bed Boards widespread use. These concepts will be further explored in Section 4.4 Measuring Implementation Outcomes.

4.3.2 Integrating the Bed Board into Daily Routines

Having introduced the Bed Board to end-users and established the basic premise behind its implementation, that of improving patient flow and assisting the bed management process, a discussion of how the Bed Board might practically achieve these goals is required. Figure 4-4 expands on Figure 4-3 by indicating how the Bed Board may compliment daily routines.

Figure 4-4 Integrating the Bed Board into Daily Routines



As indicated in Figure 4-4, the Bed Board has the potential to bring more sources of information together and share this information across the hospital. Most of the information that the Bed Board provides is updated automatically once reported and entered into Hospas as

previously discussed. There are some additional manual entry features, though, that require consideration.

The Bed Board provides four opportunities to manually enter additional information beyond the information fed to it from Hospas every hour. These opportunities come in the form of the inter-hospital transfer functionality, estimated discharges, theatre additions and unexpected emergency admissions. The use and practicalities of these features will be discussed in more depth in Chapter 5. However, at this stage it is worth considering who might be responsible for entering information into these areas on implementation of the Bed Board.

The estimated discharges, theatre additions and unexpected emergency admissions categories, all require the entry of numerical information. As such, allowing more than one end-user to update this information would more than likely result in unreliable information with patients being counted more than once in demand estimates. Assigning one end-user to these entries is the best option. The most obvious choice in this regard is to allocate the bed manager on duty.

In contrast, the inter-hospital transfer feature will indicate a host of information including patient names, medical record numbers, to and from hospitals and doctors names amongst other criteria as indicated in Appendix 5. Once entered, this information will remain on the screen for all to see until such time as the patient is received at the receiving hospital. So it is safe to assume that no double-entry of information will occur and, thus, allowing any Bed Board user in the hospital to enter information on this screen will not create undue confusion.

As is also illustrated by Figure 4-4, once information is drawn together, the Bed Board enables shared monitoring and anticipation of bed supply and demand. Transparency of supply and demand will encourage clinical staff to view other parts of the system and compare bed occupancy rates to those of their own wards or clinical units. This can only assist in encouraging a systems perspective and, with time and nurturing, the corporate identity amongst individuals required in moving toward a Lean model of operations. A Lean, or Just-in-Time, model is applicable in this sense, as the Bed Board has the goal of improving efficiency and lowering, or more even distribution, of capacity utilization is characteristic of Lean operations in approaching this goal.²⁵

²⁵ Slack, N, Chambers, S and Johnston, R, *Lean Operations and JIT - JIT and Capacity Utilization*, p 521-522, Operations Management – 4th Edition, Publisher: Prentice Hall – Financial Times (2004)

Measuring capacity utilization in the use of beds on wards is a difficult undertaking. This concept will be discussed in more detail in Chapter 5. However, as a starting point, occupancy rates presented on the Bed Board are a basic indication of capacity utilization. It is worth recalling that, traditionally, the use-it-or-lose-it mentality of clinical operations and management, as discussed in Chapter 2, acts to encourage increased capacity utilization. This embedded belief, however, could be used to operational advantage by encouraging a “pull” system.

A pull system could result with ward staff having better insight into potential demand. For example, if the orthopaedic ward is running at 70% occupancy the NUM can look to the ED screen for newly admitted orthopaedic patients and/or to other wards for orthopaedic outliers to draw into the ward. Similarly, once the ambulance arrivals board is up and running, the NUM may check on this to see a little further ahead and anticipate accommodating a new ambulance arrival patient. The incentive to do this is two-fold. Firstly, the NUM traditionally feels that resources must be used to their maximum safe capacity. Secondly, as previously discussed, drawing the most clinically appropriate patients to specific wards ultimately lends itself to more efficient care and better quality outcomes.

As POWH also provides community care services, this pull concept could be extended beyond the hospital to draw patients that would benefit from these services out of the wards and back into the community. As such, community care nursing staff would, in the context of encouraging a pull system, benefit the system through Bed Board access. As these employees have intranet access, this is readily achievable.

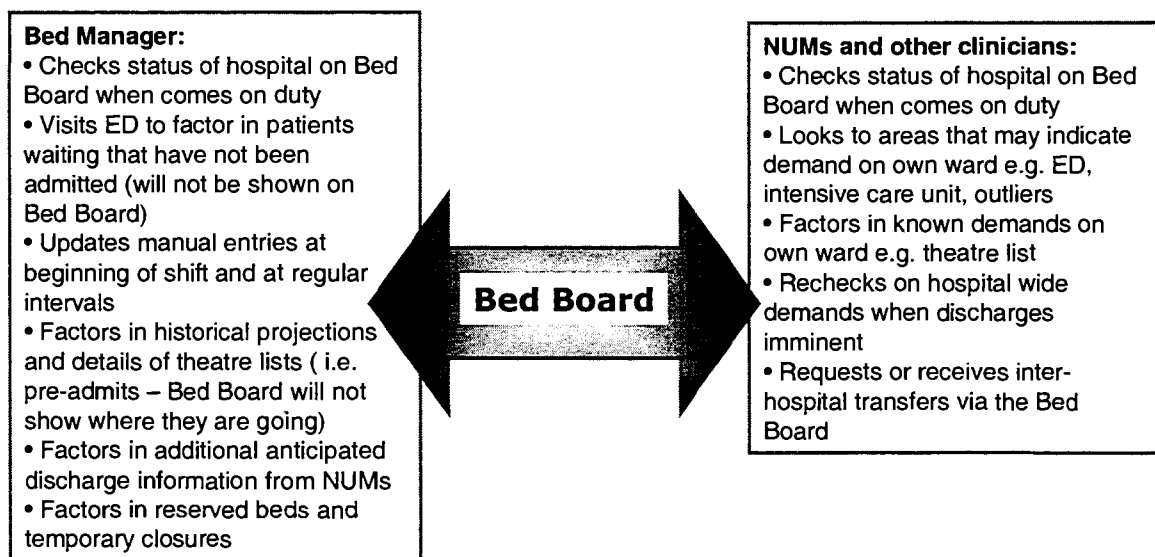
Of course, there is a limit to factors pulling patients through the system. At some point the patients will return home and the majority will do so without community health services. Incentives and options for increasing efficiency in this regard will be explored more in Chapter 5. With use of the Bed Board, however, it can be seen that a basic pull model can be achieved as often the occupancy of one component of the continuum of care, whether it is the ambulance service, the ED, or a ward represents the potential demand on the next step in the system.

To encourage efficiency through a pull model, then, all that NUMs and other clinicians really need to do is log into the Bed Board periodically, have a look at what is going on around the hospital, and compare this to the current or anticipated supply on their own ward. Having identified opportunities to accommodate patients, these staff members could then phone or page the bed manager on duty with suggested patient movement options.

Although the bed manager will view the Bed Board periodically as well, the NUMs and other ward staff can assist by keeping a focussed eye on the activities of their own wards and potential patients. Ward and ED staff will also need to fill in the information gaps that the bed manager will not see on the Bed Board. Rather than logging in at random, then, NUMs could log in when they know that patients will be imminently discharged from their wards. For example, the NUM on the respiratory ward may anticipate the discharge of 3 patients from the respiratory ward within the next 2 hours. He or she could check the Bed Board for incoming respiratory patients in the ED. Noting that there are 2 respiratory patients waiting in the ED, the NUM can then inform the bed manager on duty of these possible transfers. This is necessary as the bed manager will not see the discharges from the respiratory ward until they occur. Without this insight from the respiratory ward NUM, the bed manager may have placed the 2 ED patients in outlier beds before the respiratory ward discharges were brought to his or her attention.

So it can be seen that providing transparency essentially creates opportunities for hospital wide team work. It may be a mistake, though, to assume that these activities will occur automatically. To encourage a pull model, the education process discussed in Section 4.3.1 should include some of the insights discussed in this Section. Figure 4-5 presents some work practice ideas that could be shared with Bed Board users at POWH based on these concepts.

Figure 4-5 Work Practices to Encourage Integrating the Bed Board into Daily Practice



4.4 Measuring Implementation Outcomes

Post implementation the Bed Board needs to demonstrate that it is providing a reliable indication of hospital activities within the capacity of its design and that it is contributing to overall patient flow initiatives and efficiency in the bed allocation process. Table 4-4 indicates the primary areas of performance, potential methods and measurements relevant to assessing the value of the Bed Board post implementation.

Table 4-4 Potential Methods and Measurements for Evaluating the Bed Board

Performance Area	Method of Measuring	Measurements
Data Feeds	Periodic audits using the template in Appendix 7	Verbatim data; Matching fields
Reporting of Events	Random audits by bed managers	Reports within 15 mins of event
Data Entry to Hospas	Random audits involving NUMs and cross referencing with Hospas entry times	Enters within 15 mins of receiving report
Impact on Patient Flow and Bed Management	Periodic review of effect on patient access KPIs – data extracted from HIE	Number of internal transfers; number of outliers; occupancy levels and distribution; subjective user satisfaction surveys

As suggested in Section 4.1, the accuracy of data feeds from Hospas to the Bed Board server can be tested independent of testing work practices for data reporting and entry as phase 1 of implementation. It would be prudent, particularly in the first few weeks after go-live, to retest the accuracy of feeds periodically. Appendix 7 provides a possible template for this testing.

A potential approach to assuring the timeliness of reporting events is to assign staff who will best pick up on inaccuracies. The use of bed managers would fit the role here. As suggested at the end of Section 4-1, a target of reporting and entering data within 30 minutes will reasonably accommodate the Bed Boards initial hourly refreshes. A further assumption could be that it is fair to divide this time evenly between the two main staff groups involved. As such, a target of reporting events within 15 minutes of their occurrence for clinicians and a target of entering data within 15 minutes of receiving reports for clerks.

The reporting of patient transaction events will need to rely on an honour system to a large extent, particularly after hours when there is less staff on the wards. Physically checking patients and/or beds is really the only way of verifying accuracy of reporting. Although it is impossible to check all wards on a frequent basis, the bed managers could conduct random audits intermittently as they visit various parts of the hospital. For example, a bed manager may sight a patient arriving on a ward and write down the time of arrival and the patients name and medical record number. For after-hours transactions, the bed manger could later check with patient transaction call centre records to establish the time between the patients arrival and when a call was logged to report this event. Similarly, if empty beds are noted in the bed managers travels, the bed manager could view similar records to establish when discharges were reported. During regular hours, the bed manager would have to verify reports with clerical staff on the wards. This could potentially be contentious, however the bed managers are somewhat skilled in challenging the activities on the wards as this is a part of their daily activities.

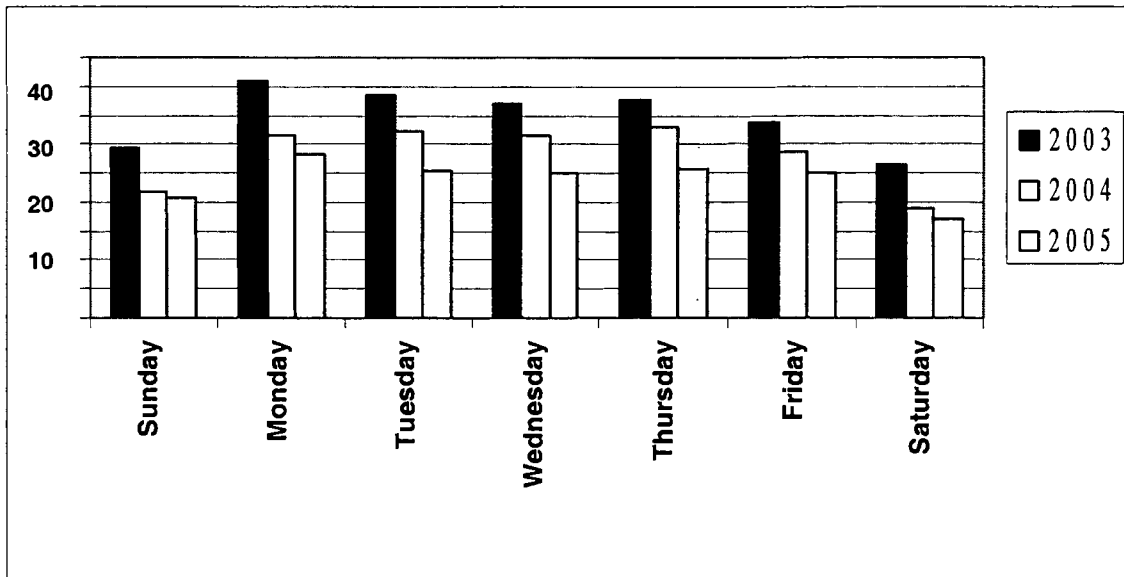
Staff involved in reporting could assist in assessing the timeliness of data entries. This would require, for example, a NUM to make a note of the time, name and medical record number associated with a given reported event. The noted time could later be cross-referenced against Hospas entries to establish the gap between reporting and data entry. As for the reporting audits conducted by bed managers these would most practically be conducted at random. To ensure that this random approach is a credible threat, a quota of audits could be scheduled per month with results collated by a central body, likely the patient access manager at POWH. To further assist those involved in audit processes, audit templates could be supplied as illustrated in Figure 4-6.

Figure 4-6 Random Audit Sheet to Assist Timely Data

POWH Random Audit Sheet for Timely Data					
Auditor name: _____			Reporting <input type="checkbox"/> (target 15 mins)		
Ward: _____			Data Entry <input type="checkbox"/> (target 15 mins)		
Time	Patient Name	MRN	Event	Cross-Referenced Time	Delay

Evaluating the overall impact of the Bed Board on patient access and the bed management process offers several potential objective measures. As the Bed Board aims to reduce the number of outliers and internal transfers, weekly or monthly figures for these measures could be compared to pre-implementation figures. Figure 4-7, for example, is a graphical representation of internal transfers by day pre Bed Board implementation for POWH.

