An Evidence-Based Review and Training Resource on Smooth Patient Flow
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Preface

This document provides an evidence-based review and training resource on smooth patient flow. Its aim is to enhance and consolidate research evidence on the theory and practice of patient flow systems and to make this an accessible training resource for healthcare professionals working in hospitals within New South Wales (NSW).

The document was commissioned by the NSW Ministry of Health and prepared by the eHealth Services Research Group (eHSRG), University of Tasmania. Although the document can be read as a standalone resource, it is part of a broader collaborative study on smooth patient flow education and has been structured to form part of an education pack that includes a training manual.

In constructing this evidence-based review, data from a variety of sources were collected and analysed. The document analyses peer-reviewed and other literature on the theory and practice of patient flow systems published in Australian and international sources within the last 10 years. The document also builds on existing work on patient flow systems by the NSW Ministry of Health. Finally, the document draws on insights generated from the analysis and interpretation of primary research data collected by the eHSRG during eight site visits to hospitals across NSW in April-May 2012.

Combined, this evidence supports a systems focused approach to patient flow. This approach aims to understand, identify and resolve delays to patient care within hospitals in order to ensure the delivery of high quality, safe and timely care to patients. In this context, smooth patient flow is about releasing capacity from the current system through better management of patients during the provision of healthcare services.

This document highlights that smooth patient flow is the result of a set of processes, rather than the specific result of a set of changes. These processes involve all hospital staff (as well as patients and their families) at different times in a variety of different ways (operational, tactical, and strategic). Significantly, this training resource aims to contribute directly to improving understanding of these processes as well as their inter-relationships.

It is anticipated that this document will help healthcare professionals in NSW hospitals to reflect on how their work practices, and the work practices of others, affect patient flow; to recognise how flow issues relate to the quality and safety of care; and to understand how smooth flow can sustainably release system capacity by reducing waste, duplication and delay in the provision of healthcare services.

What we already know

Problems with hospital patient flow typically manifest themselves as issues of workload, capacity and resourcing. These manifestations are undeniably of concern to hospital staff at all levels. Often, attempts to address these issues directly will focus on symptoms, rather than on underlying causes. At its core, the patient flow challenge is a matter of the quality and timeliness of the care which the system provides to patients, and their safety within that system.

The policies, processes and practices that need to be in place to facilitate smooth patient flow are not complicated. Hospitals need to:

• Establish a realistic estimated date of discharge (EDD) for each patient at the time of their admission;
• Make sure that the EDD is updated progressively during the course of the admission, as the patient’s likely clinical course becomes clearer;
• Commence patient discharge planning within 24 hours of their admission (or possibly prior to admission for elective cases);
• Implement separate streams of activity for emergency and elective surgery (including the allocation of a separate theatre for emergency surgery);
• Make sure that each patient is seen by a senior clinician (i.e. an individual able to make clinical decisions about a patient’s care and discharge) on each day of the patient’s hospital stay;
• For complicated discharges, confirm the discharge date two or three days in advance to allow for coordination and planning of services;
• Effectively communicate the planned time and date of discharge to all who are involved in a patient’s discharge (e.g. allied health, pharmacy, community services, patient, family and carers); and
• Provide support for patients who are being discharged to leave the ward as early in the day as possible (e.g. preferably by midday).

These practices are well documented as helpful contributors to smooth patient flow, well supported by evidence of benefits, and well understood within hospitals. Unfortunately, in many hospitals they are either not happening at all, or implemented in a fragmented manner that may end up contributing little to overall flow and instead simply shifting the resulting flow problem to another part of the hospital.

**Why is it so hard?**
The gap between theory and best practice is not unique to patient flow. In many areas of endeavour the knowledge necessary to support improvement is available, but it is rarely evenly distributed amongst those who need to use it. Health professionals also face numerous competing priorities, challenges and points of inertia to be overcome.

By providing a body of knowledge on the theory and best practice of patient flow, this document acknowledges that there are no quick fixes and no ‘silver bullets’. Improving patient flow involves an iterative set of processes that will take time to implement. There is no single cause of disrupted patient flow, and no single intervention that will address the patient flow problem holistically. Improving flow is a system wide undertaking that will require strong and consistent leadership, and widespread commitment from health professionals throughout the hospital system.

**Further information from NSW Government sources are available here:**


Australian Resource Centre for Healthcare Innovations (ARCHI)

http://www.archi.net.au/home


Service Redesign <http://www.archi.net.au/resources/redesign>

Centre for Healthcare Redesign <http://www.archi.net.au/resources/redesign/redesign/chr>

Better Patient Journeys <http://www.archi.net.au/resources/redesign/redesign/better_journeys>
# Table of Figures

Table of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.</td>
<td>Outline of Resource Structure and Key Themes</td>
</tr>
<tr>
<td>Figure 2.</td>
<td>NSW Patient Flow Systems (PFS) Framework – The Seven Elements (NSW Health, 2012)</td>
</tr>
<tr>
<td>Figure 3.</td>
<td>Key Factors Impacting on Patient flow</td>
</tr>
<tr>
<td>Figure 4.</td>
<td>Cumulative daily elective (EL) admission and discharges (Allder et al., 2010, p. 442)</td>
</tr>
<tr>
<td>Figure 5.</td>
<td>Hourly bed occupancy over a week (Allder et al., 2010, p. 443)</td>
</tr>
<tr>
<td>Figure 6.</td>
<td>Bed occupancy &lt;7 days length of stay, November 2006 to January 2008 (Allder et al., 2010, p. 443)</td>
</tr>
<tr>
<td>Figure 7.</td>
<td>Bed occupancy &gt;7 days length of stay, November 2006 to January 2008 (Allder et al., 2010, p. 443)</td>
</tr>
<tr>
<td>Figure 8.</td>
<td>Problems and disconnections identified along a patient journey (O’Connell et al., 2008, p. S10)</td>
</tr>
<tr>
<td>Figure 9.</td>
<td>Opportunities to improve patient flow (Kirby &amp; Kjesbo, 2003, p. 39)</td>
</tr>
</tbody>
</table>
Executive summary

This document provides an evidence-based review and training resource on smooth patient flow. It is the first part of a broader collaborative study on smooth patient flow education commissioned by the Ministry of Health NSW. It specifically aims to enhance and consolidate research evidence on the theory and practice of patient flow systems and to present this in an easily accessible format for use as part of the training resources being developed in the broader study. This resource can be read as a standalone text, but its structure, orientation and format has been organised to complement other resources being developed for smooth patient flow education. This resource was developed over a 16 week period between April and August 2012.

In constructing this resource a variety of data were collected and analysed. It begins with an analysis of peer-reviewed literature published in Australia and internationally within the last 10 years. The resource builds on existing work on patient flow systems undertaken by the NSW Ministry of Health. It also draws on insights generated from the analysis and interpretation of primary research data collected by the eHealth Services Research Group (eHSRG) during eight site visits to hospitals across NSW in April and May 2012. Figure 1 illustrates an outline of the resource structure and key themes covered.

Figure 1. Outline of Resource Structure and Key Themes

A critical review of relevant literature was undertaken in March and April 2012. The formal search strategy identified a list of 1,135 unique references on patient flow and related topics. Following examination of these materials for suitability (using inclusion/exclusion criteria) 569 source materials were identified for further assessment to assess the quality of evidence, key themes and issues discussed. A comprehensive bibliography of all these sources is included as a separate appendix at the end of this resource. Following further analysis 142 key papers were identified for presentation or detailed citation in this resource. These are provided in a separate reference list for ease of identification and access.
Following an introduction and background, Chapter 1 describes the approach used in the identification and analysis of evidence. Analysis and discussion of this evidence is then structured into six chapters. Within each chapter, key themes are identified, relevant literature is reviewed, and evidence is discussed.

- Chapter 2 examines the context for discussions of flow including contemporary pressures in hospital environments and the system changes required to achieve smooth flow;
- Chapter 3 presents theories and models designed for understanding and achieving smooth flow;
- Chapters 4, 5 and 6 specifically analyse key evidence on strategic, operational and tactical aspects of smooth flow as they apply within the domains of Hospital Operations (chapter 4), Clinical Practice (chapter 5) and Patient-centred care (chapter 6). These chapters deliberately incorporate the seven elements of the NSW patient flow systems framework and group them into these three domains. This alignment relates directly to other resources provided as part of the broader collaborative project on smooth patient flow education including the Patient Flow Training Manual.
- Chapter 7 concludes by briefly examining approaches to embedding and sustaining a smooth patient flow culture.

The key messages of this resource review are the following:

1. Faced with a daily reality of ever busier hospital environments, it is understandable that many health professionals and patients have come to perceive waiting, delays in treatment or care and even cancellation of services as an unfortunate but necessary part of the healthcare delivery – but the evidence presented shows that this does not need to be the case;

2. Many obstacles to smooth patient flow are attributed to the shortcomings of particular individuals, wards or services. This is unhelpful and tends to focus on symptoms rather than the causes which are often embedded in the way a hospital has chosen to organise its business. As a result, optimising patient flow in one area may actually lead to a disruption of flow elsewhere in the system. At its best, improving patient flow is about taking action to make the total system work better;

3. Discussion on the pressures facing hospitals continues to focus on the numbers of hospital beds, and the percentage occupancy of those beds. The evidence shows that improving patient flow can sustainably release system capacity by reducing waste, duplication and delay in the provision of health services. The efficient and appropriate use of hospital beds for timely high quality patient care is as important as how many beds are available:

4. Unnecessary variation disrupts patient flow, and leads to less efficient use of resources. Resources that are available on a day with low activity cannot be transferred to a day when it’s busy; unused capacity cannot be stored, and is wasted;

5. Each patient and their family and carers are potential participants in the patient’s care, but they usually remain an untapped resource. Many patients remain unaware of the course of their planned care in hospital, and are taken by surprise and left unprepared when it’s time to leave. Although it’s not always possible, including patients and family as a part of the care team can assist with smooth patient flow and enhance the outcomes of care;

6. The key role for the management of patient flow is to help, guide, mentor and facilitate other staff as they identify problems, select and use tools to identify and analyse the problems, and design and implement solutions. This role is about ensuring colleagues are empowered to identify problems and develop and own their solutions at strategic, tactical and operational levels;

7. Crowding in the ED, and delayed ED admissions continue to be a major focus of attention; delays with discharge, however, receive much less attention. Even though discharges are given a lower priority, they continue to be a major contributor to many of the problems at the ‘front end’ of the hospital.

8. Decreasing the variability of clinical practice can result in improvements in the quality of care, improve patient flow, and a decrease in staff stress. Decreasing the variability in care pathways does not erode clinical autonomy. At its core, patient flow is an issue of quality of care delivery and patient safety;
9. Communication and relationship building can be a more effective approach to managing patient flow than either ‘hassling’ other staff to move a patient, or focusing on isolated efficiency gains within an organisational silo;

10. There are frequent calls to increase the resources (particularly staff and beds) which are provided to busy hospitals. However, it can be difficult to make the case that more resources are needed when there is good evidence that capacity can be increased through improved use of existing resources, and no evidence that the improvements have been made.

**Concluding Remarks**
This document provides an evidence-based review and training resource on smooth patient flow and is the first project part of a broader collaborative study on smooth patient flow education. The evidence it presents supports a system focused approach to patient flow. This approach facilitates improved understanding, identification and resolution of delays to patient care within hospitals and directly contributes to ensuring the delivery of high quality, safe and timely care to patients.

Smooth patient flow is a set of processes, rather than a specific destination. These processes involve all hospital staff at different times (as well as patients and their families) in a variety of different ways (operational, tactical, and strategic). This resource aims to contribute directly to improving understanding of these processes as well as the inter-relationships between them and about the best ways of releasing capacity from the current system through the better management of patients during the provision of health services.

It is anticipated that this resource will support healthcare professionals in NSW hospitals to reflect on how their work practices, and the work practices of others impact on flow and to recognise how flow issues relate to the quality and safety of care. This resource also aims to raise awareness and understanding on how smooth flow can sustainably release system capacity by reducing waste, duplication and delay in the provision of health services. More broadly, it is hoped that this resource will also be useful for other healthcare professionals, improvement specialists and researchers in this field in Australia and Internationally.
1 Introduction

“Doctors, nurses, laboratory workers, radiologists, radiology technicians, and an array of other healthcare workers interact to varying degrees in the care of a given patient in the healthcare system. If these processes, and the people who provide these processes, are not positively and proactively cooperating to develop a seamless system...[then] the provision of healthcare begins to appear to the patient...as having been ‘functionally siloed’ in that service handoffs and transitions are not effectively handled.

“To most effectively ensure that this coordination occurs, we must align strategic incentives across the various aspects of healthcare in a systems approach.”

(Mayer & Jensen, 2009, p. 8, emphasis added)

This chapter provides an introduction to, and background on this evidence-based review and training resource. It starts with background on discussions about patient flow, and briefly introduces the patient flow systems framework developed by the NSW Ministry of Health. It details the focus of this resource and briefly outlines the broader collaborative study on smooth patient flow education, of which it is a component. The chapter also presents the approach used in the identification and analysis of evidence. This covers a discussion of the search strategy and results of relevant published peer-reviewed literature identified. It also provides an overview of key insights generated from primary data collected and analysed during eight hospital site visits conducted in NSW during April and May 2012.

The chapter concludes with a brief overview of the education and training approach to smooth patient flow that is embedded within this resource, and the other resources that have been developed to support smooth patient flow education. The educational approach has been designed to flexibly accommodate the needs of a diverse range of health professionals and hospital support staff across operational, tactical and strategic aspects of smooth patient flow. Importantly by emphasizing these multiple perspectives this systems approach supports understanding and knowledge acquired on smooth patient flow to be shared amongst all staff at individual hospital sites. It is anticipated that this will facilitate those staff trained in smooth flow at each hospital site to generate sustainable improvements in patient flow based on the best available evidence and tailored to local needs and priorities.

1.1 Background and the Patient Flow Systems Framework

“The story is the same wherever you go: accident and emergency is starting to back up and soon the four-hour target will be breached. Unless something is done, cardiology might cancel patients - with target breaches. Bed managers are sent to find empty beds. Two hours later, they return with stories of unreported empty beds, or beds that will be free by teatime. ‘It’s not enough!’ cries the group leader. ‘Find some more.’ Two hours later, people are calm. Somehow, free beds have appeared and everyone leaves exhausted, knowing this daily ritual will be repeated.” (Walley, 2007)

This evidence-based review and training resource recognises the increasing pressure and changing demands on healthcare and hospital services that have occurred in Australia particularly over the last 10 years. Faced with the daily reality of ever busier hospital environments, it is understandable that many health professionals and their patients have come to perceive extended waiting times, delays in treatment and/or care, and even the cancellation of services as an unfortunate but necessary part of contemporary healthcare delivery. This resource provides evidence that this is not case. It also highlights that these problems of smooth patient flow do not result because health professionals lack commitment or are not working hard enough. The chapter highlights how a systems-based approach can help address these flow problems to achieve better patient outcomes and reduce delays, waste and the duplication of effort in the safe delivery of patient care (IHI, 2003).

This resource builds on the Patient Flow Systems (PFS) framework developed by the Ministry of Health New South Wales (NSW) in 2008. The framework was developed following an audit by the Ministry of Health of patient flow in twenty hospitals across NSW and an examination of the experiences of the UK’s National Health Service (NHS) and a number of other healthcare systems internationally. The audit which was conducted aimed to understand and investigate the key constraints and challenges impacting on patient flow in NSW hospitals.
The key constraints identified included diagnostics, consultations, transport, allied health, access to beds, and the patient flow service structures. Based on an analysis of the data, the PFS framework was developed and structured into seven essential elements that were identified as requirements for achieving effective patient flow.

The framework describes the clinical elements of the PFS framework as Care Coordination and Standardised Practice, with close connections to Quality, Governance and Variation Management. The System elements are Demand and Capacity Planning, Demand Escalation and Governance co dependent with Quality and Variation Management. These elements are the basis for best clinical care and enhanced patient experience. They are underpinned by the use of data and evidence to support decision-making in support of improved patient flow.

![Figure 2. NSW Patient Flow Systems (PFS) Framework – The Seven Elements (NSW Health, 2012)](image)

In briefly reviewing the PFS framework here, it is essential to reiterate the importance of the use of data and evidence in supporting decision-making around improving patient flow.

As the PFS framework has been rolled out into NSW hospitals in recent years, a number of tools and resources have been provided to assist with accurate assessment of data on current patient flow. Learning resources have been provided through the NSW e-learning on-line portal (GEM), an initiative of the NSW Ministry of Health Clinical Redesign Program. These resources aim to provide access to learning opportunities for all staff working within the NSW health system (for example, flow self-assessment tools, and flow process mapping tools).
Most significantly, the NSW Ministry of Health has also rolled out a suite of electronic modules through a Patient Flow Portal (PFP) that staff can use to assist in the management of patient flows at the ward, hospital and local health district levels. These modules include: the Bed Board for monitoring patient length of stay (LOS) and estimated date of discharge (EDD); the recording of Waiting for What reasons; a module around inter-hospital transfers; a demand and capacity predictive tool; and a dashboard.

At its core the PFS framework focuses on improving flow and proactively managing patients admitted to NSW public hospitals through a whole-of-system approach that explicitly aims to avoid placing the major burden for this management on Emergency Departments (EDs). It is about ensuring that people receive the care they need when they need it, with minimum waiting times. The framework embeds the principles of proactive demand management, coordinated patient care and reduced patient delays through escalation and strong executive accountability. Proactive demand management includes avoidance of and alternatives to hospital admission through the use of services such as Hospital in the Home, Extended Care Paramedics and Aged Care Facility Outreach programs.

It is in this context that the NSW Ministry of Health released a tender early in 2012 for a study that would build on the PFS framework and support the consolidation, development and sustainability of smooth patient flow skills and knowledge within NSW. The aim of the study is to document evidence and knowledge on patient flow theory and practice from published literature (and from case studies within NSW) and to formalise and synthesise this into an educational package. Following a selection process, the eHealth Services Research Group (eHSRG), University of Tasmania was commissioned to complete this work.

An evidence-based review and training resource:
This evidence-based review and training resource is the first part of a broader study. It enhances and consolidates the PFS framework by explicitly linking together theory and best practice on patient flow. While the resource can be read as a standalone text, its structure, orientation and format have been organised to complement the other resources developed for the smooth patient flow education package. In particular, it is important to note that the seven elements of the PFS framework have been grouped into three domains (Hospital operations; Clinical Practice and Patient-Centred care) to support an examination of the evidence and knowledge on the strategic, tactical and operational aspects of flow as they relate to these domains.

This resource is primarily focused on health system and hospital aspects of patient flow. While some attention is given to flow improvements within individual hospital business units (for example, Emergency Departments (EDs), Operating Theatres, Pharmacies and Outpatient Clinics), it is not intended as a comprehensive guide to patient flow improvement in individual areas. It is about how to understand patient flow, how to think about patient flow, and how to approach patient flow issues. There are numerous descriptions of how particular flow issues have been addressed. These descriptions are provided in order to stimulate thinking, and are not intended as tailor-made solutions which are ready to be applied in practice. An extended bibliography is provided with this resource for readers who may wish to undertake further research into flow improvement activities in individual areas.