Figure 4-7 Average Internal Transfers by Day Last Three Years at POWH



Data Source: NSW Health, Health Information Exchange

Measuring occupancy levels and their distribution could also indicate the effect of the Bed Board on maintaining patient access. Running at excessively high occupancies is considered a dangerous practice in hospital settings. Not only does high occupancy present the opportunity for errors in practice, it provides no room for unexpected admissions. The ideal occupancy to safely serve acute care needs and provide ED services is not prescribed by any governing body, though studies and models of service delivery have attempted to address this issue.

Bagust et. al.²⁶ used a simulation model that reflected the relationship between ED demand and available bed capacity to analyze the effect of fluctuating and unpredictable demands on bed requirements. Using this model, they predicted that there was a discernable risk of a bed being unavailable for any patient requiring immediate admission when overall occupancy

²⁶ Bagust, A, Place, M and Posnett, J, *Dynamics of Bed Use in Accommodating Emergency Admissions: Stochastic Simulation Model*, British Medical Journal, Volume 319, 17 July (1999)

rates exceeded 85%. An acute hospital, they predicted, could expect regular bed shortages and periodic bed crises if occupancy rates rose to 90% or more. Their conclusion, that spare bed capacity is essential for accommodating ED admissions, generally agrees with the experience of senior nursing staff at POWH who consider 85% occupancy a safe level of operation.

The overall hospital occupancy, then, could be compared pre and post Bed Board implementation to see if the Bed Board has assisted in staying below the 85% threshold or lowering the overall average. Similarly, analyzing occupancy per ward pre and post implementation may be insightful in understanding the distribution of patients and resource use throughout the hospital.

A final measure of overall impact could come in the form of subjective evaluation from end-users. As well as helping to understand the value of the currently implemented tool, this could invite end-user input into future tools and/or technology implementations. Figure 4-8 provides a potential end-user questionnaire for post-implementation evaluation by the NUMs on the wards. As NUMs on all overnight wards stand to benefit the most in their daily management of wards by the introduction of the Bed Board, these staff members should be the primary target with user surveys.

Scoring the survey in Figure 4-8 could be a simple process of assigning a score of 5 for each 'strongly agree', 4 for each 'agree' and so forth down until 1 for each 'strongly disagree'. Scores could then be averaged. An initial target may be an overall average of 3 with minimum scores of 4 for questions 7 and 8. That is, a minimum goal of ensuring that end-users find the Bed Board easy to use and have faith in its accuracy is the first step. A subsequent target, perhaps after 3 months or so of use, could be a minimum overall average score of 4. That is, unless the end-users believe they are getting a better picture of overall bed supply and demand and, further, believe that they can influence the activities on their wards with the Bed Board, then it may not be fulfilling its full potential in patient flow management.

Input into the value of the current version of the Bed Board can be incorporated into the design of future versions, functionality considerations on the implementation of iPM and any other potential applications of technology in improving patient flow and bed management. Some limitations of the current Bed Board and possible future directions are explored in Chapter 5.

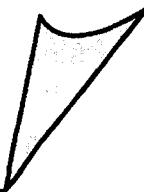
Figure 4-8 Example of Survey for End-Users

POWH Bed Board End-User Survey for NUMs

Rank your response from 1 (strongly agree) to 5 (strongly disagree) by ticking the relevant column.

	1 Strongly Agree	2 Agree	3 No Opinion	4 Disagree	5 Strongly Disagree
1. I use the Bed Board frequently through my shift.					
2. The Bed Board allows me to draw the most appropriate patients to my ward.					
3. There are less outliers in my ward from other wards since the Bed Board was implemented.					
4. The Bed Board has improved my understanding of workload distribution across the hospital.					
5. The Bed Board has improved the coordination of patients between the ED and my ward.					
6. The Bed Board has improved my working relationship with the bed managers.					
7. The Bed Board is easy to use.					
8. The Bed Board is reliable.					

What features would you like to see added to the Bed Board in subsequent versions?

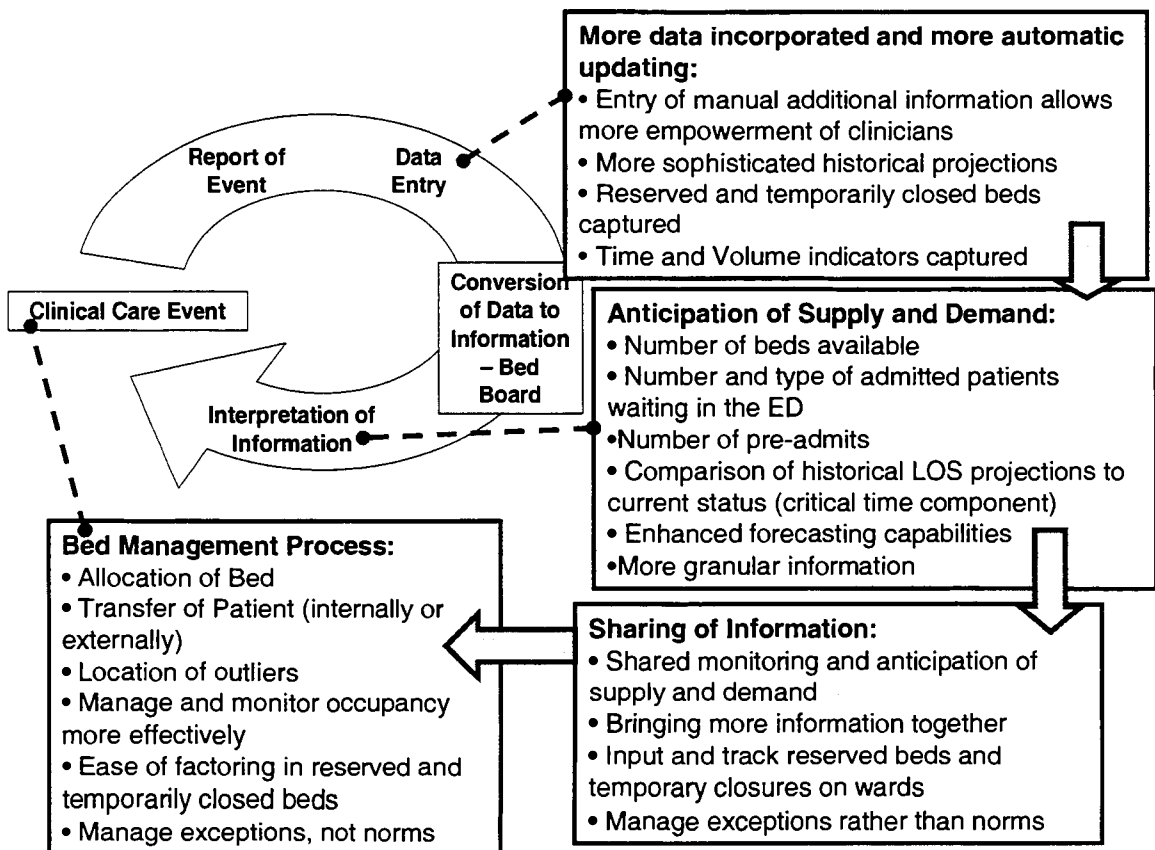


5 TOWARD GREATER INTERACTIVITY – MODELS FOR INCREASED FUNCTIONALITY

5.1 A More Comprehensive Tool

As discussed in Section 3.3, the Bed Board opens the way for new and improved technology implementations. Chapter 4 introduced some limitations to the current Bed Board indicating additional factors that would have to be considered in its use. This Chapter explores potential options for building on the current model to create a more comprehensive standalone tool for managing patient flow. Figure 5-1 expands on Figure 4-4 by indicating factors that could contribute to a more comprehensive patient flow management tool.

Figure 5-1 A More Comprehensive Patient Flow Management Tool



Although there is a lot of information added in Figure 5-1, it should be recognized that the primary attribute of the current Bed Board is indication of supply and demand by volume of patients. The Bed Board essentially earns this attribute by indicating the occupancy status of all parts of the hospital and sharing this information across the hospital. Capacity utilization and throughput, however, are not determined purely on volume. A time component needs to be considered. The additional information in Figure 5-1 seeks firstly to fine tune current volume indicators and, secondly, to incorporate a time component to patient flow management.

5.2 Refining Volume Indicators

While the Bed Board does provide indications of occupancy levels, it should be noted that there are limitations to the summaries it provides. The issues of reserved beds and temporarily closed beds were introduced in Chapter 4. Accommodating these issues is challenging. This is because the Bed Board is primarily an extraction and reporting tool and data, at first, will be extracted from a patient admissions system, Hospas, which was not designed with bed management in mind. As Hospas has no fields for these features, adding them to the current Bed Board would require manual entry of this information. While manual entry is possible, hourly updates of extracted data is bound to lead to mismatches in manual and automatic entries. As a shared communication tool, mismatches in information will threaten its usefulness and risks rejection by users and resistance to subsequent technology implementation.

Reworking the current Bed Board into a version 2 to accommodate Hospas limitations by patient specific manual entries, therefore, may not be the best approach. For the current implementation, the emphasis should be on educating all end-users on appropriate interpretation of the information that will be presented. Flagging these limitations to ensure that they can be accommodated by iPM on its implementation, however, is necessary at this stage and allows foresight in design of bed management models post iPM implementation. Manual entry of additional information, however, is possible for some functions and has been incorporated into the current version.

Specifically, manual entry of daily, hospital-wide demand and supply information is possible as this information does not need to follow patients individually from hour to hour. The current Bed Board has 3 entries that are managed this way, estimated discharges, theatre additions and unexpected emergency admissions. In a sense, these entries are like electronic post-it notes that are shared with all Bed Board users. In practice, assigning individual staff to ownership and

daily entry of this information will be necessary to prevent communications breakdown as suggested in Chapter 4.

The inter-hospital transfer feature is another manual entry function. Although this feature is patient specific, it does not require patient tracking from the admissions system. Patients transferring out are, generally, unlikely to be internally transferred before they leave. Patients awaiting transfer in have not yet been assigned a bed so they are not entered on the admissions system until this time. In addition there is adequate patient information for each entry to avoid any doubling-up of entries or miss-communication as mentioned in Chapter 4. All entries to the inter-hospital transfer function are manual. It is, in essence, a patient-transfer specific e-mail feature designed to improve communications between hospitals using the Bed Board. The transfer feature does, however, archive waiting times and, as such, provides some insight into bottlenecks between hospitals.

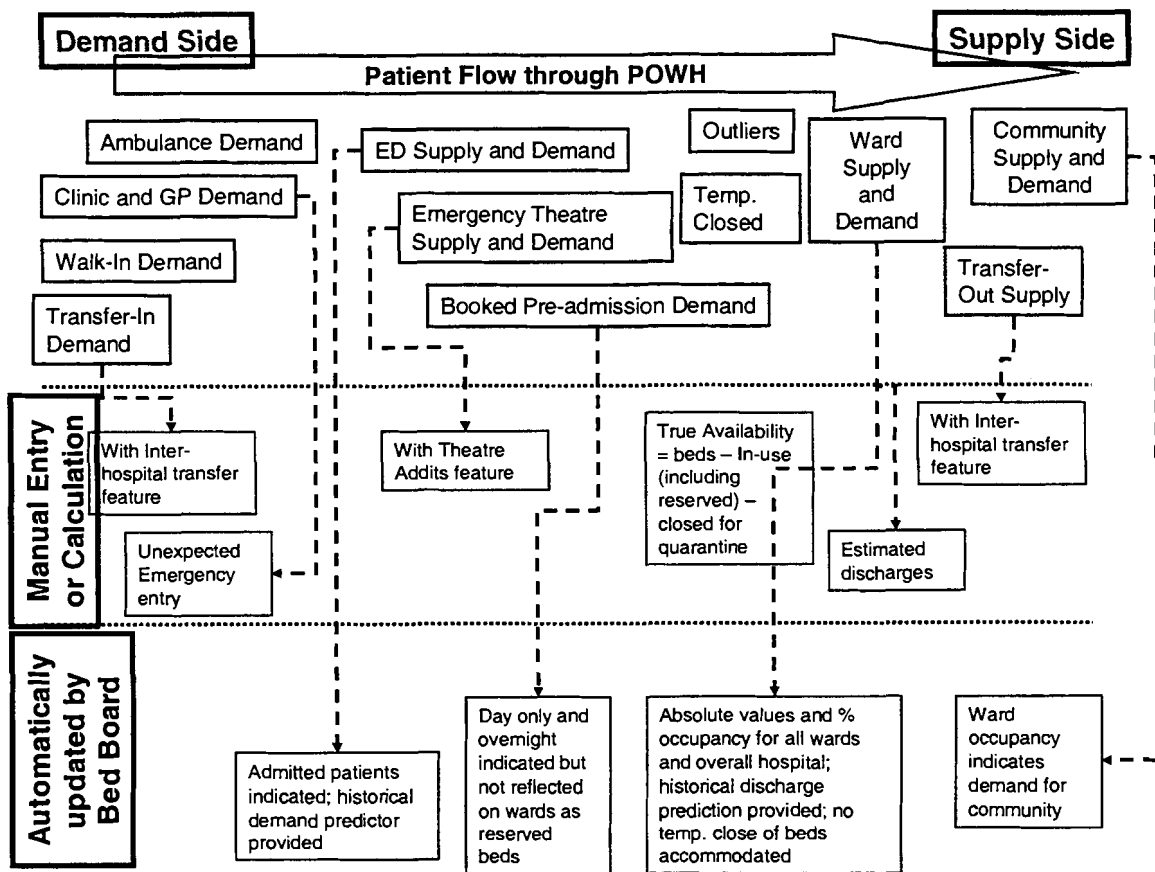
The outlier feature in the Bed Board should be included here in the discussion of automatic and manual entries. Although there is a column for outliers on the main screen as shown in Appendix 2, no one, to date, has determined a reliable means of populating it. Once again, Hospas has no means of flagging outliers by design. Hospas does, however, associate medical specialists with individual patients. One possibility, then, is to assign medical specialists to their predominant wards of practice. The Bed Board could then cross reference this information with the ward to which patients have been assigned and flag mismatches as outliers. The problem with this approach is that assignment to specialists is not always that predictable. Many specialists will visit many wards and updating staffing turn-over and leave relief on a Bed Board specific medical specialist field may be an onerous task.