This resource also discusses the need to change the way patient flow systems are designed in order to achieve workable and enduring changes in patient flow, but it does not attempt to provide detailed advice about how to undertake these redesign activities. There are numerous valuable and comprehensive resources available to guide hospitals through complex redesign processes. Within the NSW Ministry of Health these resources are primarily available through the Centre for Healthcare Redesign.


Looking forward, it is anticipated that all resources developed as part of the patient flow education package will be made available to healthcare professionals throughout NSW. It is anticipated that the Ministry will facilitate the implementation approach across NSW.

1.2 Evidence based review
This document analyses peer-reviewed and non peer-reviewed literature on the theory and practice of patient flow systems published in Australia and internationally during the last 10 years. This section provides
information on the method used in conducting the review including scoping the focus of the review, the search terms and criteria used for inclusion and exclusion, and the search strategies employed to identify relevant peer-reviewed publications. The following broad inclusion criteria were applied:

- **Literature published in the form of full text articles.** Literature published in the form of abstracts, short reports or reviews are included in the bibliography at the end of this document but were not formally analysed in the body of the report, except where they offered a new or unique contribution;

- **Literature published in the English language.** Some literature published in languages other than English was reviewed, but has not been included in this review; and

- **Literature published in Australia and internationally since the year 2002.** Some literature published prior to 2002 has also been included where it was assessed as being particularly relevant.

The aim of scoping the review in this manner was to ensure a broad coverage of the literature relevant to the theory and practice of flow in general, patient flow in particular, and related issues, as well as to facilitate the identification of any gaps or limitations to the evidence currently available.

**Literature analysed but subsequently excluded**

A number of criteria have been defined to exclude papers from the body of this document. Following the initial search, papers were briefly evaluated to identify their relevance to the scope of this review. This evaluation identified a large number of papers that, while matching the search terms, had very limited, if any, relevance to the smooth patient flow in public hospitals.

Given the numbers of papers that were excluded through this process it was considered useful to provide some examples of them and their related themes below:

- **General practice or family physician care:**


- **Care in outpatient settings:**


- **Dental care:**
  (Harris, R. V., & Sun, N. (2012). Dental practitioner concepts of efficiency related to the use of dental therapists. Community Dentistry and Oral Epidemiology;


NB. The references above are not included in the comprehensive bibliography appended to this resource.

**Search Strategy**

The search strategy used to undertake this review was aimed at ensuring the identification of:

- **Peer-reviewed publications providing quantitative and/or qualitative evidence on patient flow and issues related to its relevance to hospital operations, measurement, management, and links with health outcomes and healthcare safety and quality;**
At the broadest level the final selection process was guided by a number of factors including:

- Ensuring the presentation of all high impact materials in the body of the document;

This review of literature also aimed to support a critical appraisal of the evidence in relation to the seven elements of patient flow system (PFS) framework developed by the NSW Ministry of Health.

The formal search strategy targeted a number of sources of potential materials on patient flow and related issues including full text databases; citation databases and sources; web-based search engines and direct analysis of output from government agencies and centres of research excellence, as described below:

- The key databases searched to identify and collect original peer-reviewed publications and reviews on patient flow and related issues were: MEDLINE (PUBMED), OVID, PROQUEST, and the Cochrane Library;
- The key web-based search engine utilised was Google Scholar;
- Based on MeSH keywords the following terms were used:
  - Patient flow
  - Hospital and flow
  - Flow and lean
  - Care coordination and hospital

Using the MeSH keywords above the formal search strategy produced an initial list of 972 references. Following the hospital site visits in April and May 2012, some additional selective searches were performed. These were focused on:

- The relationship between protracted length of patient stay (in both EDs and hospital wards) and poor clinical outcomes or risks;
- Change management;
- Education and training to support organisational change;
- Modelling and simulation; and
- Care coordination.

After removing duplicated items, this approach resulted in 1,135 unique references. In addition to the resources provided by NSW Health, full copies of source materials for these references were retrieved through openly available sources and the University of Tasmania library.

Following examination of these materials for suitability (using inclusion/exclusion criteria) 582 source materials were identified for further assessment of the quality of evidence, key themes and topics covered. A comprehensive bibliography of all the sources identified is included as a separate appendix at the end of this resource. Following assessment of these sources 148 key papers were identified for presentation, discussion and citation in this resource. These are provided in a separate reference list for ease of identification and access. Despite the thoroughness of the search strategy, and the care exercised during the review process the eHSRG acknowledge that (given the volume of literature identified, filtered and selected, and the existence of variable and unstandardised nomenclatures) it is possible that there will be a small number of relevant articles that have not been included.

Assessment:

All source materials were independently assessed and categorised separately by two members of the eHSRG. The assessment process involved reviewers analysing the health setting of the material, its scope and focus, the research methodology (if any), the results or outcomes reported, and the implications and insights of the material (particularly in relation to limitations and transferability of results to Australian healthcare settings).

Following the independent assessment and categorisation of all source materials, results were compared and the final list of 134 key publications were selected for presentation and discussion in the body of this document.

At the broadest level the final selection process was guided by a number of factors including:
○ Avoiding duplication in the identification and presentation of key issues found amongst the source materials; and
○ Optimising the utility and usability of this document.

In assessing and selecting materials for inclusion in the body of this resource, it is necessary to add a cautionary note about the uncritical acceptance of evidence and anecdotal reports from other countries (and to a lesser extent other jurisdictions within Australia). The drivers of healthcare practice in different places can exhibit significant differences in the circumstances that stimulate decision making and patient flow management. In the USA, for example, both for-profit and not for profit hospitals are driven by revenue considerations. Empty beds may represent a missed cash flow opportunity, rather than a resource which can be applied to a relentless queue of new admissions. In the UK, hospitals, general practitioners and other primary care services are all managed within the NHS. As a result, it is possible to take an approach to service coordination that would be much harder in Australia. Despite these reservations, there are nevertheless valuable insights which can be gained from the experience of others.

Most aspects of patient flow management are supported by reliable evidence from before and after (pre- and post-intervention) studies and case reports in the literature. One exception was the scarcity of evidence about the use of demand and capacity planning to assist in the management of patient flow. It is likely that matching demand to capacity is accepted as an appropriate activity for managing hospital resources, and not considered as a subject for comparative research at this stage.

1.3 NSW Hospital Site Visits - Key Themes

In addition to the analysis of peer-reviewed literature and the leveraging of existing work on patient flow systems by the NSW Ministry of Health, this resource draws on insights generated from the analysis and interpretation of primary research data collected from healthcare professionals working in NSW hospitals. A total of eight hospital site visits were conducted during two weeks in April and May 2012. Research at each site included interviews with the executive team and the patient flow manager, as well as focus groups involving participants from a wide range of hospital business units.

This methodological approach involved the careful selection of a cross-section of hospital sites in metropolitan and regional locations, covering eight of the seventeen local health districts. Participants displayed a range of opinions and levels of understanding (from basic through to advanced) about patient flow and its proactive management. The site selection was completed in consultation with NSW Ministry of Health staff working with the roll-out of the Patient Flow Portal (PFP). The focus of this field research was to enable the development of experiential knowledge and case studies on best practice, as well as identifying issues and challenges with using the PFS framework and Patient Flow Portal (including the integrated Demand and Capacity Predictive Tool).

As well as learning directly about staff experiences with patient flow, the research team was also eager to be exposed to perspectives from NSW staff on successful approaches to education and training, along with suggestions about how best to tailor training around smooth patient flow.

Data was collected and analysed in two phases. The initial phase of four hospital site visits facilitated the development of some base-line data. The second round of site visits extended this data collection and supported some early validation of the systems approach in the other education and training resources being developed as part of the broader study. Data collection techniques involved a range of qualitative and quantitative techniques including semi-structured interviews, focus groups, observations and comparative analysis of statistical data across the hospital site, local health district and state-wide. Between five and eight hours of focus groups and interviews were conducted at each of the eight sites. The 50+ hours of audio recordings collected during this process were transcribed and analysed using thematic analysis techniques to identify core and repeating key themes. This analysis also contributed to the identification of some core concepts that are listed in Appendix 1 and integrated into a number of chapters in this resource.

Prior to presenting the results of the analysis of the published literature, it is helpful to briefly summarise some of the key themes that were generated from the site visits. It should be noted that these are representative, rather than comprehensive, and that they do not reflect significant input from senior medical staff other than those in senior hospital management positions interviewed. This stated, these themes provide a useful
validation of the challenges being experienced by staff in supporting smooth patient flow. These themes resonate strongly with evidence presented in other chapters within this resource.

**Communication Practices**

Many staff at all sites identified the need for better communication about the flow of patients through the hospital. This included comments on the need for improved communication about patient flows beyond the hospital, particularly where patients required community support services or transfer to residential care.

Improved communication was repeatedly identified as a key factor in improving flow. Paradoxically, it emerged that many staff who expressed the need to receive improved communication about the flow of patients from others, appeared not to connect this with their own behaviour. During discussions and in response to specific questioning it emerged that some staff with high expectations as recipients of communication were often inattentive in providing good communication to others about patient flows.

As the evidence presented in this resource highlights, the nature, type and timing of communication can make an important contribution to improving patient flow, especially when flow challenges arise.

**Hassle doesn’t help**

A closely related theme on communication practice was made by staff at a number of sites who identified how communication on patient flow frequently became counter-productive to improving flow, particularly when hospitals are extremely busy. It was noted that the operational and performance measurement focus on patient flow adopted by many senior staff led to unhelpful responses. When problems of patient flow are identified some managers respond by increasing the number of phone calls, pager messages and physical visits to the wards to ask extremely busy clinical staff to respond to the flow problems.

Many staff highlighted that this behaviour by senior staff rarely contributed positively to smooth patient flow but did contribute to the pressure and stress experienced by clinical staff on the ward. The constant interruptions are very often counter-productive and distract staff from patient care activities. Time that could be spent safely completing a patient’s episode of care is wasted on repetitive conversations with managers. Interestingly senior staff across most hospital sites visited were anxious to directly help their staff when flow challenges arose, but many were unaware that the behavioural responses adopted were often operationally rather than strategically focused, to the detriment of achieving smoother flow and helping their staff.

As evidence presented in this resource highlights, increased stress, distraction and fragmented work practice due to disruption have been shown to increase the likelihood of medical, medication or administrative error.

**Disconnect between Patient Flow and Patient Safety**

In a number of sites, clinical staff expressed the perspective that there was a strong disconnect between the view of patient flow as expressed by senior management and the view expressed by staff in middle and lower ranks. This disconnect led to a perception amongst many middle and lower rank staff that patient flow is primarily about ‘pushing’ patients through the system to meet management-focused key performance indicators (KPIs) rather than about improving the timeliness, quality and safety of healthcare delivery. It was also suggested that this sense of disconnect was often accentuated by staff awareness of a significant anomaly. The PFS framework advocates setting a realistic estimated date of discharge for each patient; commencing discharge planning at the time of admission; and aiming to complete daily patient discharges by 11 am. The reality on the ground is very different, with the majority of patient departures across most of the sites visited occurring both later in the day and later in each week.

Analysis also revealed a common difference between medical views of patient flow and its importance or priority and the views of other clinical staff often more directly involved in managing these flows. The attention of doctors tended to focus more on the process of providing care to an individual patient, while ward nurses were sensitive to perceived delays in care, and the need to manage overall bed availability. This difference was frequently identified as a point of frustration and tension particularly where patients had to wait or were delayed because of the routines of medical work.

Combining these disconnections highlighted that for many staff the vocabulary around ‘patient flow’ had come to have negative connotations, including:
• The unit which helps move patients through the hospital and facilitates prompt discharge;
• An active bed management strategy that is applied in a bed crisis; and
• A senior management driven strategy to meet their KPIs.

Many staff across the sites visited also expressed the view that the vocabulary of patient flow carried with it a sense of hassling, nagging and harassment during times of high workload and stress. There was also a concern expressed by many clinical staff that contemporary approaches to patient flow were perceived to have the potential to impact negatively on the safety and quality of patient care.

As evidence presented in this resource highlights, differing perceptions of patient flow are not helpful to achieving improved flow. Benefits are easier to realise when staff have a shared understanding of the aims, approaches and benefits of smoother flow. The evidence also confirms that smooth flow is intimately and directly related to the timeliness of safe, high quality care and reciprocally that chaotic flow increases the risk of negative impacts on the safety and quality of care.

**Escalation Non-Responsiveness**

In some sites, a number of staff (frequently those who had worked at a site for an extended period) expressed the view that their efforts to identify problems, issues and/or potential solutions to flow had frequently not led to any noticeable response or change despite their repeated attempts to escalate the issues.

The effect of this lack of responsiveness to issue escalation generated a sense of disempowerment and an acceptance of the existing situation, or the development of a ‘why bother’ attitude.

As evidence presented in this resource highlights, not all issues that are escalated can be acted on immediately. But what clearly emerges is that issues raised do need to be tracked, and data collected and shared amongst colleagues to validate the concerns and to ensure meaningful knowledge loops are maintained across the hierarchy of staff involved in promoting smooth flow.

**Blaming Symptoms Rather than Causes**

In many sites there was a strong willingness amongst some staff to assign blame for patient flow problems to specific individuals, groups, wards or services. It was less common for there to be an acknowledgement that most flow problems are complex, multi-factorial, and system related. The tendency to focus on the symptoms of flow problems rather than understanding and assessing their causes highlighted that there are some common misconceptions about patient flow, its causes and potential solutions.

As evidence presented in this resource highlights, the majority of flow problems are systemic in nature and require holistic responses. Attributing negative results to the shortcomings of particular individuals, wards or services is unhelpful and unlikely to improve patient flows. It also tends to generate fragmented solutions that simply result in shifting patient flow bottlenecks around the hospital rather than improving overall system flow.

**Predictable workload imbalance**

In most sites it was possible to identify predictable and regular peaks in hospital activity that affected patient flow. For example, many clinical staff could identify that ‘Mondays are always a bad day for admissions and bed availability’, while many clinical support staff could identify that ‘Fridays are always busier because of the extra discharges before the weekend’. In some sites visited, there were also examples of specific work practices which directly contributed to additional peaks and troughs during the day. For example, many clinical support staff recognised the peak periods for their services during the day, and during the week. But only in a few instances had this recognition resulted in changes to work patterns to adjust to those peaks and troughs. Rarely had process changes been introduced to prioritise activities that would support patient discharge.

As evidence presented in this resource highlights identifying and responding to predictable imbalance in workload activity can aid in smoothing patient flows and contribute positively to reducing the overall work stress experienced by many clinical and clinical support service staff during these recognisable daily and weekly cycles.

**Patient Engagement and Experience**

In most sites staff recognised the importance of communicating directly with patients, family and carers about their journey through the hospital system. However, there were only a few sites where a systematic approach...
had been developed for these communications, and rarely were patients or their carers invited to actively participate in the discharge process in a systematic way.

Generally, patients’ expectations were managed poorly, or communicated in different ways by different staff with limited coordination between them. It was reported that this often led to conflict with families and carers, and to delays in completing the episode of care. There appeared to be few explicit processes designed to initiate an early transfer of responsibility for self-care back to the patient. Many staff were aware that patients can suffer distress and frustration because of failures to communicate effectively with them.

As evidence presented in this resource highlights focusing on effective communication with patients and their carers can contribute positively to patient flow and particularly to smoother discharge. Evidence supports the position that in appropriate circumstances, patients and their families and carers can become more actively involved in the processes leading to a successful and timely discharge.

**Implications of the 4-hour rule**

Across the sites visited medical staff acknowledged that the 4 hour rule is already stimulating a rethinking of the traditions about how sub-specialty teams interact with Emergency Department (ED) patients. The 4 hour rule is already impacting on communication, behaviour and handover practices between ED and ward-based teams. In some sites there were already some rules and procedures agreed between consultants (for example, between ED and medicine, and ED and mental health) providing frameworks for registrars to process patients in ED, although these practices were not widespread. Increasingly, the incidence of patients being ‘bounced back’ to ED by the admitting team is being reduced, with the expectation that once patients leave ED any subsequent referrals to another ward, team or unit will be conducted from the initial receiving ward or service. In some sites, there were concerns that patients would either be transferred out of ED at 3 hours and 59 minutes (or before) to meet the rule, or once their wait had exceeded 4 hours, they would end up staying in ED for an extended period while patients arriving later were prioritised for admission to meet the 4 hour target.

As evidence presented in this resource highlights the impact of the time based rules for patient flows does require careful monitoring to ensure that new ‘gaming’ practices do not emerge that create unexpected or negative second order effects on patient flows and the safety and quality of patient care.

**Capacity-driven discharge**

In many of the sites visited there was evidence that the degree of attention given to discharge-related activities varied inversely with the availability of beds, such that an intense focus of activity on discharging patients only occurred when the hospital was near or at 100% occupancy.

As evidence presented in this resource highlights, emergency admission activity is uncontrolled but does occur with a largely predictable degree of variability. Elective (‘planned’) admission activity is almost entirely driven by decisions which the hospital makes, but can be highly variable within a day, across the week, and during the year. Discharge activity, which frees up beds for new patient admissions, is entirely the result of decisions made within the hospital, and is also subject to a high degree of variability.

From the site visits it was not widely recognised that one significant role of senior management within the hospital is to analyse and understand the variability inherent in these three activities, decide whether the degree of variability in controllable activity is acceptable, and to intervene appropriately.

**The impact of VMO practice**

At most sites, the work routines of Visiting Medical Officers (VMOs) were identified as problematic, and as not being managed effectively to the detriment of patient flow. There also seemed to be a lack of common understanding of the factors driving VMO behaviour. The alignment between the care processes that the hospital considered appropriate for the bulk of their patients and the care practices used by VMOs was not strong. Clearly public hospitals are only a component of the care provided by VMOs, but many hospital staff appeared to have little appreciation of these other VMO activities.

It was evident that a key challenge for hospital staff is the lack of apparent structure to the activities of VMOs, and the lack of transparency, communication and timeliness about their activities at the hospital.
VMO practice issues identified by hospital staff as being problematic for patient flow included:

- **The timing of ward rounds**: Medical consultants in particular tend to conduct ward rounds during the afternoon or evening. This provides little opportunity to discharge patients the same day if the consultant decides that the patient is well enough to depart. In addition, ward round timing can be unpredictable for some consultants;
- **Infrequent attendance**: Many consultants are on-site fewer than five days a week. This can lead to patients waiting for an additional one or two days prior to permission for discharge being provided;
- **Reluctance to delegate the decision to discharge patients**: Many consultants insist on seeing the patient themselves before deciding they can be discharged. Delegation of this decision (to a consultant colleague, a reliable registrar, or to a nurse as part of criterion based discharge) might assist with patient flow by reducing unnecessary days of stay;
- **Ward round communication practices**: Registrars and JMOs typically accompany VMOs on ward rounds. Once the consultant makes a decision about the patient's ongoing care, or about discharge, it is the responsibility of the JMO or registrar to enact that decision by completing the relevant clinical documentation (which may include orders for pathology or imaging, allied health referrals, a prescription for discharge medication, or the discharge summary). These clerical tasks are typically deferred until the end of the ward round, which may be two or three hours later. In the case of a late afternoon round, communication about these ‘next steps’ of care may be forgotten or impracticable, leading to further patient flow delays.