Alternatively, outliers could be manually flagged on the Bed Board. The problem with this approach, however, is the same as the problem that presented with the reserved and temporarily closed bed scenarios. That is, manual entry of patient specific data risks mismatches of manual and automatic entries. As well as noting the need to accommodate a patient specific outlier field on iPM, foresight in design could see an outlier flag assigned to a patient automatically closed if the patient is transferred to a more appropriate ward before discharge. To accommodate this, the flagging process could request the entry of an 'appropriate ward for closure' entry.

An alternative to flagging the patient fields extracted from Hospas is to have a separate manual entry section in which an assigned staff member, likely the bed manager on duty, enters patient names, their wards and the preferred ward of accommodation on a whole hospital basis. This would act, like the other manual entries already incorporated, like an electronic post-it note section that is shared with all users. Ideally, though, the tracking of outliers would more efficiently be accomplished by patient specific entries assigned to patient records and appearing beside their names on the Bed Board.

Figure 5-2 has some parallels with Figure 2-8, but incorporates the potential use of the Bed Board in assisting the patient flow process. To help summarise the requirements for volume indicator refinements, the lower section of Figure 4-3 indicates the need for manual entries or calculation or the existence of automatic updates by the Bed Board as discussed. Text boxes in the upper third of the figure that have no dashed arrow leading from them are not indicated in any way, manually or automatically, by the current Bed Board.

Figure 5-2 Patient Flow and Integration of the Bed Board



Note that Figure 5-2 uses nomenclature that defines the supply side of patient flow as the supply of services and beds, predominantly on the wards. This classification has been used as the Bed Board is predominantly a bed management tool and the general goal is to meet the demands of incoming patients by the supply of beds. Arguably, a converse view indicating more of a pull philosophy could see the right hand side as the demand side. From this perspective, demand on the system is considered the return of healthy people to the community from a supply of patients. While clinicians would no doubt agree that returning healthy people to the community is the goal, with an incessantly increasing inflow of new patients it is understandably difficult to view this perspective as anything other than a philosophical challenge.

Nonetheless, encouraging patient flow through the provision of efficient and well integrated services could be more beneficially imbedded into the hospital culture. As previously discussed, there are some incentives for the NUMs on the wards and staff in the community healthcare office to draw patients into their services and there is evidence to suggest that more efficient service provision addresses systemic risk. With these incentives as the selling point, assisting more efficient flow through the wards could be enhanced with the incorporation of time based predictors and real-time tracking into an overall patient flow management tool.

5.3 Incorporating a Time Component

Chapter 4 introduced the role of the Bed Board in moderating capacity utilization. Determining capacity utilization in the use of beds on a ward, however, is not entirely black and white. If the demand on a ward remains steady by number of presentations over a defined period, for example, but the average length of stay (LOS) shows an incremental increase, this increase could be attributable to either, or both, of two factors. Firstly, it may be the product of inefficient operations resulting in increased capacity utilization for the same amount of productivity. Metaphorically, the patients are being warehoused when they could be moving onto other areas of the hospital or going home. Alternately, the patients being seen may be of higher general levels of acuity requiring longer lengths of stay. Acuity may or may not be indicated by the mix of diagnostic groups presented on a ward. A 200lb patient with a fractured leg may well take longer to learn to walk again than a 120lb patient with the same diagnosis. This alternative recognizes that all patients are different.

There is, then, some clinical interpretation required in determining capacity utilization on the wards. However, knowing the average LOSs and relating these figures to current cumulative

LOSs, demand and occupancy rates is a good starting point and allows management and clinicians to hone in on unusual or unexpected variances from the norm. Unfortunately, the current Bed Board does not track patient LOSs, but gives us partial indication of demand and information on occupancy only. This presents as an opportunity to combine the Bed Board with other information for a more comprehensive tool.

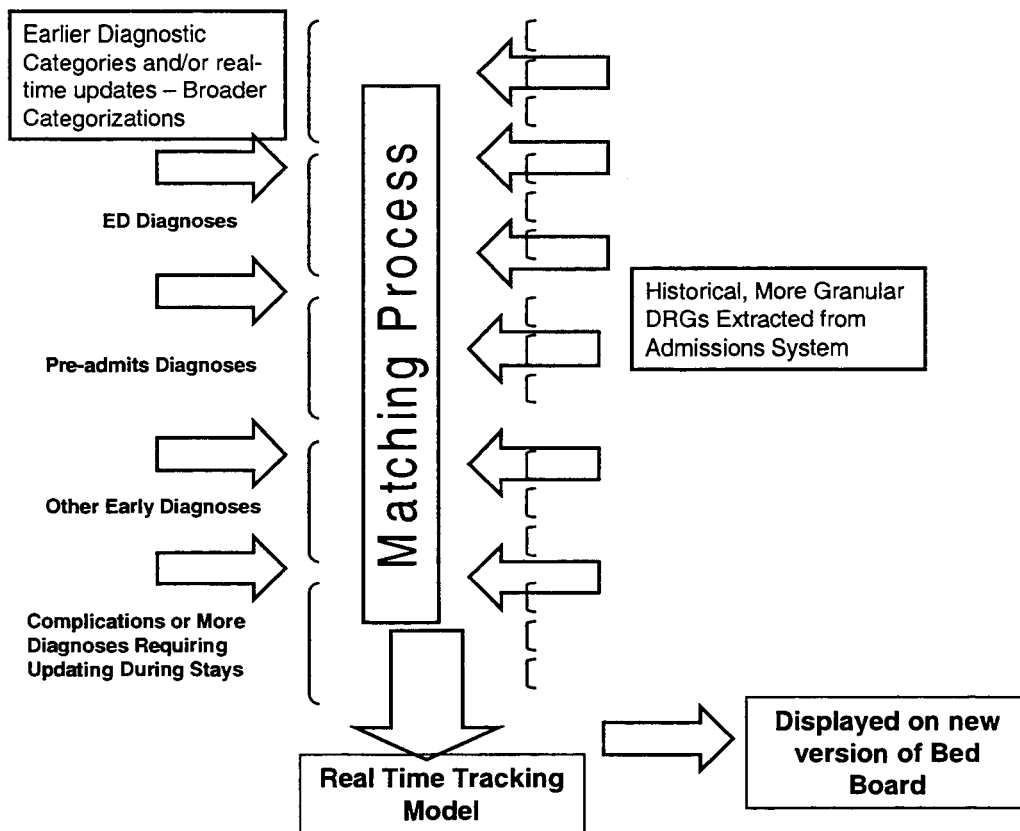
As a starting point, the “estimated discharges” column on the main screen of the Bed Board requires manual entry. At present the evening bed manager collects predicted discharge information from each wards’ NUM at the end of every day shift. The bed manager then tallies these figures for a hospital wide figure and notes it down for the morning bed manager as an aide to managing the next day. Logically enough, this figure could be entered into the Bed Board by the evening bed manager upon implementation of the Bed Board. This process could very easily be made more efficient with subsequent versions of the Bed Board by having the NUMs enter their own estimates each evening and the Bed Board automatically tallying them. An even more efficient process, however, could see the automatic entry of estimated discharges using more granular historical modelling.

At present, estimating discharges is based on each NUMs experience and their knowledge of the current goings-on on their wards. Some wards, ideally, have morning whiteboard meetings to briefly discuss patient progress with doctors, nursing and any allied health staff involved to help with this process. With high throughput rates and increasing demands on all staff involved, however, a more efficient process could see the flagging of potential delays only. That is, following clinical pathways could amply ensure that the majority of patients are discharged in a timely fashion. Historical modelling based on diagnostic groups could be used to estimate the expected length of stay (LOS) and a relatively simple lookup routine could track real-time progress against historical trends. These historical LOS trends are already stored in Hospas and, post data-migration will also be available in iPM. Appendix 9, for example, indicates the top 20 diagnostic related groups (DRG) represented on the Cardiothoracic Surgery Ward at POWH and the historical average LOS associated with these groups as extracted from Hospas.

There is something of a sequencing problem associated with this concept. DRGs are, in current practice, entered by medical records staff when patients are discharged. As well, the predominant use of DRG information has been for retrospective analysis of service-demands for the allocation of funds and resources. As such, DRGs represent a nomenclature that is somewhat

esoteric in the view of nursing and other clinical staff. Nonetheless, there is a current requirement to enter initial diagnoses into the admissions system. ED staff, for example, enter an ED diagnosis to populate a field of the same name in Hospas. To make this general concept work, a matching process would be required to ensure that preliminary diagnoses and any updates during the patients stay are able to find a match with historical average LOS data. Input masking and drop-down menus could assist in the matching process. Updating of field matching lookup functionality with any added DRGs or broad admission diagnosis categorizations over time would lead to a self learning model. A higher level view of this concept is illustrated in Figure 5-3.

Figure 5-3 Matching Diagnostic Categories with Historical Data



5.4 Putting Time and Volume Indicators Together

The question, at this stage, is how to amalgamate historical and current information to provide a simplistic and efficient time-based patient tracking tool and relate this to occupancy and other volume-based indicators. As suggested, the process of predicting supply and demand may be simplified by manually flagging variances and assuming that the majority of patients will meet

the average LOS as historically indicated and then be discharged. In other words, unless a clinician, such as a NUM on a ward, intervenes, the real-time tracking model will assume that patients will meet historical predictors and a bed will be indicated as 'soon-to-be' or 'should-be' available based on prediction rather than waiting for manual entry of transactions.

The upside of this proposal is that it would, by design, allow bed managers, patients and clinicians to predict demand ahead of time. For example, if the average LOS for a respiratory patient with chronic obstructive pulmonary disease is 6 days, the future use of this patient's bed can be predicted as follows. On the day of admission the bed will be indicated as in-use for the next 6 days, on the second day of stay the bed will be indicated as being in-use for the next 5 days and so on, until the predicted date of discharge arrives at which point the bed will be indicated as free for a new patient if the patient is discharged as predicted.

At this point, if the real-time tracking model predicts that the bed should be free and the admissions system indicates that it is, in fact, still occupied by the same patient, a warning flag should be raised. There are two possible explanations for this situation: 1. the patient has experienced complications or subsequent diagnoses requiring a longer stay, but this information has not been entered into the real-time tracking model (via the new Bed Board), or 2. capacity utilization is in excess of historical indications for this patient indicating inefficiency.

The downside of this proposal, is that it is a relatively 'in your face' approach to capacity utilization. Some tact would be required in introducing this type of modelling and management of patient flow. A predictable reaction from clinicians is that management are telling them, in fact forcing them, to follow a prescribed model of efficiency. The argument against this reaction is twofold. Firstly, the historical model would be prescribed by the clinicians themselves. That is, the predictions would be drawn, via the admissions system, from the resource utilization that these same clinicians, in practice, have used in treating patients in the past. Secondly, the model design should always allow clinicians to over-ride the prescribed prediction. That is, despite the use of input-masking to accommodate more predictable clinical stays, an 'other' category and the ability to manually enter any number of days personally predicted should be incorporated. Personal input should be allowed at any point in the patients stay.

A cynical view of this latter feature would be that it would be overused, such that the model would be generally over-ridden by an ad-hoc process more in common with current methodology. However, for wards with more predictable stays, such as high-turnover surgical

wards, allowing the model to inform users would likely be the easier option in practice. For wards typifying co-morbidities and frequent complications of stay, close monitoring of the model and the refinement, addition and/or broadening of early diagnoses and DRG categorization features could be incorporated into the model to effect a self-learning component. For more clear-cut diagnoses and DRGs, self-learning could be automatically incorporated by ensuring that historical predictions are based on a rolling average pattern of data extraction from the patient admissions system.

An additional feature that could be added to this proposed real-time tracking model initially or later on, dependent on clinician sentiment, is a comparison of POWH capacity utilization performance to the experience of other hospitals. Benchmarking information for major teaching hospitals in Australia and New Zealand is available however its use for this purpose would have to be negotiated with the governing body that oversees this non-profit organisation. State-wide NSW Health information for benchmarking purposes would be more readily accessible, though it would obviously represent a more limited scope.

While these suggestions are well beyond the scope of the current Bed Board implementation, they are presented here for consideration in moving beyond the current tool. Recognition of the limitations of the current tool will indicate that as the first of a series of technologies this is an organisational wide learning experience. As such, POWH managerial staff should not be discouraged by these limitations and downplay the impact of the current implementation. In contrast, employing every effort to guarantee success with the current tool within its capacity will pave the way for additional more comprehensive and compelling tools and work practice possibilities. In addition, sharing these insights upfront will invite user input into the development of subsequent tools. Staff involved in the procurement and implementation of iPM and its bed management functionality or further revision of the current Bed Board could incorporate the insights presented here with user input for more robust and comprehensive systems.

Overwhelmingly, though, the inclination to present these foresights lies in the usefulness of data which is already in the Hospas system and will also be captured in the iPM system on its implementation. While the Bed Board extracts occupancy information for an understanding of demand and supply by volume at the present moment, factoring in an understanding of demand and supply by time from historical LOS data is too useful a proposition to ignore. Simply put, this information would allow clinicians and managers to more readily forecast resource requirements

based on the supply consumed by given demands in the past. Figures 5-4, 5-5 and 5-6 suggest possible representations of this information.