These issues appeared more problematic at sites with a low proportion of full time consultant staff. It is unlikely that any of the practices described above represent insurmountable barriers to improved patient flow. Noticeably a number of hospitals appeared reluctant or unable to initiate successful conversations with VMOs about changes in practice. The concerns outlined above accurately reflect the perceptions which were clearly and forcefully expressed during hospital site visits about VMOs, their roles, behaviours and attitudes.

It should be noted that this is not a balanced view - the structure of the site visits allowed little opportunity to obtain alternative views from a VMO perspective. VMOs participated in focus groups at only one site and these clinicians in no way matched the archetypal VMO described at other sites.

### 1.4 Overview of education and training approach

The section presents a brief overview of the education and training approach to smooth patient flow that is embedded within this resource and the other resources that have been developed to support smooth patient flow education. The approach has been designed to flexibly accommodate the needs of a diverse range of health professionals and hospital support staff across operational, tactical and strategic aspects of smooth patient flow. Importantly by emphasising these multiple perspectives this systems approach allows understanding and knowledge acquired on smooth patient flow to be shared amongst all staff at individual hospital sites. It is anticipated that this will facilitate those staff trained in smooth flow at each hospital site to generate sustainable improvements in patient flow based on the best available evidence and tailored to local needs and priorities.

At the broadest level the education and training approach is structured into two major inter-related components:

- **On-site Training**: designed and structured for all hospital staff involving multi-disciplinary training delivered in a number of one hour modules and supported by a Patient Flow Training Manual;
- **Off-site Training**: designed and structured for staff members who have completed on-site training and who will be involved directly in coordinating smooth flow initiatives at their hospital sites, including the sustainability of the on-site training over the medium to long term. This training, delivered in three one-day sessions off-site, involves interaction with staff from other hospitals and is supported by a Patient Flow Leaders Manual.

The education and training package is intended to raise awareness, build understanding and stimulate preparedness to improve patient flow amongst NSW staff. While it discusses the need to change the way patient flow systems are designed in order to achieve workable and enduring changes in patient flow, it does
not attempt to provide detailed advice on how to undertake those redesign activities. As mentioned above (section 1.1) there are numerous valuable and comprehensive resources available to guide hospitals through complex redesign processes. Within the NSW Ministry of Health these resources are primarily made available through the Centre for Healthcare Redesign <http://www.health.nsw.gov.au/performance/redesign.asp>.

The education package does however anticipate that trainees will be able to recognise those small changes that can be initiated following training based on a few simple steps that include: acknowledging a problem exists; identifying and agreeing on a description of the problem; analysing the problem; designing a workable (and affordable) solution; testing the solution to decide whether it will work and then proceeding to either embed the solution as permanent practice, or roll back the change to consider alternatives.

In this context, it is useful to reflect on evidence published by Proudlove, Boaden and Jorgensen (2007) who reviewed the role of bed managers in the NHS in some detail, and discussed how the bed manager role could be supported through professional development. The authors noted that the role is usually assigned to nurse managers, and can be both stressful and managerially complex. The authors questioned the appropriateness of calling these staff bed managers or patient flow managers:

“...whatever the title, few of them really manage beds (let alone patient flows) or are responsible for more than a small part of the patient journey. The critical success factor for their role (in their view) is the development of effective relationships with key individuals working at different stages of the patient journey.” (Proudlove et al., 2007, p. 35)

The authors further observed that this stressful job tends to have a higher than usual rate of staff turn-over, and little collegial support:

“Bed managers feel isolated because there is often relatively little opportunity for them to share experience and good practice, either locally or nationally.” (Proudlove et al., 2007, p. 36).

The authors proceed to identify a number of trends including firstly that the imposition by the NHS of more stringent performance measures on hospitals in the early 1990s resulted in an increased focus on bed management in an attempt to improve capacity management. Secondly, that although bed availability is seen as a critical issue, it is actually a symptom of the way in which beds are used, rather than necessarily an undersupply of beds or staff per se. Finally, managing beds is a multi-level activity that requires commitment to both executive and operational management that requires the involvement of staff across all stages of the patient journey.

**An emphasis on multiple perspectives of patient flow**

The education and training package has adopted an approach that promotes multi-perspectives to the challenge of smooth flow in order to build on each participant’s position and contextual knowledge (Williams, 2001). This approach aims to support each participant to interpret the patient flow framework from their own professional perspective, whilst simultaneously acquiring an understanding of the perspectives and experiences of patient flow from others.

This multi-perspective approach creates an environment of professional awareness from different angles to strengthen multi-disciplinary review of the challenges and sharing of potential solutions to increase the total knowledge base at (Mann, Gordon, & MacLeod, 2009; Proudlove et al., 2007). The different perspectives are examined from operational, tactical and strategic levels as they impact smooth patient flow. As stated above, this approach is designed to ensure that staff trained in smooth flow at each hospital site will be able to collaborate in generating sustainable improvements in patient flow based on the best available evidence and tailored to local needs and priorities.
2 Understanding Hospital Pressures: Why Smooth Flow is a Priority

“... the flow of patients through an acute hospital depends upon a complex set of relationships between many departments, services and people. Achieving improvements in the way patients move through such a complex system requires a coordinated approach to admission, treatment and discharge of patients based on core principles of system engineering. It requires hospitals to untangle the complexity of their existing processes so they can understand where the key bottlenecks exist within their clinical units. It also requires a fundamental commitment to providing safe, effective, efficient and timely care where services are designed first and foremost according to patient needs”.

(Clinical Excellence Commission (N.S.W.), 2005)

This chapter aims to contextualise discussions of patient flow within broader contemporary debates on the pressures facing public hospitals. The chapter starts with an examination of the impact of these factors in interrupting patient flow. It also highlights how a systems perspective challenges the argument that negative impacts on patient flow cannot be resolved unless hospitals are provided with more beds, more staff, larger emergency departments, or all three. The chapter proceeds to confirm that many of the specific symptoms of poor patient flow are a consequence of how systems have been designed. Evidence is presented supporting a systems-based approach to developing initiatives for smooth flow. The chapter also provides evidence which cautions against flow initiatives being merely about quantitative measurement. Genuine enhancements in individual and organisational capacity are needed in order to deliver smooth flow. The chapter concludes by presenting the evidence confirming the importance of system and culture change to support the normalisation of smooth flow, and for work practices which represent waste, duplication and delay to be recognised, responded to, and removed.

2.1 Factors Impacting Patient flow – the need for a Systems Perspective

“Though clearly we have much more to learn about how to make our systems safe, we already know far more than we put into practice.” (Leape & Berwick, 2000, p. 725)

The last decade in Australia has witnessed vigorous debate at both Commonwealth and State levels about the best ways to fund and manage the delivery of healthcare services. At the same time health professionals, (particularly those working in public hospitals) have seen a dramatic change in the nature of and demand for their services. Ageing populations and the increased burden of chronic disease continue to transform the nature of healthcare, and lead to growing demand for increasingly expensive medical procedures, medications and health care services. As a result health reform remains a major item on political and policy agendas, and changes to Medicare, health system funding, medical insurance, eHealth and the legal and regulatory environment continue to occur. The challenge is to find more effective ways of maintaining the affordability of the overall system, without reducing equity or access to safe, high quality care for all Australians.

Improving patient flow within a hospital necessitates the balancing of activity across all internal business units, and collaboration with individuals and organisations providing pre-hospital and post-hospital care. Intense optimisation of the work of an individual business unit in isolation may have the unintended effect of reducing the optimisation of overall hospital patient flow.

Around the world, government budgets are under increasing pressure from declining revenues and increased demands for outlays. These pressures continue to drive a requirement for improvements in efficiency and productivity within publicly funded services. In public hospitals, these pressures have led to decreasing lengths of stay for inpatient episodes, and an increasing expectation of out of hospital care, including patient self-care. In the context of patient flow discussions, one common theme relates to bed occupancy and the lack of available beds.

Figure 3 highlights some of the key factors within the literature reported as impacting on patient flow. To support the discussion in this chapter the figure locates these factors along the trajectory of a patient’s journey both prior to hospital admission through treatment and back into the community or on to other health services.
Over the last two decades there has been a long term decrease in the number of acute hospital beds as a result of changes in the way that care is provided. Lengths of stay for many types of admission have decreased dramatically, many patients now receive treatment on the same day within outpatient or non-hospital settings, and most non-acute patients are housed in more appropriate facilities. In Australia these long-term trends continue to generate public concern:

“Since 1984 there has been a 60 per cent cut in the number of public hospital beds, yet hospital patients aged 85 and over have increased by over 20 per cent in the last five years. Record longevity and increasing levels of age-related illness means we need more beds to meet the increased demand for hospital care arising from a larger, older and sicker population.” (Sammut, 2009)

Fatovich, Hughes and McCarthy (2009) make the case that the principal cause of ED crowding is a lack of available beds, and there is a commonly held view that high rates of bed occupancy have a deleterious effect on the safe, efficient operation of a hospital (Keegan, 2010). An ideal occupancy target of 85% is often quoted, although the evidence for the choice of this figure is questionable (Bain, Taylor, McDonnell, & Georgiou, 2010). Fatovich, Nagree and Sprivulis (2005) identified access block (when an admitted patient in ED waits more than eight hours for a ward bed) as the principal cause of ED crowding. They suggested that improved patient flow within the hospital was the intervention most likely to minimise access block, and hence reduce ED crowding.

In an article in the MJA, McCarthy (2010) considered issues related to access block in EDs, in the light of the 4 hour target. This policy, agreed to by the Council of Australian Governments (COAG) requires “… emergency department services to implement a new four-hour National Access Target to ensure patients are admitted, referred or discharged within four hours of presentation to an emergency department.” (Council of Australian Governments Meeting 19 and 20 April 2010, Canberra: Communique, 2010). While noting that ED access block is a symptom of blocked patient flow elsewhere in the hospital, McCarthy suggests that the problem is a result of insufficient bed numbers, contributed to by protracted episodes of patient care resulting from poor scheduling of treatment activities.

There is no doubt that high occupancy rates are associated with increased rates of healthcare associated infections, and delayed admissions from ED. A countervailing view suggests that a hospital which is not managed and operated efficiently will accumulate patients inappropriately, resulting in unsafe conditions for both patients and staff. Adding beds to a hospital with impaired patient flow is probably not the only solution, and may not even be a solution.

Figure 3. Key Factors Impacting on Patient flow
It may be that the challenges now facing emergency departments (EDs) are, at least in part, the result of successive improvements in their effectiveness and capacity over the last decade. There is no doubt that the role of EDs has expanded. Taylor, Bennett and Cameron (2004) surveyed Directors and Nurse Unit Managers of EDs in Melbourne to assess how the service mix and clinical practices had changed between 1998 and 2002. The authors concluded that EDs had responded to access block issues by incorporating a range of hospital inpatient services into their work, with EDs now providing an expanded range of care.

But are the problems largely the result of insufficient hospital beds? Gray, Yeo and Duckett (2004) evaluated trends in the use of acute hospital beds by older Australians in the decade to 2002. They noted growing concerns about difficulties with access to acute hospital beds, and the resultant impact on waiting lists and increased crowding. Their analysis of the use of hospital beds by older people showed that, although the population 65 years or older had increased by 18% in that time, use of hospital beds had remained stable, at around 47%. For those aged 75 or over, separations increased by 23%, although overall bed utilisation in older groups (65-74 and ≥75 years) had decreased. They noted that the trends in bed utilisation shown by their analysis were at odds with popular perceptions, and suggested that ageing of the population is not associated with a proportional increase in bed utilisation by older people.

An analysis of German health insurance data by Busse, Krauth and Schwartz (2002) supported the findings of Gray, Yeo and Duckett. They found that days of hospital use in the last year of life were similar for the young and the old (24 days under age 25, and 23 days over age 85), and that the average number of hospital days per year of life was stable (around 2.0 –2.2 days) for those who died between 50 and 90 years of age.

### A Strange Ritual

Problems with patient flow and the management of bed occupancy are common across healthcare systems. Within hospitals which are predominantly public-funded, the problems appear remarkably similar. In 2007 Paul Walley, writing in the *Health Service Journal*, described a situation in the NHS which resonates with that currently prevailing in Australia:

“Every weekday a strange ritual happens in hospital meeting rooms across the country. A group of people gather together for a collective panic about bed availability.

“The story is the same wherever you go: accident and emergency is starting to back up and soon the four-hour target will be breached. Unless something is done, cardiology might cancel patients - with target breaches. Bed managers are sent to find empty beds. Two hours later, they return with stories of unreported empty beds, or beds that will be free by teatime. 'It's not enough!' cries the group leader. 'Find some more.' Two hours later, people are calm. Somehow, free beds have appeared and everyone leaves exhausted, knowing this daily ritual will be repeated.” (Walley, 2007)

He goes on to describe the factors which contribute to chaotic patient flow and the resultant bed shortages:

“First, each department holds a local queue to ensure staff are not kept waiting. This prevents seamless patient progress from one stage to the next. Second, the whole system succumbs to demand amplification, meaning any demand or capacity variation is intensified by over-reaction. So as the queue is passed from A&E to x-ray and back again, both departments are ‘swamped’ by the higher peaks and lower troughs around average original demand at the front door of A&E. The situation is made worse when there are large time lags in the system and information is uncertain. The system can be destabilised by these effects.

“Healthcare demand, especially emergency demand, is relatively stable compared with other service sectors, such as selling airline seats. However, the biggest determinant of demand variation in hospitals is artificially introduced. When we look at elective demand, the system, in theory, has time to smooth the number of patients as they enter the hospital from the waiting list. But instead, patients are batched to optimise use of surgical sessions and this magnifies the variation in demand. So Mondays are really busy for electives, and the predictably worse Monday 'no beds' crisis in A&E is utterly self-inflicted.

“Now the system dynamics start to get interesting. As batching happens at every step along the clinical pathway, admissions and discharges become massively unsynchronised on daily and weekly periodic cycles. On a daily basis, arrivals happen from early in the morning to late at night. Discharges are still
compressed to a relatively narrow time span in the late afternoon and early evening. This is why the daily beds crisis often melts away by 6pm. On a weekly basis, Fridays are almost always the busiest day for discharges, especially Fridays before holidays. Just think about the state of beds on Christmas Eve.

“People often blame social services for not dealing with hospital discharges. Is this ever likely when the events we manage convert a relatively smooth demand into chaos?” (Walley, 2007)

There is potential for trends towards shorter and more intense hospital stays to result in increased risk to patients, and poorer health outcomes, although those results are not inevitable. It is possible for well designed systems within hospitals to deliver consistent high quality care with reduced resource use, and hence to continue to provide safe care within a constrained budget. When Davis, Lay-Yee, Scott and Gauld (2007) analysed the impact of hospital bed reductions and systemic reform on patient mortality in New Zealand they found that changes had been made without undue impact on patient outcomes, although system changes may have been slow.

Phillips and Smallwood (2010) cautioned against an overly simplistic interpretation of statistics about acute hospital beds. Comparing Australian bed numbers with those in the OECD is complicated by different counting rules, and shorter lengths of stay mean that fewer beds are needed for the same number of admissions. The authors also highlight the disparity in public hospital beds per 1,000 population between metropolitan and rural and remote locations, and suggest that a need for higher bed numbers in rural and remote areas may reflect deficiencies in non-hospital clinical services.

O’Connell, Ben-Tovim, McCaughan, Szwarcbord and McGrath (2008), in making the case that clinical process redesign can improve hospital performance in the face of rising demand, outline some typical examples of the problems and disconnections in Australian hospitals:

• Poor communication, with care delivered in clinical ‘silos’, and miscommunication and adverse events usually occurring at the interfaces of these silos. Decision-makers are often not able to be contacted as needed; for example, decision making for surgical patients in ED can often be delayed because surgical staff are busy in theatre.
• Poor alignment of activities; for example, delivery of a meal, a physiotherapist visit and an investigation all happening simultaneously.
• Imperfect alignment of laboratory and imaging services with patient requirements, and lack of a robust prioritised approach to laboratory workload to optimise overall hospital patient flow.
• Poor interface between specialist teams and ED staff.
• Staff not being rostered according to the requirements of patients. A typical example is the ‘9 to 5’ rostering which still dominates for various staff in service areas such as ED, even when patient arrivals and the business of the ED peak in late afternoon to early evening. This mismatch of patient demand and staff supply results in minimal staff having to deal with maximal activity. This causes further frustration for staff, worsening of patient queues and increases the risk of adverse events.
• ED staff needing to ‘shop around’ for an inpatient team to take responsibility for a patient (often older) who is difficult to ‘sell’.
• Lack of a common understanding by both staff and patients of the expected patient pathway and date of discharge, which inhibits better planning of preparatory work before discharge. Particularly problematic is the poor compliance with documenting an estimated date of discharge. This is compounded by senior nurses and registrars not being empowered to discharge patients. Processes for smooth discharge, such as preparation of discharge prescriptions, are often not well planned. For example, a junior doctor is called at late notice to write prescriptions for a patient ready for departure, but the doctor is busy with other tasks and does not complete the prescriptions until after the pharmacy has closed, thus resulting in a delay in the patient’s departure.
• Decision making in wards tends to happen only ‘9 to 5’ Monday to Friday.
• Suboptimal processes for accessing services delivered in the community. Only certain professions, rather than the multi-skilled team, are authorised to perform the tasks required to ‘move the patient along’. All of these factors result in unnecessary delays in discharging patients from acute facilities into the community, causing a damming of patient flow ‘downstream’ that exacerbates the ‘upstream’ congestion in the ED.” (O’Connell et al., 2008, p. S11)
Scott (2010) reviewed literature about the use of acute hospital beds in Australia. He found that within hospitals, patient throughput could be improved by outsourcing some surgical procedures to the private sector; using a hospital-wide approach to reformatting care and patient flow to address access block and delayed discharge; separating unplanned and elective activity; increasing same-day and short stay admissions; and reducing ineffective or marginally effective interventions. Outside hospitals, he found significant potential for improvement through better access to rehabilitation, residential aged care and community support. He noted that 70% of acute hospital bed days were used by patients awaiting transfer to other forms of care.

It’s the system, stupid
If a hospital has impaired or clogged patient flow most days, that’s almost certainly because of the way systems are designed; changing systems is a smarter way to respond than working (even) harder.

2.2 Responding to the Flow Challenges: A Culture of Managing Not Just Reporting

There are very few opportunities for improvement within mature organisations where the improvement can be achieved without the measurement of results. However, the measurement process on its own is not enough.

The management of public sector organisations involves two competing cultures: a performance management culture, focused on building organisation capacity, and a performance reporting culture, focused on tracking quantitative achievement in order to meet externally applied goals and targets (Public Administration Select Committee, 2003). Both cultures will exist in any organisation, and are often in contention with each other. It is not possible to improve system performance without data. A strong performance reporting focus may serve to improve performance against benchmarks, but cannot be guaranteed to achieve improvements in system performance. If undue attention is focused on performance reporting at the expense of performance management, there is a real risk that gaming may be used to artificially improve performance against external measures.