Figure 5-4 Potential Ward Summary Profile with Real-Time Patient Tracking

Platform: 10, Open: 9, Closed: 1 (Infection), Reserved: 2, Available: 1, Occupancy, 8/9 = 89%
Outliers * : 1

Bed Board | IHT | Admin | Reports | Help | Log Out

Ward Profile Summary
 Ward Description: 2/PB10W
 Platform: 10, Open: 10, Occupied: 9
 Date and Time: 25 May 2005 12:06:00

Bed No.	Bed type 1 - DoH	MRN	Patient Name	Current MO	MO Specialty	MO Stream	Leave Status & Date of Return
001	General - Mixed	1140	Confidential		Geriatrics		
002	General - Mixed	1464		Haematology			
003	General - Mixed	1562					
004	General - Mixed	1541					
005	General - Mixed	1552					
006	General - Mixed						
007	General - Mixed	156282		MCINTOSH, SCARLE	Los		

Predicted LOS

Actual LOS

Status

Benchmark LOS

6	3	On Track	7
12	11	1 Day Left	10.5
4.5	1	On Track *	5
5	5	D/C Due	6
Empty	Empty	Available	Empty
Empty	Empty	Closed (Infection)	Empty

Clicking on Patient Name allows clinicians to update diagnoses and/or complications to affect or override Predicted LOS and to flag outliers (unique identifiers could also allow hyper-linking to Electronic Medical Records)

Figure 5-5 Potential for Supply and Demand Forecasting Screen Using Real-Time Patient Tracking

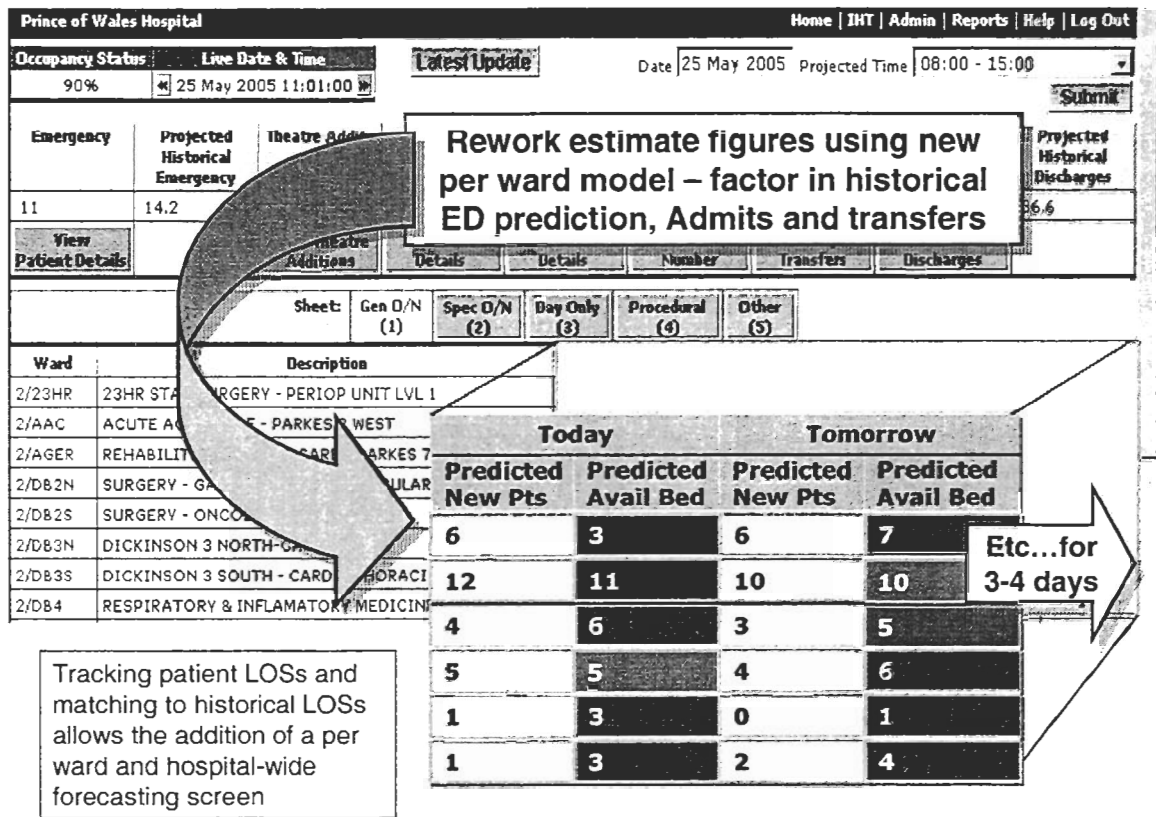
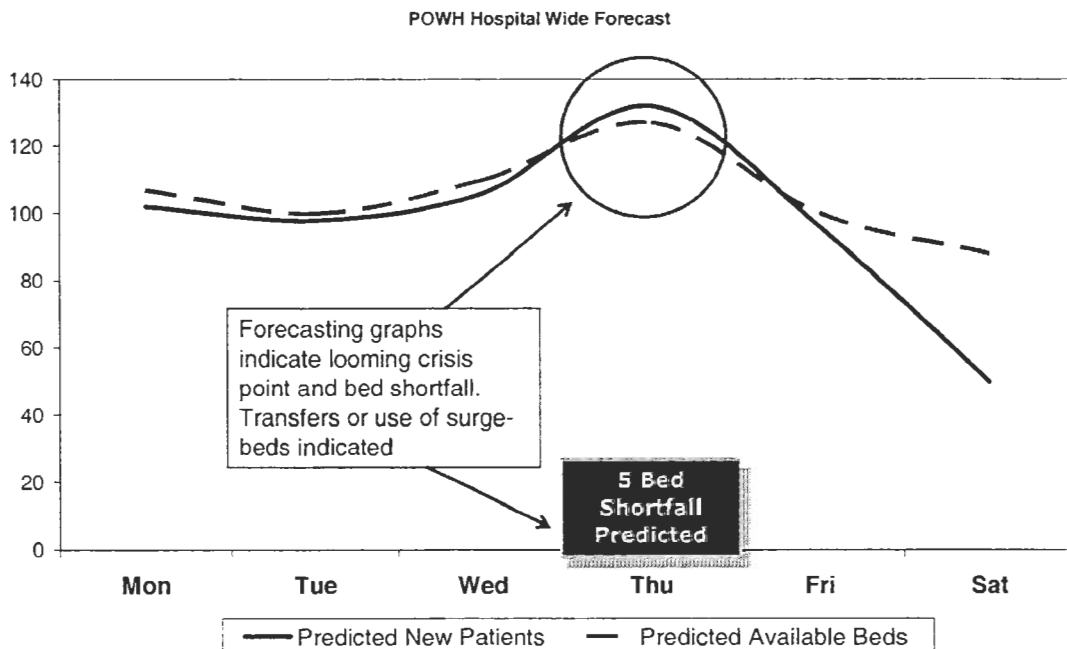


Figure 5-6 Potential for Forecasting Graphs Derived from Forecasting Summary Screen



6 RECOMMENDATIONS – A BED BOARD CHANGE MANAGEMENT PLAN AND STRATEGIC DIRECTIONS

6.1 Review and Primary Aims of the Change Management Plan

Before outlining recommendations for a change management plan, it is worth briefly reviewing the impetus behind this initiative. It should also be re-emphasized that the Bed Board faces a number of challenges to its potential use and value. Primarily, as an assistive tool, the Bed Board risks being relegated to a tool for managerial monitoring only. This project proposes that this use is of minimum value in itself. It does little to encourage patient flow and does not pave the way for a more integrated approach with subsequent technology implementations.

As discussed in Chapter 2, in an environment of increasing demand the use of business technologies represent an opportunity to improve the efficiency and quality of healthcare delivery, particularly as business technologies have demonstrated value at a systems management level in other industries. As introduced in Chapter 2 and further explored in Chapters 3 and 4, the autonomous nature of a typical hospitals structural core, its clinicians, has resulted in a somewhat segmented approach to delivering services. This approach, as discussed, has lead to patient access and quality of care concerns attributable to systemic risk.

The organizational structure of hospitals is not likely to change in a hurry, nor is radical change in this regard desirable as this structure has significant benefits as well as shortcomings. If anything, clinicians' autonomy is consolidated by the competitive global human resources market they now operate in. Although this creates a complex environment, it is evident that managerial and clinical end-goals are essentially one and the same, notwithstanding alternative views of the risks and demands of delivering quality healthcare. Critically, though, managerial staff needs to recognize that, despite shared goals, patient flow initiatives need to be driven by clinicians. In realising the potential of tools like the Bed Board then, a primary goal of implementation should be that of integrating managerial insight into clinical practice.

The emphasis of this change management plan, then, is on education and shared organisational learning. The underlying premise of patient flow, systemic risk and the broader environmental demands on POWH need to be introduced from the outset and revisited at every

point in the implementation process. This approach also invites clinical input that will be critical to the development of better systems management and the introduction of the Bed Board and similar tools as part of this process.

Inviting clinician input can be something of a challenge in an environment where day to day operations are stretching workloads and clinical responsibilities. Tucker et. al.²⁷ observed and reported on the problem solving behaviour of nursing staff in hospital settings. Their general conclusions were that nursing staff had a tendency to deal with problems one at a time as they arose. Heavy workloads, a strong sense of the ability to resolve problems individually, and lack of clear and non-judgemental communication channels tended to discourage the reporting of problems that could have lead to systems improvements. It would be painfully ironic if these observations were not incorporated into introducing a tool designed to enhance system-wide transparency.

Establishing and fostering effective communications channels, then, is also considered an important component of this change management proposal. In this endeavour, it is advantageous to anticipate and act on as many of the risks addressed in the preceding Chapters as early on in the change management process as possible. Particularly those risks that are likely to lead to user uptake or rejection of the Bed Board as a daily working tool or discourage the further development and integration of more advanced business technologies.

On this note, dealing with any of the shortcomings of the Bed Board identified in Chapters 4 and 5 upfront will, likely, generate better working relationships between managerial and clinician staff from the outset. Ensuring that all end-users accessing the Bed Board are interpreting the information in the same way is essential for effective communication between clinicians and between clinicians and the various levels of governance involved. Additionally, feedback and user buy-in would be encouraged if the Bed Board is presented as one part of a series of complimentary technologies. Emphasis on the potential to develop the Bed Board and subsequent implementations to incorporate clinician feedback would encourage the corporate identity required to move the organization to another level of integrated care and performance.

²⁷ Tucker, A, Edmonston, A and Spear, S, *Why Your Organization Isn't Learning All It Should*, Harvard Business School, Working Knowledge for Business Leaders, July 30 (2001) cited at <http://hbsworkingknowledge.hbs.edu/item.jhtml?id=2397&t=technology&noseek=one> on 27 June, 2005

In essence, then, the change management plan presented here, represents the view that implementing the Bed Board is an important early step in nurturing a more sophisticated operational culture incorporating systems awareness. Despite the Bed Boards shortcomings as a stand alone bed management tool, it is important that management and clinicians, alike, do not downplay the significance of this implementation. This project considers this implementation a pivotal step in moving toward greater levels of organisational transparency through the application of business-like technologies. The ultimate goal is to integrate the Bed Board into daily routines and ensure that its role is simple and useful to end users. If this buy-in is achieved, an associated shift in culture can be leveraged off to aim for the more advanced operational requirements of a mass customization model of service delivery.

6.2 Recommended Change Management Plan

Appendix 8 provides a Gantt chart as an overview of the recommended plan. A breakdown of each step in the plan is provided in Section 6.2.2. The emphasis of the plan and the details provided in Section 6.2.2 is to keep information clear and simple. Key messages are indicated for each of the educational sessions. The ultimate goal is to sell the most important components of previous Chapters of this project without overwhelming end-users.

An overall ten week time-frame has been estimated based largely on the time needed to gather clinicians together for educational sessions. Managerial and bed management staff will be relatively easy to fit into a timeslot. Some of the clinicians that will be involved will work various shifts. For each educational session, there will likely be at least 2 timeslots to accommodate clinicians' shifts and work routines. As a result, extra efforts will have to be made to share the insights of each session with all end-users.

Before providing more details of each step in Section 6.2.2, Section 6.2.1 is included to establish channels and methods of communications from the outset.

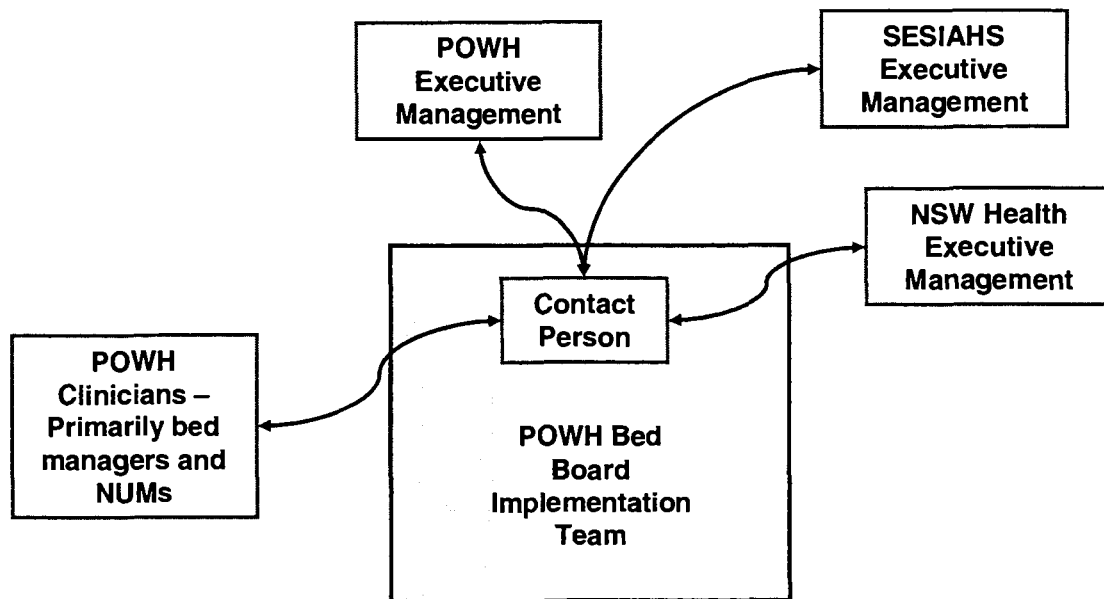
6.2.1 Communications Initiatives

Communication dictates the structure of the recommended change management plan. Channels of communication are established from the outset with an early step in the plan being an education session bringing end-users and management together to establish the rationale behind the Bed Board and its implementation. As discussed in previous Chapters, clinicians, particularly

the bed managers and NUMs, will be pivotal in ensuring the success of the Bed Board. Their presence and influence, then, needs to be felt from the outset.