KPI focus
The importance of performance targets to the success of an organisation or its managers may lead to an excessive focus on the achievement of key performance indicators (KPIs) and targets. The result can be a focus on gaming to achieve targets, rather than a focus on improved performance.

Pitches, Burls and Fry-Smith (2003) provided a tongue-in-cheek guide to data optimisation for clinicians and managers within a performance reporting environment who must present their data in the best possible light. They offer suggestions for the gaming of non-clinical performance data, fraudulent reimbursement claims, and the gaming of clinical data as options for ‘sexing up’ poor performance data.

Radnor (2008) proposes a typology of gaming, based on an analysis of reports about the use of performance indicators (PIs) in public service organisations in the UK. She notes that “…often these PIs, through performance measurement and performance reporting, too often result in ‘gaming’ rather than performance management supporting improvement for the service.” (2008, p. 316) She also observes that “…too much focus on measurement and reporting means that performance measures and indicators are not so much used as a tool to improve the performance of an organisation but become an ends in themselves.” (2008, p. 318) While the measurement and reporting of performance indicators, both internally and externally, is an important element of the management of contemporary organisations, improvement requires more intervention than a pure focus on the KPIs.

2.3 Changing the system and Changing the Culture: Supporting Smooth Patient Flow

“Insanity is doing the same thing, over and over again, but expecting different results”.

- Source uncertain (commonly attributed to Albert Einstein)
Many of the barriers to smooth patient flow are interpreted as being the result of actions taken by an individual, delayed actions or inaction. In reality, many flow challenges are systemic, and embedded in the way the organisation performs its regular business.

There is a risk with patient flow that there will be a focus on reporting about flow, at the expense of taking action to improve flow performance. Formally assessed targets such as the ED 4 hour target, off-stretcher times and the proportion of discharges before 10 am can be achieved by manipulating activity or reporting, by exhorting staff to work harder, or by actually improving performance. It can be difficult from a position inside the work of an organisation to have a clear view of business processes from a systemic perspective.

“Every system is perfectly designed to get the results it gets”.

Paul Batalden cited in (McInnis, 2006, p. 32)

This apparently simple observation by Batalden carries with it a powerful message: if there is to be a change in the outcomes delivered by a system, or better KPI performance, then there will need to be a change in the system.

At its best, improving patient flow is about taking action to make systems (‘the system’) work better. It may be tempting to try to improve flow by pushing staff to work harder or longer, but that approach is likely to be counterproductive. Flow fatigue and staff burnout or resentment will become apparent in the short to medium term, and although pushing the existing system to work better may deliver benefits initially, these improvements will inevitably reach a performance plateau.

*Disruptions and delays are built into the system*

Limits to throughput are ‘engineered’ into existing hospital systems. There is a possibility that these systems were designed by intent, to meet carefully specified requirements. It is more likely that they have been designed by happenstance and accretion, repeatedly modified, tweaked and varied, with innumerable workarounds and short term variations added over time. Only a changed system can be relied on to deliver different results.

Silvester, Lendon, Bevan, Steyn and Walley (2004) explored the underlying reasons for excessive queueing in the NHS, and the resultant backlogs and waiting times. They suggested that most queueing was not a result of insufficient capacity or under-resourcing. Their conclusion was that queueing was the result of a poor or absent management of the mismatch between variable demand and the variable scheduling of capacity.

As an example, consider the implications which the introduction of the 4 hour rule has for work practices in an ED. For medical staff the 4 hour rule will require a rethinking of the traditions about how subspecialty teams interact with ED patients. The 4 hour rule doesn’t allow time for extended debate or prevarication about the most appropriate path for clinical referral. Rules and procedures will need to be agreed between consultants (especially between ED and medicine, and ED and mental health) which will provide registrars with a consistent framework for the processing of patients in ED. *(NSW Hospital site visits, 2012)*

The importance of this redesign of clinician interaction, and its implications for patient care, should not be underestimated. Munir (2008) discusses the impact of the introduction of the 4-hour rule in the NHS, and identifies data which suggests that its introduction has had an adverse impact on the care of older patients, prior to ED arrival, in ED, and following an ED episode.

*No hassle*

An early step along the path to smooth flow is a commitment to abandon the use of a “harassment culture” to hurry patients through the system. This may result in a short term worsening of patient flow overall, but will serve to increase the time available for patient care.

If the systems within an organisation are going to change, then those within the organisation will need to have the confidence to understand that change is possible, that it will not have catastrophic consequences for them as individuals, and that any unsatisfactory personal outcomes will be managed. Small changes in day to day routines can help with smooth flow. Staff need the confidence to understand that it is possible to consult with their peers to make small adjustments to routine processes. Clear visible leadership and support will be needed.
to give staff the confidence to try a new approach, and perhaps not succeed the first time. It is useful to remember that learning from mistakes is often very valuable as long as there are not penalties for trying!

A paper by McGrath et al (2008) discusses challenges that arise during the implementation of system redesign and transformational change in healthcare. They emphasise the critical role of leadership in such an undertaking: “Visible involvement of the chief executive and senior management is essential. Senior management needs to set the standards for service delivery and drive the change process.” (McGrath et al., 2008, p. S32) Although this resource is not about redesign or transformational change, the same principles apply. Clear leadership and support from senior management is essential if sustainable improvements in patient flow are to be realised.

**Hassle doesn’t help**

Hassling and nagging staff who are already working under pressure is unlikely to improve their individual task performance, or the performance of the system overall.

Other elements of successful change which were identified by McGrath et al, and which have applicability to an environment in which small scale alterations can take place include: engaging clinicians; working with a multidisciplinary care coordination team; focusing on the patient journey, making patients and their carers part of the team and the use of data.

Improvement is unlikely to follow a linear upward path. Those managing or driving change should be prepared for the possibility of poor results; and if that is the case, roll back the change and try a different approach to solving the problem. To do this successfully, those engaged must be supported, have resilience and be adaptable. These skills are often the most important to achieving long term success.

**Communication and relationship management.**

Unsurprisingly, communication remains an essential component of smooth patient flow. If there is not good communication between members of the care team, unnecessary delays are likely to be introduced into the patient’s journey, and coordination of care may be less effective than it should be. Communication about smooth flow is needed as a minimum in the following three areas:

- Among peers;
- Forwards and backwards along the line of process; and
- Upwards and downwards in the organisational hierarchy.

Good communication in a busy clinical setting is much easier if it is supported by good working relationships.

### 2.4 Key readings for this chapter


  This paper makes the point that, although an ideal occupancy target of 85% is often quoted, the evidence for the choice of this figure is questionable.


  This paper discusses the role of bed managers in the NHS, describing the nature of their role, how bed managers can improve the quality of bed data provided by wards, and the varying degrees of strategic, operational and mixed functions which they undertake at different hospitals.

This recent report from the Australasian Surge Strategy Working Group examines emergency department surge capacity and draws conclusions about the capacity required to deal with mass casualties. Based on the discussion, there appears to be a trend towards the use of surge capacity to deal with regular workload peaks which are with the normal distribution of activity.


This analysis of German health insurance data found that days of hospital use in the last year of life were similar for the young and the old (24 days under age 25, and 23 days over age 85), and that the average number of hospital days per year of life was stable (around 2.0 -2.2 days) for those who died between 50 and 90 years of age.


This paper argues against the use of the term “surge” to describe those regular (daily) peaks in activity that result in emergency department crowding.


This analysis of the impact of hospital bed reductions and systemic reform on patient mortality in New Zealand found that changes had been made without undue impact on patient outcomes, although system changes may have been slow.


These authors identified access block (when an admitted patient in ED waits more than eight hours for a ward bed) as the principal cause of ED crowding. They suggested that improved patient flow within the hospital was the intervention most likely to minimise access block, and hence reduce ED crowding.


This paper evaluates trends in the use of acute hospital beds by older Australians in the decade to 2002. The authors note growing concerns about difficulties with access to acute hospital beds, and the resultant impact on waiting lists and increased crowding. Their analysis of the use of hospital beds by older people showed that, although the population 65 years or older had increased by 18% in that time, use of hospital beds had remained stable, at around 47%. For those aged 75 or over, separations increased by 23%, although overall bed utilisation in older groups had decreased. The authors note that the trends in bed utilisation shown by their analysis were at odds with popular perceptions, and suggest that ageing of the population is not associated with a proportional increase in bed utilisation by older people.


This paper expresses the commonly held view that high rates of bed occupancy have a deleterious effect on the safe, efficient operation of a hospital.


This paper considers issues related to access block in EDs, in the light of the 4 hour target. The paper highlights the reality that ED access block is a symptom of blocked patient flow elsewhere in the hospital, and suggests that the problem is a result of insufficient bed numbers, while noting that protracted episodes of patient care resulting from poor scheduling of treatment activities also contribute to the problem.

A discussion of the challenges that arise during the implementation of system redesign and transformational change in healthcare. The authors emphasise the critical role of leadership in such an undertaking.


This paper discusses the impact of the introduction of the 4-hour rule in the NHS, and identifies data which suggests that its introduction has had an adverse impact on the care of older patients, prior to ED arrival, in ED, and following an ED episode.


This paper makes the case that clinical process redesign can improve hospital performance in the face of rising demand, and provides some typical examples of the problems and disconnections in Australian hospitals.