A member of the implementation team needs to be assigned the role of contact person and introduced in the first education session. This role should entail organising and facilitating educational sessions, distributing e-mailed advisories and sharing the insights of all clinicians and managers at POWH as the implementation process proceeds. The contact person should also attend SESIAHS and/or NSW Health meetings of relevance to the Bed Board. In addition the contact person needs to be open to input from end-users throughout the implementation process. Using this role, Figure 6-2 outlines the interactions that the contact person would facilitate and the methods employed.

Figure 6-1 Role of Contact Person and Tools & Methods Employed



Communications Tools and Methods:

- Educational Sessions
- E-mail
- Phone
- Pager
- Help section of Bed Board – directs to POWH contact
- Feedback from Audit Tools

Although the contact person will aim to incorporate end-user feedback into the proceedings, the emphasis on earlier education sessions will be that of delivering managerial insight to clinicians. As such choosing a contact person who has both bought into the message of a systems approach being delivered and has credibility with clinical staff is essential. In sharing these insights, the contact person will have to overcome the anticipated resistance from clinicians and influence a positive acceptance of the Bed Board implementation. A nurse or doctor now in a managerial role may be a good choice as contact person.

The communications tools and methods chosen are those that are already familiar with end-users. Pagers, phone and e-mail are frequently used by clinicians in daily practice. The intranet is less frequently used at POWH as, in its current form, it is not quickly or easily navigated to find new information. A POWH newsletter is e-mailed to all staff weekly and general information on the Bed Board could also be included in this.

6.2.2 Primary Steps of the Change Management Plan

6.2.2.1 Step 1: Implement Software for Testing

The structure of the Bed Board with the use of an Area based server is such that the software implementation is largely beyond the control of the POWH implementation team. Nonetheless, this is included as a step in the implementation plan, rather than as a handover, as issues may arise in the initial testing of Hospas feeds that could require interaction between the POWH implementation team and information services staff from SESIAHS and/or NSW Health. While the software implementation itself should be relatively straight-forward, holding off on subsequent steps, particularly the first education session in step 4, is a possibility if unforeseen technical problems arise. Some flexibility is possible in this regard as the POWH implementation team wholly comprises POWH staff.

6.2.2.2 Step 2: Phase 1 Testing

Step 2 primarily aims to test the integrity and frequency of data feeds from Hospas to the Bed Board server and representation on web browsers on the intranet. A further aim is to test the consistency and manageability of user functionality. Appendices 6 and 7 provide proposed templates for these tests.

The testing of data transfer is something that may be done at frequent intervals, especially within the first weeks of the implementation process to ensure that data feeds are consistent. The

template in Appendix 7, then, could be re-used as a standard testing tool. For these tests, the data represented on the Bed Board should be verbatim with the data entered to Hospas. Additionally, feeds must consistently occur on the hour to ensure reliability in practice.

Appendix 6 is 1 of 6 pages of functionality testing. As the Bed Board was developed in-house in two other greater Sydney area hospitals, it has not undergone the degree of formal user acceptance testing that would otherwise be expected from commercially available products. As such, a member of the Bed Board implementation team at POWH should systematically test all of these functions to ensure reliability and consistency.

To ensure that navigating and using the software is user-friendly a select number of end-users could be invited to browse through the Bed Board in phase 1. Those invited to participate in this process will need to understand that the information presented on the screen will not necessarily be accurate at this stage. The functionality that the majority of end-users will employ will be relatively limited so it is anticipated that end-users will find navigation and use of the Bed Board no harder than web browsing or using e-mail; which all intended Bed Board end-users can already manage.

There are some administrative functions, however, for which it would be worthwhile having intended end-user engagement earlier on. Specifically, the administrative tasks of authorising, managing and assigning login should be explored by the eventual intended owner of these tasks. It is anticipated that the patient access manager or a delegated authority in this capacity at POWH will be a good candidate for these ongoing administrative duties. There is no need to employ a formal testing approach for these functions, however, as they are not anticipated to prevent the overall implementation from going ahead if they are unwieldy in practice. It would be beneficial however, to make note of any inefficient characteristics that could be addressed by SESIAHS information services staff at a later stage to ensure the long-term success of administrative duties. At minimum, documentation of findings and requests around these functions should be forwarded to SESIAHS and NSW Health along with the more formal documentation of testing undertaken by the POWH implementation team.

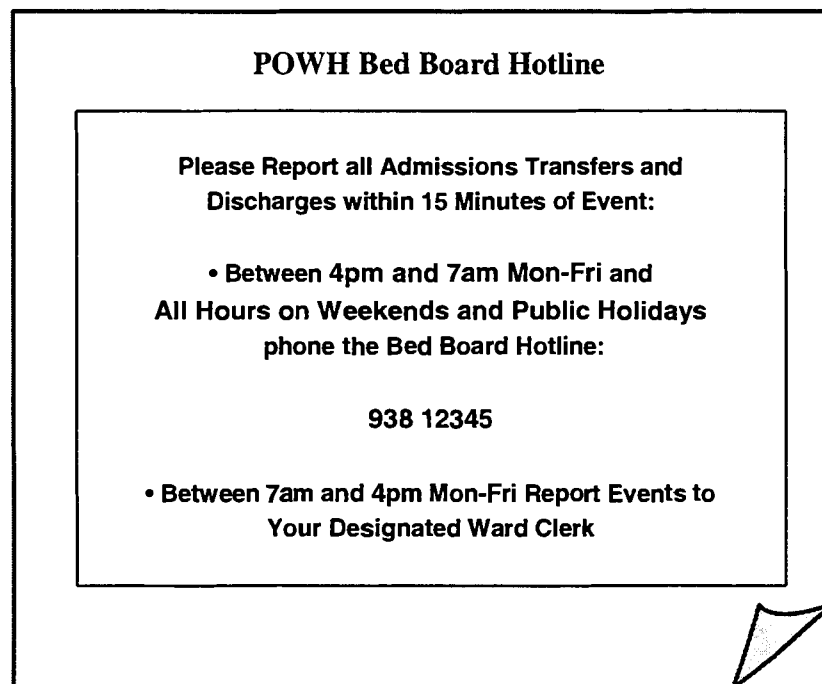
6.2.2.3 Step 3: Organize After-Hours Infrastructure

Organising after-hours infrastructure early in the implementation plan will ensure that, once end-users are educationally prepared, the Bed Board can go-live without infrastructure-based delay. Employing and training an after-hours clerk to fill the 4pm to 8pm Mon-Fri timeslot,

as recommended in Chapter 4, is one part of step 3. The recruitment process could take longer than the 4 weeks allocated to step 3. This is not considered a significant risk, however, as a large pool of clerical staff at POWH, who are already trained in Hospas use, can be readily drawn upon to fill any gaps in staffing. Assigning a PC, Hospas access and work space for the after-hours clerk will also be needed. The medical records department at POWH could likely accommodate this need without undue disturbance.

The other initiative required in step 3 is to arrange a call-line through the POWH telecommunications department. The phone number assigned will need to be re-routed after 8pm and on weekends to the ED where the ED clerk will enter data through the night and on weekends. This will ensure that only one number is used from 4pm until 7am the next morning Mon-Fri, all weekend and on public holidays avoiding confusion for after hours nursing staff. 'Hotline' notices indicating the relevant hours and the number to call could then be made up laminated and posted on every ward just prior to go-live. These notices should also indicate that all reporting between the hours of 7am-4pm Mon-Fri should be directed to the designated day clerk for the ward as shown in Figure 6-3.

Figure 6-2 Bed Board Hotline Notice



6.2.2.4 Step 4: Education Session 1

Step 4 aims to introduce end-users to the broader demands on healthcare services, the need to incorporate a systems component to clinical practice and how the Bed Board will fit into this context. This has to be presented as a convincing sales pitch with an emphasis on how this will help end-users. End-users will have to be encouraged to challenge their assumptions about delivery of quality care. There also has to be significant attendance from managerial and executive staff to emphasize their commitment to making the Bed Board work effectively.

Program directors, who are senior doctors and senior nurses, need to be included for buy-in and to pass on the message to all doctors and nurses. After this first session, program directors will need to put the Bed Board on the agenda for the next program meetings to share their knowledge with all staff. After the first session, however, it should be adequate for program directors to have their staff refer to the NUMs, bed managers and the project contact person for any further enquiries; the program directors should not need to attend subsequent education sessions. Table 6-1 indicates an appropriate list of invitees.

Table 6-1 Invitees for Education Session 1

Invitee/s	Reason
Bed Managers	Key Users
NUMs	Key Users
Senior Nursing Staff	Key Users and Commitment to Project
Program Directors	Educate on Concepts & Buy-in for Future Projects; Pass Key Messages on to all Clinical Staff.
POWH Bed Board Implementation Team	To Run Session
Clerical Staff	Vital link in Timely Data Issue
POWH Executive Director	Commitment to Project & Key User
SESAHS and/or NSW Health Exec	Commitment to Project & to get Feedback
Patient Access Manager	Key User and Commitment to Project

A proposed agenda for education session 1 is presented in Table 6-2. Figures and Tables referred to are from this project. Although there has been ample opportunity for staff to attend patient access improvement initiatives, to date, high staff turnover and the introduction of a new tool, the Bed Board, warrants revisiting some of the fundamental demand information to begin with.

Table 6-2 Agenda for Education Session 1

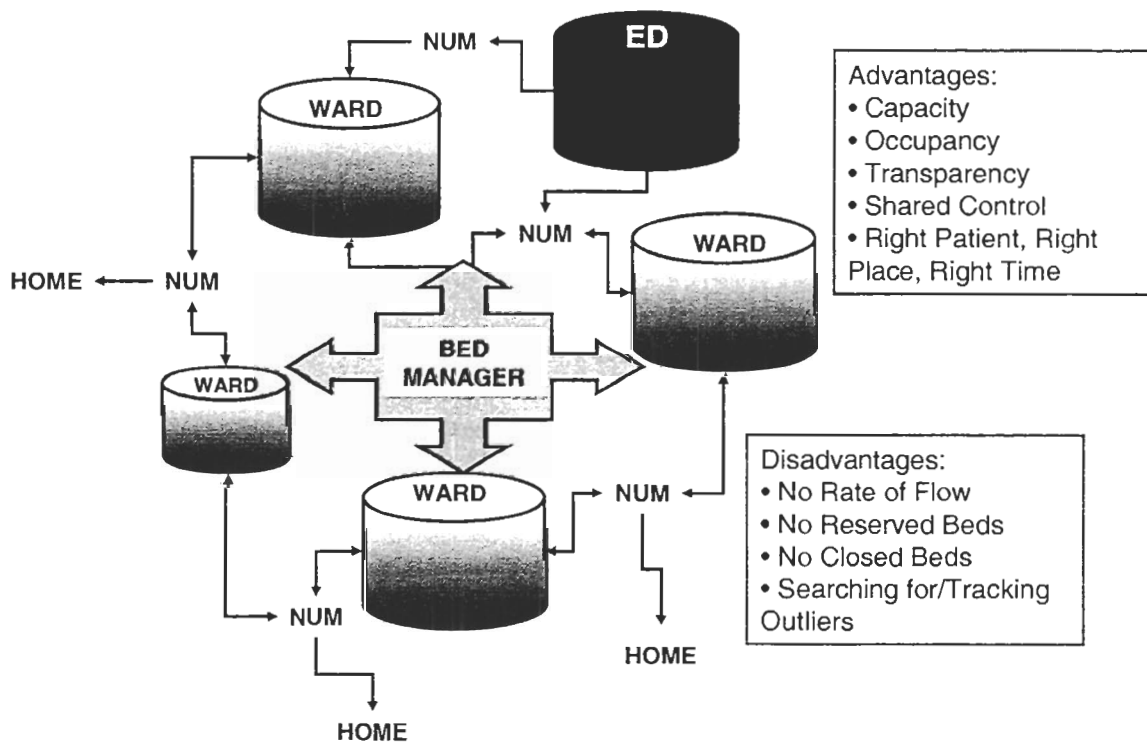
<u>Agenda</u>	
<i>Materials (PowerPoint and Handouts)</i>	
<ul style="list-style-type: none"> • Introduction/Review of environmental demands 	<ul style="list-style-type: none"> • Figures 2-2 to 2-5
<ul style="list-style-type: none"> • Concept of Systemic Risk 	<ul style="list-style-type: none"> • Point form summary of the work of Donald Berwick • Handouts should include links to the Institute for Health Improvement and the National Health Service
<ul style="list-style-type: none"> • Complexity and size of POWH – vulnerable to systemic risk 	<ul style="list-style-type: none"> • Figure 2-8 • Demand and turnover indicators – Appendix 1
<ul style="list-style-type: none"> • How the Bed Board helps • Limitations of the Bed Board 	<ul style="list-style-type: none"> • Table 2-1, Figure 3-7 • Figure 6-4
<ul style="list-style-type: none"> • Work practices – general concept - will be addressed more specifically in subsequent sessions 	<ul style="list-style-type: none"> • Figure 4-3 • Figure 6-4 – teamwork concept
<ul style="list-style-type: none"> • Alleviating fears 	<ul style="list-style-type: none"> • Figure 2-11

The key take-home messages from this session should be:

- Demands on healthcare services in NSW will continue to increase and need to be better managed by increased efficiencies.
- There is evidence to suggest that these increased demands and a ‘silo’ approach to patient care leads to increased risk to patients through compromised patient access and decreased quality of care.
- The Bed Board can assist in decreasing systemic risk by sharing information about supply and demand across the hospital.
- Bed managers and NUMs can use this information to more easily direct patients to the most appropriate wards, improve the management of outliers, and reduce the number of internal transfers.
- The Bed Board is one component of the solution. It will only work if everyone buys in i.e. data reporting, data entry and acting on information to effect positive change. Awareness of its limitations is necessary.

Figure 6-4 could be shared at education session 1 to help illustrate both the advantages and limitations of the Bed Board. Metaphorically, the various units of the hospital, the ED and the wards, could be seen as storage or water tanks. The NUMs, then, are the valves between the tanks and the bed manager a central control of flow. If managed well, the Bed Board will indicate the volume of each tank and how full it is at any one time and help the NUMs and the bed manager to control patient flow. This information is shared with all components of the system, but there has to be widespread buy-in for more effective flow. The advantages and disadvantages are presented in point form, allowing room for discussion of the details involved. Discussion of work practices to manage the advantages and disadvantages can be elaborated on more at the next education session.

Figure 6-3 Metaphor for Supply, Demand and Flow for Education Session 1



On closing education session 1, it should be re-emphasized that quality of care can be improved with more efficient delivery of care. The use of Figure 2-11 could be employed here to indicate the ultimate goal of moving toward a mass customization model as opposed to a mass production model to reassure clinicians that efficiency will not compromise safety and quality but will, in contrast, be a contributing factor to quality and safety. Finally, a lot of material will be presented but the opportunity to revisit this will be ample in subsequent education sessions.

6.2.2.5 Step 5: Draft Work Practices, Audit Tools and Audit Quota

Work practices designed to encourage use of the Bed Board need be considered up-front in order to maximise the benefit of this new tool. Particular consideration should be given to the bed managers, as their jobs are the most likely to change with the introduction of the Bed Board. From the outset, it should be made clear to bed managers that their jobs are in no way threatened by the introduction of the Bed Board. The ongoing need for a central coordinator with clinical insight cannot be overemphasized. Additionally, although other clinicians will be able to offer suggested bed allocations based on their view of the Bed Board, final decisions will still be required and will remain the bed managers' responsibility.

With the significant central role of the bed managers re-affirmed, thought can be given to practices that will incorporate the Bed Board into their daily routines. Figure 4-5 provides some insight into work practices that will assist in this process. While these are relatively simple ideas, some encouragement will be needed to integrate them into practice. By nature, the bed managers' jobs have been dynamic and task oriented. As such, some work will likely be required to convince them that it will be more efficient to take time out intermittently to sit down, view the Bed Board, incorporate other factors and consider their allocation decisions. The Bed Board can take a lot of the leg work out of gathering information and, as it is viewable via a web browser and the intranet, the bed managers can easily log in on any ward or in the ED.

Encouraging NUMs to view the Bed Board on a regular basis will also be essential. This will promote their understanding of the demand and supply of beds across the whole hospital at any one time. Figure 4-5 lists potential work practices that the NUMs could employ to promote use of the Bed Board and a systems view. As discussed in Chapter 4, by logging in and browsing through wards and the ED, the NUMs will be able to assist in drawing the most appropriate patients to their wards. Realising the benefits of this insight should result in the development of a corporate identity amongst the NUMs that encourages greater team work. In its use, they will also see the benefit of timely reporting to keep the Bed Board accurate.

Although timely data will be encouraged by the benefits of using the Bed Board, accuracy may still be a problem, particularly shortly after its introduction before end-users have realised its full benefits. To help in assessing data reporting and entry accuracy, an audit process will be necessary. As proposed in Chapter 4 a target of 15 minutes to report events and an additional 15 minutes to have them entered to Hospas presents as a reasonable target to achieve hourly accuracy of Bed Board feeds. A simple generic template as illustrated in Figure 4-6 could

be utilized by staff to audit both reporting and data entry timeliness. Table 6-3 is a potential guide for auditing which could be shared with end-users in education session 2 as a guide to agreed targets.

Table 6-3 Potential Audit Approach, Schedule and Targets

Audit	Target	Staff Member	Frequency
Reporting events	15 mins or less	Bed manager	20 per week (to begin)
Entering data	15 mins or less	NUM	5 per week/ward

The audit process should require NUMs to record patient names and MRNs, the event that occurred and their times of reporting these events as indicated in Figure 4-6. Cross referencing report-times to entry-to-Hospas times and calculating delays could be managed by the implementation team to begin with in order to fine tune the process. On handover, these checks could be handled by medical records staff proficient in reviewing Hospas entries and results could be sent to the patient access manager.

As suggested in Chapter 4 the timeliness of reporting events could best be audited by bed managers. The bed managers are mobile and already visiting many wards a day. The bed manager could observe the physical arrival and departure of patients to and from wards and the ED and note times on the audit sheet. These can then be cross referenced with ward clerks for normal business hours and with the after-hours hotline times-of-report for after-hours. The bed manager could forewarn the appropriate ward clerk to record the times-of-reports for, for example, the morning, so that the ward clerks do not need to record this information constantly. Once again, the implementation team could assist in tabulating and reporting on audit results initially. On handover, these duties could likely be managed, again, by medical records staff and reports sent to the patient access manager.

Higher level measures of the impact of the Bed Board include overall hospital occupancy, average numbers of outliers and average numbers of internal transfers per day. These measures could be reported on a weekly basis from go-live to handover to begin with. On handover, the value and insight provided by these measures will need to be decided on by POWH executive management so that ongoing data extraction and reporting duties could be assigned appropriately.

6.2.2.6 Step 6: Education Session 2

A primary aim of education session 2 is to introduce recommended work practices for improving patient flow by use of the Bed Board to the bed managers and the NUMs. In proposing work practices, the limitations of the Bed Board can be further explored here and ways of working around these limitations discussed and agreed upon. The second main aim of education session 2 is to propose and agree upon performance targets and auditing processes for timely data. Table 6-4 indicates the invitees for this session and Table 6-5 provides a proposed agenda.

Proposed performance targets and measures from Section 4.4 can be presented as suggestions for feedback. These do not present as unreachable or unreasonable. The emphasis of the session, however, should be on what staff and management agree on as the required factors to make the Bed Board work for everyone. If changing some of these proposals prior to go-live will assist in outcomes, the change management plan allows time for the implementation team to rework documents appropriately. Reference can be made to the use of an end-user survey post go-live as shown in Figure 4-8 as further openness to end-user suggestions and the willingness to make the changes necessary to ensure an effective tool.

Table 6-4 Invitees for Education Session 2

Invitee/s	Reason
Bed Managers	Key Users and New Work Practices Required; Agreement on Performance Targets and Auditing
NUMs	Key Users and New Work Practices Required; Agreement on Performance Targets and Auditing
Senior Nursing Staff	Key Users and Commitment to Project
POWH Bed Board Implementation Team	To Run Session
Clerical Staff	Vital link in Timely Data Issue – Need to be Included in Performance Target and Audit Process Agreement
POWH Executive Director	Commitment to Project & Key User
Patient Access Manager	Will Oversee Audit and Reporting on Handover; Agreement on Performance Targets and Auditing
Medical Records Manager	Involvement in Audit Process

Table 6-5 Agenda for Education Session 2

<u>Agenda</u>	
<i>Materials (PowerPoint and Handouts)</i>	
<ul style="list-style-type: none"> • How the Bed Board will Assist Patient Flow • Widespread Use is Essential for Accuracy and to Promote Flow 	<ul style="list-style-type: none"> • Figure 6-4 • Figure 4-3
<ul style="list-style-type: none"> • Work Practices to Assist in Putting the Bed Board to Work 	<ul style="list-style-type: none"> • Figure 4-5
<ul style="list-style-type: none"> • Limitations of the Bed Board 	<ul style="list-style-type: none"> • Figure 6-4 • Figure 4-5
<ul style="list-style-type: none"> • Performance Target Discussion and Agreement 	<ul style="list-style-type: none"> • Table 4-4
<ul style="list-style-type: none"> • Audit Tools and Schedule Discussion and Agreement 	<ul style="list-style-type: none"> • Figure 4-6 • Table 6-3
<ul style="list-style-type: none"> • End-User Feedback After Go-Live 	<ul style="list-style-type: none"> • Figure 4-8

The key take-home messages from education session 2 should be:

- NUMs should frequently look to other areas of the hospital as potential demand on their own wards. They can then work with bed managers to effect efficient patient allocation decisions.
- Bed managers should allow the Bed Board to reduce the leg work required in gathering supply and demand information.
- Both NUMs and bed managers need to factor in reserved beds as indicated by theatre lists and temporary closed beds as monitored and recorded by the bed managers.
- Staff need to work together to make the bed board work. This includes NUMs, bed managers, clerical staff and the patient access manager. The implementation team should be used as a valuable resource in refining and coordinating practices and processes while the implementation process progresses.
- Feedback is welcomed from all staff and management throughout the implementation process at any time via the contact person. End-user surveys for bed managers and NUMs will be used after go-live.

6.2.2.7 Step 7: Refine Work Practices and Audit Process

Following education session 2 any modifications to the intended performance targets, audit tools and procedures can be made in accordance with negotiated agreements between the bed managers, NUMs and clerks and POWH executive management represented by the patient access manager and the executive director. The approximate 1 ½ weeks allocated to this step should be sufficient time for this. It is not intended or anticipated that radical divergences should occur in step 6. Any changes are more likely to be variations on the original themes such that minor documentation changes are all that should be required.

6.2.2.8 Step 8: Prepare for Phase 2

By this stage the implementation team should have confidence in the technical reliability of the Bed Board and in the knowledge of end-users. Final preparations before go-live include distributing Bed Board hotline notices as shown in Figure 6-3, organizing login privileges for all end-users, and reminding all end-users of the go-live day.

Bed Board hotline notices will need to be prominently displayed in all areas that will see reporting of patient transactions. That is, on all wards, both day and overnight, and in the ED. The implementation team contact person may be a good candidate for this job allowing personal re-enforcement of the go-live date and changes to practice. Alternately, to further indicate executive commitment, the patient access manager could personally deliver the notices.

Login names and passwords should be e-mailed to end-users the evening before the go-live day so that NUMs and bed managers are able to log in simultaneously when they start work at 7 am on the go-live day. Evening NUMs can log on when they commence work in the afternoon of the go-live day. Essential end-users for go-live login are the bed managers, all NUMs, and all senior nursing staff and executive staff. The implementation team will already have login rights from phase 1 testing. Clerical staff do not require login privileges as their interaction is via Hospas. Login for other staff that could potentially benefit, such as doctors in the ED, can be arranged post go-live. E-mails to all clinical staff indicating the go-live day and how to submit a request for access via the Bed Board login screen should be circulated prior to go-live.

A final e-mail to NUMs, bed managers and clerical staff to remind these essential contributors to the success of the Bed Board of the go-live day and the essential role that they play could be distributed 2 days ahead of go-live day.

Closure of all issues of step 3 will need to be confirmed prior to go-live. As discussed in Step 3, if a permanent after-hours clerk for the hotline has not been employed at this stage, arrangement can be made to draw on POWHs pool of clerical staff temporarily. A final infrastructure related requirement will be to ensure that a Bed Board icon hyperlinked to the intranet address of the Bed Board is displayed prominently on the opening page of the POWH intranet.

6.2.2.9 Step 9: Go-Live

Immediately on go-live, the implementation team could commence the audit process by distributing audit templates to the bed managers and NUMs. These staff members should be very familiar with their roles in timeliness of data, promotion of patient flow using the Bed Board and audit requirements following the 2 education sessions to date. As well as overseeing and assisting with audit process, the implementation team could use the 3 weeks before education session 3 to collect and analyze higher level data as discussed in Section 4-4. In addition, the contact person for the project should be available to assist staff with any questions or concerns that arise. After the Bed Board has been in use for 3 weeks, user surveys, as depicted in Figure 4-8, could be distributed in time for the collection and tabulation of results for education session 3.

6.2.2.10 Step 10: Education Session 3

Education session 3, then, aims to review and discuss progress to date as reflected by audits, higher level indicators, end-user survey results and the shared views of session participants. Other areas that need to be covered in this session include end-user input to possible future products and to the handover process and ongoing maintenance of the Bed Board. Table 6-6 provides a list of invitees and Table 6-7 a proposed agenda.

Table 6-6 Invitees for Education Session 3

Invitee/s	Reason
Bed Managers	Key Users and New Work Practices Required; Review of Accuracy and Feedback on Use Plus Proposed Changes
NUMs	Key Users and New Work Practices Required; Review of Accuracy and Feedback on Use Plus Proposed Changes
Senior Nursing Staff	Key Users and Commitment to Project
POWH Bed Board Implementation Team	To Run Session
Clerical Staff	Vital link in Timely Data Issue – Feedback on Reporting and Data Entry in Practice
POWH Executive Director	Commitment to Project & Key User
Patient Access Manager	Will Oversee Audit and Reporting on Handover; Details of Handover and Incorporation of Feedback from NUMs and Bed Managers
Medical Records Manager	Involvement in Audit Process; Ongoing Involvement on Handover

Table 6-7 Agenda for Education Session 3

<u>Agenda</u>	
	<i>Materials (PowerPoint and Handouts)</i>
<ul style="list-style-type: none"> • Review of Audit Results • Review of Higher Level Indicators • Review of Survey Results 	<ul style="list-style-type: none"> • Consolidated Report Prepared by Implementation Team
<ul style="list-style-type: none"> • Discussion of Change Requirements for Accuracy (Dependent on Audit Results) 	<ul style="list-style-type: none"> • Consolidated Report
<ul style="list-style-type: none"> • Discussion on Bed Board Impact on Bed Management Process and Patient Flow 	<ul style="list-style-type: none"> • Consolidated Report
<ul style="list-style-type: none"> • Discussion of Survey Results and Proposals That Staff Would Like to See Advanced 	<ul style="list-style-type: none"> • Consolidated Report
<ul style="list-style-type: none"> • Handover Requirements • Discussion of Proposed Roles 	<ul style="list-style-type: none"> • Table 6-8

The role of the implementation team in education session 3 will be to incorporate feedback into practices and processes used to date. Fine tuning of these initiatives can be

incorporated into daily activities in the week prior to handover and documented in a handover brief. Table 6-8 proposes roles for ongoing maintenance of the Bed Board on handover. These, too, can be discussed and modified during education session 3 to ensure that the Bed Board will be appropriately maintained by clear ownership of duties.

Table 6-8 Proposed Handover Responsibilities

Job	Description	Owner
User Administration	Maintain User List; Manage Login; Manage Passwords; User Questions; Process Access Requests	Patient Access Manager or Delegate
Auditing	Ongoing Audit of Reporting and Data Entry Timeliness	Bed Managers for Reporting; NUMs for Data Entry
Audit Cross Referencing Process, Analysis and Report Generation	Cross Reference Audit Templates with Actual Time of Data Entry or Time of Received Report; Calculate Delays and Generate Reports; Reports Forwarded to Patient Access Manager	Medical Records Staff, Overseen by Medical Records Manager
Higher Level Indicators and Data Feed Audits	Data Extraction and Analysis of Occupancy Levels, Number of Internal Transfers and Frequency and Location of Outliers; Intermittent Data Feed Checks; Reports Forwarded to Patient Access Manager	Medical Records Staff, Overseen by Medical Records Manager
Technical Trouble Shooting	Address any Maintenance or Downtime Concerns	Information Services Representative from POWH in Collaboration with Delegate from SESIAHS and NSW Health as Needed; Called in by POWH Patient Access Manager

The key take-home messages from education session 3 should be:

- Feedback from the session will be incorporated as able in the next week before handover occurs. Ownership of any further fine tuning required will be appointed and included in a handover brief.

- In one weeks time there will be a handover with staff taking on ownership of the roles designated in Table 6-8. Any changes to these roles and responsibilities from the session will be included in a handover brief and indicated staff members will be contacted personally by the implementation team for clarity of ownership.
- A handover brief will be shared with all session participants and will be accessible by all other interested staff. The brief will outline performance to date, ongoing maintenance requirements and suggestions for future similar products as reflected by end-user surveys.

6.2.2.11 Step 11: Fine Tuning of Work Practices and Data Entry Processes

Following education session 3, feedback on work practices and processes for use of the Bed Board in daily practice, timely reporting and entry of data, and audit processes can be incorporated into daily routines. If there are valuable recommendations that cannot be practically incorporated into daily operations within the allocated week for this step, they should be identified and appropriate handover of responsibilities should be negotiated with staff involved in the ongoing maintenance of the Bed Board. Ideally, this identification and delegation process could be met in education session 3. However, if a change that is initially considered achievable within a week proves to take longer then a clear handover of responsibility will have to be arranged.

While a week for this step may be considered too short by some, allocating a tight timeframe will more likely see closure of issues. The overall 10 week timeframe for the implementation process should allow adequate time for the implementation team to get a reasonable feel for the impact and success of the implementation. As such, there shouldn't be too many surprises at this stage. Any fine tuning that is implemented will need to be reflected in handover documentation.

6.2.2.12 Step 12: Handover

While the implementation team will wholly comprise POWH staff, a handover process is needed to ensure closure of implementation issues and that a practical method of maintaining and using the Bed Board is incorporated into daily operations. On handover, the implementation team should be disbanded and assigned to other projects and/or operational activities. All Bed Board enquiries, thereafter, should be directed to the staff allocated maintenance and operational roles as

indicated in the handover brief. Taking this approach will ensure that implementation objectives are wholly met by the implementation team without carry-over into daily operations and that a robust maintenance plan ensues.

A handover brief should be prepared and distributed to all staff who will be involved in ongoing maintenance of the Bed Board. The handover brief will aim to summarise the progression of the implementation process, the feedback from education session 3 and ongoing responsibilities in the use and maintenance of the Bed Board. The brief should also be forwarded to POWH executives, SESIAHS and NSW Health executives. The latter 2 groups may be particularly interested in the progression and outcomes of the implementation at POWH for use in other facilities and health Areas. A handover brief could follow the structure indicated in Table 6-9.

Table 6-9 Structure of Handover Brief

Structure of Handover Brief
<ul style="list-style-type: none">• Project Background• Project Scope and Primary Aims• Project Gantt Chart• Summary of Progress to Date and Lessons Learned – performance review from education session 3• Fine Tuning – implemented changes post education session 3• Roles and Responsibilities for Ongoing Operations – per Table 6-8 with any amendments post education session 3 and fine tuning week• Tools for Ongoing Operations – audit tools and schedules with incorporation of session 3 recommendations• Recommendations from End-Users for Future Products – summarising education session 3 recommendations and survey results

6.3 Future Directions

The change management plan suggested in this Chapter is aimed at maximising the potential of the current tool. The recommended handover documentation as shown in Table 6-9 could be used to incorporate end-user suggestions from surveys and education session 3 into future strategies and tools for managing demands more effectively with business technologies. It is the contention of this project, as introduced in Section 6-1, that successful implementation of the current tool could pave the way for greater transparency enhancing and more effective demand management tools.

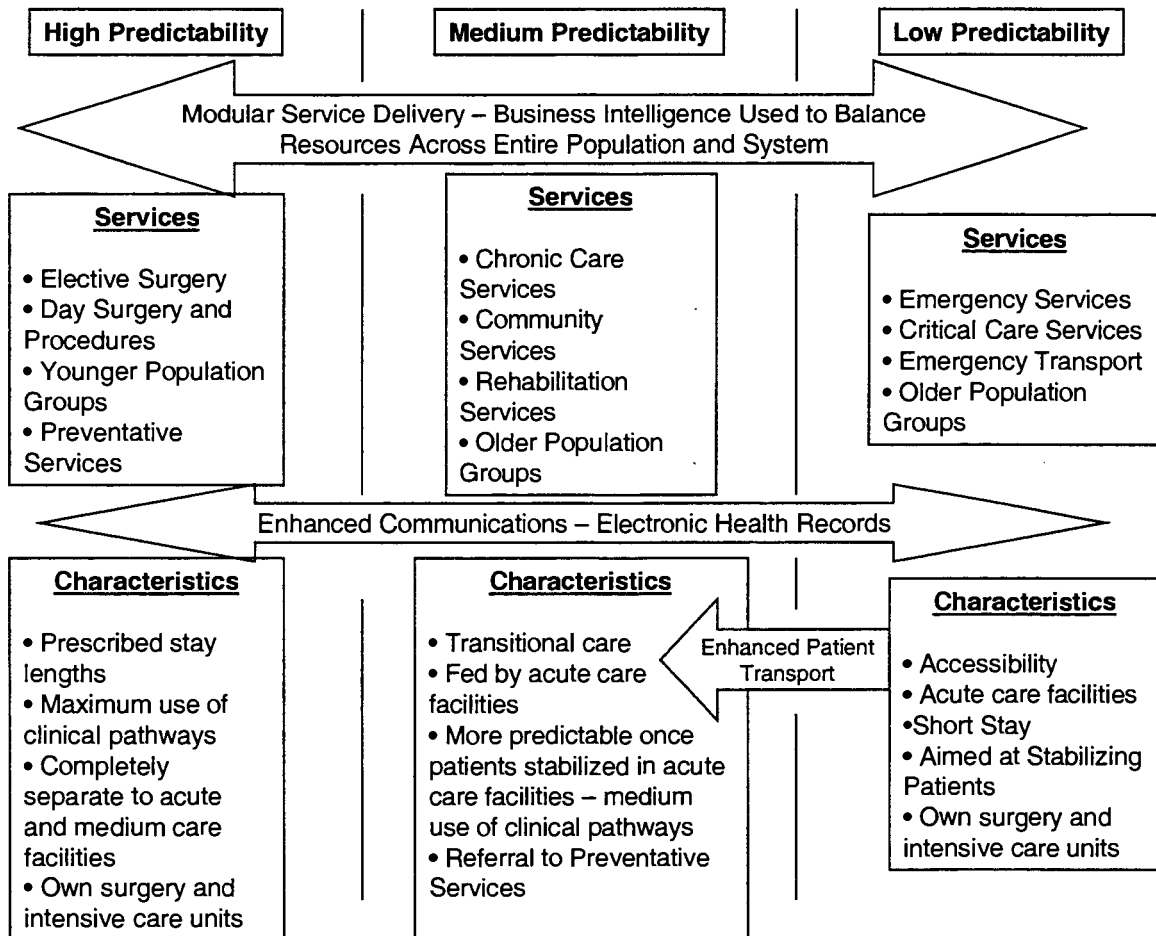
To this end, Chapter 5 has proposed strategic considerations based on the analysis of this project. In essence Chapter 5 recognizes that, firstly, the current tool requires refinement to capture a more sophisticated view of volume demands and hospital occupancy. Secondly, a time-component could be incorporated into further bed management and patient flow tools. And, finally, that supply and demand predictability could be enhanced by historical modelling of supply and demand trends.

The amalgamation of these suggestions is presented in Section 5-4 by proposal of a stand alone tool for bed and patient flow management. This model is really a synthesis of the information currently at hand into a more sophisticated business intelligence package. While this package represents an attempt to more effectively manage demands within the current structure of POWH, the analysis in itself may point to structural solutions in service delivery. That is, the process of breaking available information down into more or less predictable chunks could also be used to suggest organizational restructuring to better meet the greater demands of an aging population and advanced medical technologies.

More specifically, in proposing the stand alone tool in Section 5-4, it can be surmised that some aspects of service delivery are more predictable than others. This insight could lead healthcare managers toward different conclusions. One conclusion is addressed by Section 5-4 in the form of more sophisticated business intelligence to cope with complex and multidimensional presentation demand to the one facility. Another approach, however, would be to simply segregate services to manage demands in a more modular fashion based on the predictability associated with specific patient groups. While, traditionally, it has been thought that an economy of scales is inherent in large multi-faceted teaching hospitals, changing environmental demands and more advanced communication between facilities could very well challenge this

preconception. Figure 6-5 presents a higher level view of potential restructuring strategies based on predictability of patient groups.

Figure 6-4 Restructuring Based on Predictability of Demands



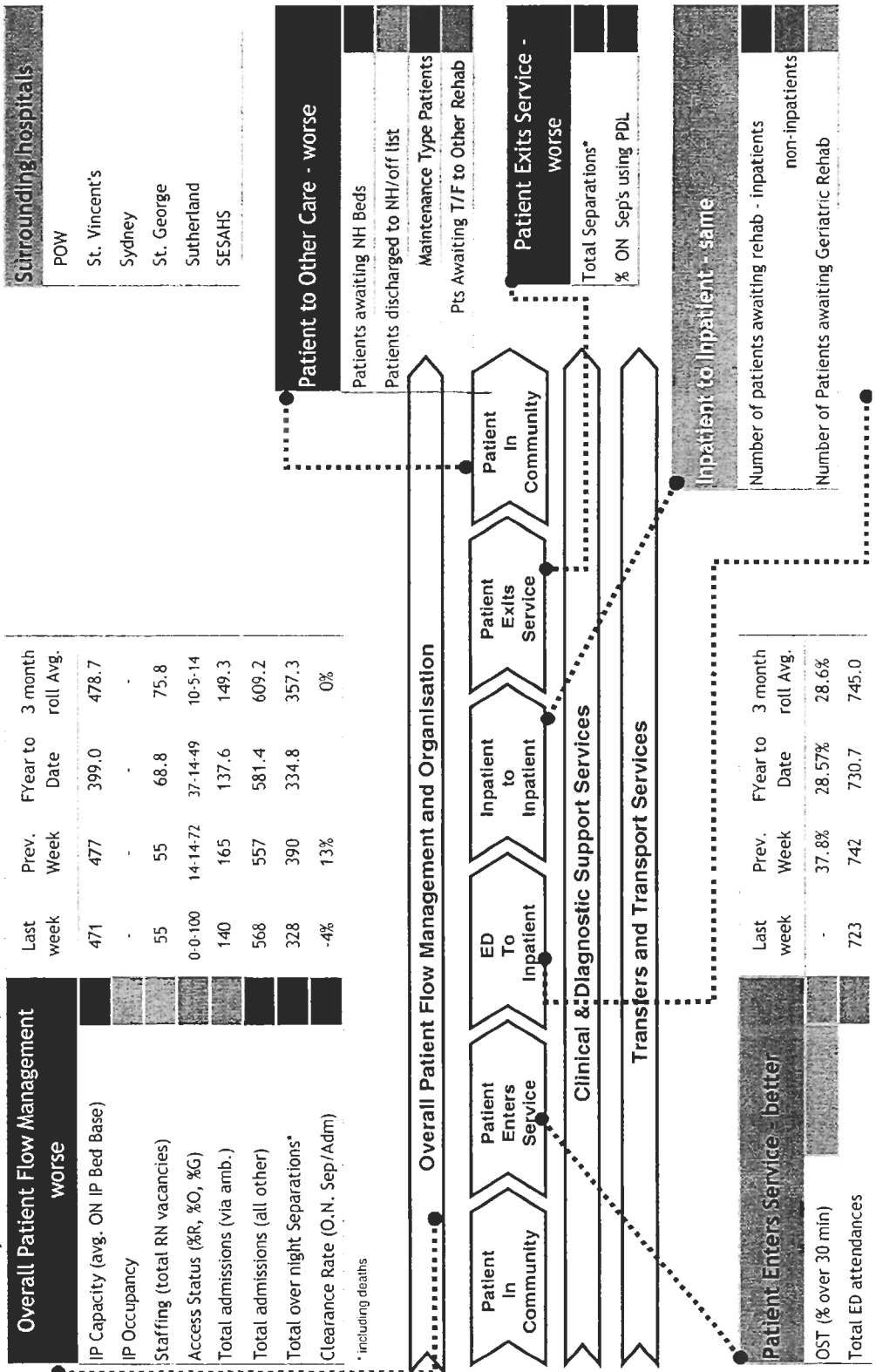
As shown in Figure 6-5 technology could be employed to allocate and manage resources across a broader spectrum of services as opposed to managing multi-factorial demands under the banner of one organization. The latter approach is embodied by the application of the Bed Board or extensions on the Bed Board theme as proposed in Section 5-4. The former approach rephrases the challenge by reconsidering the difficulty in demand management as a product of predictability. While this clearly diverges significantly from the original approach, it is a product of exploring the original approach in a methodical manner and identifying key strategic factors. Clearly there is no one correct approach to the delivery of services. However, it can be seen from this project that business analysis and business-like technologies have the potential to greatly enhance insights into population demands and the structure and methods of service delivery.

Regardless of strategic directions chosen, it is hoped that this project has opened healthcare managers at POWH, SESIAHS and NSW Health to the possibilities of business technologies both in operational management and in strategic planning. It is also hoped that this project has acted to incorporate sound business practices and processes into the healthcare environment at POWH by the suggested change management plan for the implementation of the Bed Board. As a closing observation, it may be said that the healthcare industry in NSW should benefit from continued exploration of the application of business technologies in other industries. The Bed Board is a proactive example in this regard and reflects the efforts of other service industries in emulating manufacturing industries in their quest for seamless quality processes and mass customization models of service delivery.


APPENDICES

APPENDIX 1 – Partial Detail POWH Weekly Dashboard

Week: Monday 13/6/2005 to Sunday 19/6/2005



APPENDIX 2 – Bed Board Main Screen



NSW HEALTH

Patient Flow Bed Board

Prince of Wales Hospital

Home | IHT | Admin | Reports | Help | Log Out

Occupancy Status: 90%

Live Date & Time: 25 May 2005 11:01:00

Latest Update: 25 May 2005

Projected Time: 08:00 - 15:00

[Submit](#)

Emergency	Projected Historical Emergency	Theatre Adds	Pre-admits Booked (Day Only)	Pre-admits Booked (excl D/O)	Unexpected Emergency Admissions	Hospital Transfers In	Hospital Transfers Out	Estimated Discharges	Projected Historical Discharges
11	14.2	8	8	8	0	0	0	14	36.6
View Patient Details	Enter Theatre Additions	View Details	View Details	View Details	Enter Number	Enter Hospital Transfers		Enter Estimated Discharges	

Sheet: Gen O/N (1)


Spec O/N (2)

Day Only (3)

Procedural (4)

Other (5)

Ward	Description	Platform	Open	Closed	Empty	Occupied	Outliers	Transfer	Occupancy
2/23HR	23HR STAY SURGERY - PERIOP UNIT LVL 1	10	10	0	5	5	0	0	50%
2/AAC	ACUTE AGED CARE - PARKES 2 WEST	16	16	0	2	14	0	0	87%
2/AGER	REHABILITATION AGED CARE - PARKES 7 EAST	20	20	0	1	19	0	0	95%
2/DB2N	SURGERY - GASTRO,UROLOGY,VASCULAR	30	26	0	2	24	0	0	92%
2/DB2S	SURGERY - ONCOLOGY	30	30	0	1	29	0	0	96%
2/DB3N	DICKINSON 3 NORTH-CARDIOLOGY	24	26	0	1	25	0	0	96%
2/DB3S	DICKINSON 3 SOUTH - CARDIOTHORACIC SURG	18	18	0	2	16	0	0	88%
2/DB4	RESPIRATORY & INFLAMMATORY MEDICINE- DB4	26	26	0	0	26	0	0	100%
2/ORTH	ORTHOPAEDICS - PARKES 5 WEST	20	20	0	4	16	0	0	80%
2/PB10W	PARKES 10 HAEMATOPLOGY-TEMP LOCATED 9WEST	10	10	0	2	8	0	0	80%

 Local Intranet

APPENDIX 3 – Bed Board Emergency Profile Summary

NSW HEALTH Patient Flow Bed Board									
Bed Board IHT Admin Reports Help Log Out									
Emergency Profile Summary									
Ward Description: Emergency Prince of Wales Hospital									
Occupied:									
Date and Time: 25 May 2005 11:01:00									
Bed No.	Bed type 1 - DoH	MRN	Patient Name	Current MD	MD Speciality	MD Stream	Presenting Problem	Admission Date Time	
001	Emergency Department		Confidential	Confidential	Respiratory Medicine		S.O.B.	24 May 2005 06:03:00	
002	Emergency Department				Gastroenterology		GASTROENTERITIS	24 May 2005 15:35:00	
003	Emergency Department				Cardiology		CHEST PAIN/UAP	24 May 2005 15:47:00	
004	Emergency Department				Infectious Diseases inc. STD		CELLULITIS LEGS	24 May 2005 15:11:00	
005	Emergency Department				Neurology		DIZZV/SLURRED SPEECH	24 May 2005 19:48:00	
006	Emergency Department				Orthopaedics		L LEG ABCESS	24 May 2005 20:44:00	
007	Emergency Department				Toxicology		OVERDOSE	24 May 2005 23:43:00	
008	Emergency Department				Neurology		L CVA	25 May 2005 00:32:00	
009	Emergency Department				Respiratory Medicine		ASTHMA	25 May 2005 00:21:00	

Done

Local Intranet

APPENDIX 4 - Bed Board Ward Profile Summary

NSW HEALTH		Patient Flow Bed Board		Bed Board IHT Admin Reports Help Log Out			
Ward Profile Summary							
Ward Description: 2/PB10W							
Platform: 10, Open: 10, Occupied: 9							
Date and Time: 25 May 2005 12:06:00							
Bed No.	Bed type 1 - DoH	MRN	Patient Name	Current MD	MD Speciality	MD Stream	Leave Status & Date to Return
001	General - Mixed		Confidential	Confidential	Geriatrics		
002	General - Mixed				Haematology		
003	General - Mixed				Haematology		
004	General - Mixed				Haematology		
005	General - Mixed				Haematology		
006 Empty	General - Mixed				UIM		
007	General - Mixed					General Surgery/Upper GI	
008	General - Mixed					Haematology	
009	General - Mixed						

APPENDIX 5 - Inter-Hospital Transfers Screen

[Home](#) | [Bed Board](#) | [IHT](#) | [Admin](#) | [Reports](#) | [Help](#) | [Log Out](#)

Patient Flow Bed Board

Inter Hospital Transfer

Latest Update

Inter-Hospital Transfers - Prince of Wales Hospital
Prince of Wales Hospital

Receive patients into Prince of Wales Hospital (0)

Sending Hospital Bed Request						Action			
From Hospital & Urgency	Patient Name & MRN	Requesting Doctor	Contact	Receiving Doctor	Bed & Specialty Required	Date Time Referral	Bed/Ward Allocated	Patient Sent	Patient Arrived
Request a New Transfer Receive a New Transfer from Non-Metro Hospital 									

Request patient transfer from Prince of Wales Hospital (0)

To Hospital & Urgency	Patient Name & MRN	Requesting Doctor	Contact	Receiving Doctor	Bed & Specialty Required	Date Time Referral	Bed/Ward Allocated	Patient Sent	Patient Arrived
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Done

 Local Intranet

APPENDIX 7 – Suggested User Acceptance Template for Hospas Data Transfer

Bed Board - User Acceptance Table for HOSPAS Data Transfer

Site Prince of Wales Hospital

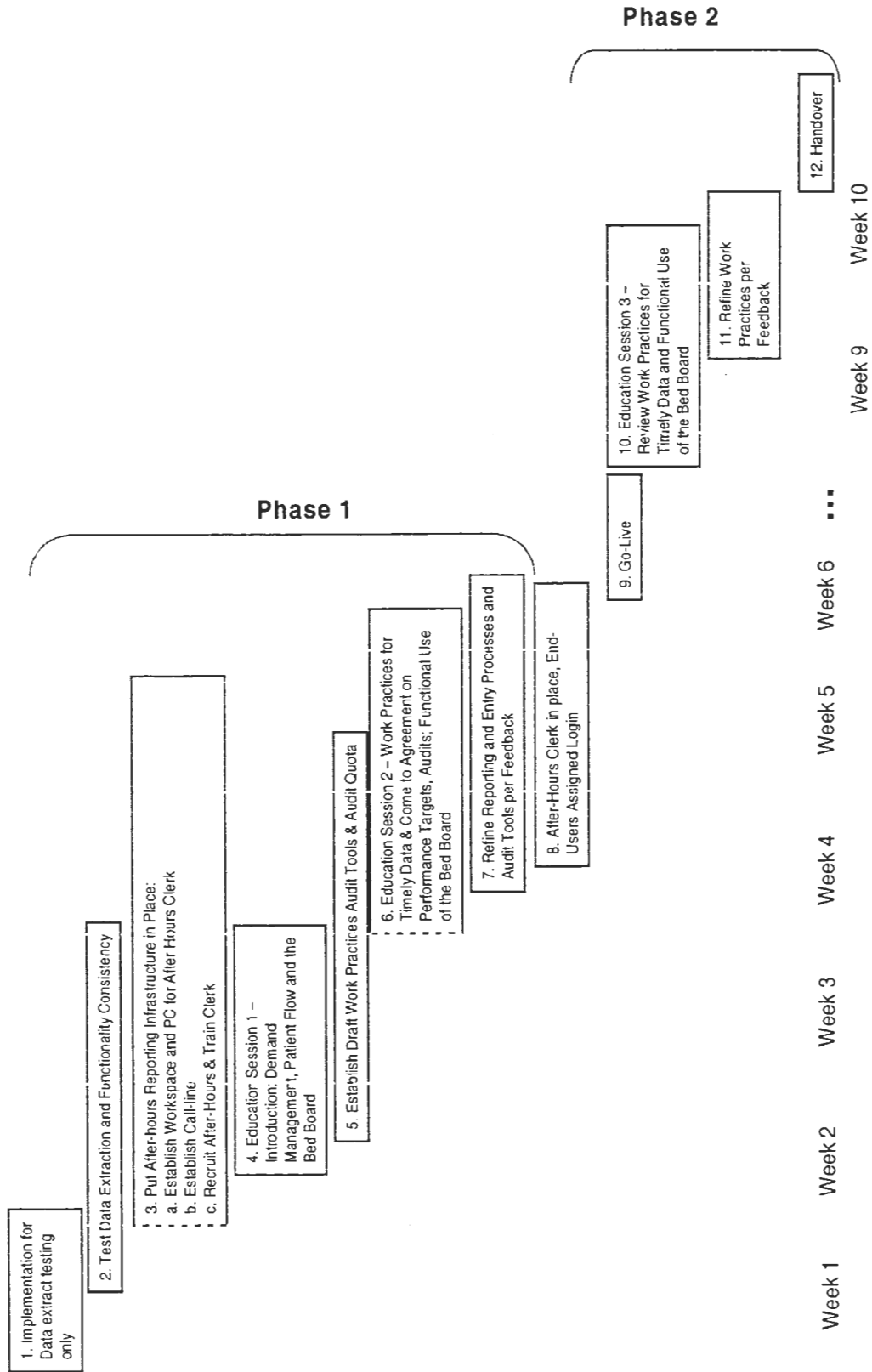
Test Date

Accept Yes No

If No indicate reason under Issues

Function	Working	Issues/Comments
Ward Setup	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Are HOSPAS Ward Codes correct	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are Ward Descriptions Correct	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are Beds 'Open' equal to 'Avail' in HOSPAS	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are Ward Bed Types equal to HOSPAS	<input type="checkbox"/> Yes <input type="checkbox"/> No	
AMOs	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Are AMOs names listed correctly	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are AMOs specialty units listed correctly	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patients		
Check following functions transfer to Bed Board Correctly :		
Name appears as it is in ATS	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Day Only Booking	<input type="checkbox"/> Yes <input type="checkbox"/> No	
O/N Booking	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Admission	<input type="checkbox"/> Yes <input type="checkbox"/> No	
CAS Admission	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Ward Transfer	<input type="checkbox"/> Yes <input type="checkbox"/> No	
AMO Transfer	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Discharge	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Leave	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Patient "No Details to be Released" flag	<input type="checkbox"/> Yes <input type="checkbox"/> No	

APPENDIX 8 – Gantt chart for Change Management Plan



APPENDIX 9 – Sample of DRG and LOS Data by Ward Extracted from Hospas

DB3S Dickinson 3 South - Cardiothoracic Surgery				
Date	3 Jun 2005	Av. LOS by Ward (last 6 months)	4.26	
Rank	Code	Description	Frequency in last 6 months	Av. LOS last 6 months
1	F06A	Coronary Bypass W/O Invasive Cardiac Inves Procedure W Catastr or Severe CC	66	5.02
2	F05A	Coronary Bypass W Invasive Cardiac Inves Procedure W Catastrophic CC	49	7.10
3	F06B	Coronary Bypass W/O Invasive Cardiac Inves Procedure W/O Catastr or Severe CC	46	3.41
4	F04A	Cardiac Valve Proc W Pump W/O Invasive Cardiac Inves Proc W Cat or Sev CC	43	6.26
5	F05B	Coronary Bypass W Invasive Cardiac Inves Procedure W/O Catastrophic CC	30	4.27
6	960Z	Ungroupable	28	4.14
7	A06Z	Tracheostomy Any Age, Any Condition	19	6.47
8	E01A	Major Chest Procedures W Catastrophic CC	18	11.28
9	F03Z	Cardiac Valve Proc W Pump W Invasive Cardiac Inves Procedure	17	6.18
10	E01B	Major Chest Procedures W/O Catastrophic CC	16	8.00
11	F07Z	Other Cardiothoracic/Vascular Procedures W Pump	11	4.09
12	E65A	Chronic Obstructive Airways Disease W Catastrophic or Severe CC	7	2.14
13	E02B	Other Respiratory System O.R. Procedures W Severe CC	6	5.50
14	I26Z	Other Wrist and Hand Procedures	5	1.40
15	F09Z	Other Cardiothoracic Procedures W/O Pump	5	3.60
16	G07B	Appendectomy W/O Catastrophic or Severe CC	5	1.40
17	E65B	Chronic Obstructive Airways Disease W/O Catastrophic or Severe CC	5	2.20
18	F42B	Circulatory Disorders W/O AMI W Invasive Cardiac Inves Proc W/O Complex DX/Pr	5	2.80
19	F12Z	Cardiac Pacemaker Implantation	4	1.25
20	F01Z	Implantation or Replacement of AICD, Total System	4	7.75

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