The authors caution against an over simplistic interpretation of statistics about acute hospital beds. Comparing Australian bed numbers with those in the OECD is complicated by different counting rules, and shorter lengths of stay mean that fewer beds are needed for the same number of admissions. The authors also highlight the disparity in public hospital beds per 1,000 population between metropolitan and rural and remote locations, and suggest that a need for higher bed numbers in rural and remote areas may reflect deficiencies in non-hospital clinical services.


This is a tongue-in-cheek guide to data optimisation for clinicians and managers within a performance reporting environment who must present their data in the best possible light. The authors offer suggestions for the gaming of non-clinical performance data, fraudulent reimbursement claims, and the gaming of clinical data as options for ‘sexing up’ poor performance data.


This paper reviews the role of bed managers in the NHS, and discusses how the bed manager role could be supported through professional development. The authors note that the role is usually assigned to nurse managers, and could be both stressful and managerially complex. They question the appropriateness of calling these staff ‘bed managers’ or ‘patient flow managers’, noting that few of them manage beds or patient flows, and only have responsibility for a small part of the patient journey. The paper suggests that the critical success factor for the role is developing effective relationships with key individuals working at different stages of the patient journey.


This report highlights that the management of public sector organisations involves two competing cultures: a performance management culture, focused on building organisation capacity, and a performance reporting culture, focused on tracking quantitative achievement in order to meet externally applied goals and targets. The report notes that both cultures will exist in any organisation, and are often in contention, and cautions that undue attention on performance reporting creates a risk of gaming to artificially improve performance against external measures.

This paper provides a typology of gaming, based on an analysis of reports about the use of performance indicators (PIs) in public service organisations in the UK. The author notes that an over-reliance on PIs can result in “gaming” instead of performance management, and that excessive attention to measurement and reporting means that performance measures and indicators can become ends in themselves.


This paper discusses the introduction of systems-based care as a core content area within the curriculum for medical education in the US. In this curriculum, students learn how physicians effectively deliver and coordinate care, and are introduced to details of the organisation, funding, and delivery of the health care system.


This paper reviews literature about the use of acute hospital beds in Australia. The author suggests that within hospitals, patient throughput could be improved by outsourcing some surgical procedures to the private sector; using a hospital-wide approach to reforming care and patient flow to address access block and delayed discharge; separating unplanned and elective activity; increasing same-day and short stay admissions; and reducing ineffective or marginally effective interventions. Outside hospitals, he identifies significant potential for improvement through better access to rehabilitation, residential aged care and community support. He noted that 70% of acute hospital bed days were used by patients awaiting transfer to other forms of care.


This paper explores the underlying reasons for excessive queueing in the NHS, and the resultant backlogs and waiting times. The authors suggest that most queueing is not a result of insufficient capacity or under-resourcing, but results from a poor or absent management of the mismatch between variable demand and the variable scheduling of capacity.


This survey of Directors and Nurse Unit Managers of EDs in Melbourne assesses how service mix and clinical practices have changed between 1998 and 2002. The authors conclude that EDs have responded to access block issues by incorporating a range of hospital inpatient services into their work, with EDs now providing an expanded range of care.


This paper describes a situation in the NHS which will appear familiar to those involved with patient flow issues in Australia. In hospitals which are predominantly public-funded, the problems appear remarkably similar.
3 Patient flow theory

“Some patient flow variability is natural, such as the flow of patients admitted to a hospital unit through the ER [emergency room]. However, it is the artificial variability where there is room for improvement. Artificial variability is the result of mismanagement. It is not driven by the timing of patients’ illnesses but by the mismanagement of scheduling and allocating limited hospital resources”.

(Litvak, Vaswani, Long, & Prenney, 2010, p. 294 emphasis added)

“The more complex the problem the simpler the solution must be, or it will not work”.

(Attributed to Goldratt: Kerzner, 2006, p. 926)

This chapter aims to provide a theoretical context for discussions of patient flow in public hospitals by reviewing existing theories and models designed for understanding and achieving smooth flow. The chapter starts with a review of theories on flow drawn from fluid dynamics and examines their applicability to the behaviour of crowds, and by analogy, the movement of patients through hospitals. The chapter also presents evidence on the relationships between disrupted or interrupted patient flow and problems such as emergency department (ED) crowding and delayed patient discharge. The chapter then examines different theoretical perspectives of relevance to understanding patient flow. These perspectives relate to the formation of queues and their analysis; the nature of variability in different hospital activities; and systems thinking for conceptualising how multiple factors interact over time to impact on patient flow. The chapter also considers the applicability of techniques from industry used for process improvement and system transformation and how they may be used to investigate and address problems with patient flow. The chapter concludes by briefly considering the importance of data and data tools for effectively investigating, improving and managing patient flow in hospital settings.

3.1 Thinking about Flow and Patient Flow

The flow of patients through a busy hospital and the challenges that this presents may sometimes appear to be a unique and intractable problem that has to be addressed and attended to by staff each and every working day. But by taking a step back, and considering patient flow from the broader perspective of studies into ‘flow’ itself, it is possible to identify analogies that support the generation of new insights useful in hospital settings.

Philip Ball (2005) draws together many of these examples as a way of identifying analogous characteristics of flow in disparate settings. With a small extension of the arguments he presents, it is possible to identify similarities between these flow examples and the way in which patients flow through the healthcare system. A number of the examples and analogies which Ball discusses are introduced below to stimulate thinking about patient flow and its complexity.

The fluid dynamics analogy

From the perspective of fluid dynamics, flow refers to the movement of a liquid (or gas) through a conduit. Fluid mechanics (hydrodynamics) explores the way in which fluids move, and the way in which flow velocity, viscosity, density and temperature influence that movement. Steady flow will see a particular volume of liquid move through a channel in a set time. Widen the channel, and the same volume of liquid will move through it more slowly; or if the rate of flow is maintained, a larger volume of liquid will pass.

This relationship between channel size, fluid volume and flow rate holds true only within certain limits. If the flow rate is too high, or the channel becomes too narrow, the flow becomes disrupted. Eddies will form, and the flow becomes turbulent. Similarly, if there is a distortion in the channel (a widening, or a narrowing) smooth flow is interrupted (Ball, 2005). All of these flows and their disruption can be accurately modelled and predicted.

Although the analogy may not be immediately apparent, there are similarities between the flow of fluid through a conduit and the flow of people and animals through an environment. Smooth flow, with minimal disorder, occurs within a broad range of speeds of flow. Once the rate of flow exceeds a particular limit, flow becomes disordered and chaotic. Further increases in the rate of flow are not possible, and energy which is directed to increasing the rate of flow is absorbed by an increasing level of disorder. Determined efforts to increase the speed of flow beyond this rate limit have little or no positive effect, and may lead to diminished flow.
In the natural world the apparently highly coordinated and complex flows exhibited by flocks of birds in flight or fish in schools emerge from computer simulation on such swarming behaviours as actually requiring only a small number of parameters to accurately mimic, model or predict them.

Similarly, the way that people move in crowds displays similar characteristics. The behaviour of crowds moving down a corridor, crossing a street or exiting from a hall can be modelled accurately using relatively few parameters. For example, a stream of people walking along a straight corridor tend to exhibit smooth flow unless a part of the corridor widens and then narrows back to its original width. When this occurs the flow of people will become distorted as some individuals enter the widened area, and have trouble re-joining the steady stream of people when the corridor narrows again.

Similarly, if a large group of people exit from a room through a single small doorway they will tend to move through in a regular smooth pattern of one or two people at a time. However, if a fire breaks out at the back of the room, as panic spreads individuals will compete to get through the door first. As modelling and numerous tragic real-life examples highlight the result is that the total flow of people from the room will slow considerably, and may stop altogether if people are injured and fall in the doorway (Helbing, Farkas, Molnar, & Vicsek, 2002).

**Flow in Hospitals**

In considering the flow examples above in the context of public hospitals, it is possible to identify how parts of the health system that may have temporary excess capacity will tend to attract and retain patients, with some patients ending up located in that part of the system for longer than is necessary. Similarly, as evidenced from the NSW hospital site visits discussed above, intense pressure and (panicked) activity directed at moving patients through the hospital system can have the paradoxical effect of actually slowing down the progress of patients through to discharge.

Understanding flow from these perspectives may help to view actions and situations in a different light, and place these actions in the context of a dynamic higher order flow process. Clearly from the perspective of fluid mechanics, there are ways to increase the upper limit for smooth flow: increase the width of the conduit; remove barriers and even out the conduit; or ‘stream’ the fluid within the system (to create ‘laminar flow’). But similarly strategies are available to improve the efficiency with which patients move through a hospital. One obvious approach is to increase the system capacity by building a larger hospital, but this is an expensive and time-consuming undertaking, and is unlikely to be considered while more cost effective and easier to implement options are available. These options include reducing barriers to patient movement (through good discharge planning), improving the matching of available resources such as beds and staff to the patient load; and grouping together patients with similar requirements, and managing them in a consistent way.

Evidence supports the perspective that patient flow can be smoothed by:

- Segmenting different classes of activity;
- Standardising clinical and administrative processes;
- Identifying and removing bottlenecks in the system;
- Matching the throughput time of linked steps in the process; and
- Avoiding batch processing wherever that is feasible.

Much of the discussion about the challenges faced by the healthcare system continues to focus on the number of hospital beds, and the percentage occupancy of those beds. However, the efficiency and appropriateness with which beds are used for patient care is more important than how many beds there are, and how full they are.

Poulos, Magee, Bashford and Eagar (2011) looked at the appropriateness of the level of care provided in an Australian acute referral hospital for 696 episodes of care (7,189 bed days), and found that only 56% of the days of care for patients with stroke, hip fracture or joint replacement were at an acute level. Patients with other diagnoses received acute level care on only 33% of their days of stay. The authors identified that 45% of the inappropriate days that patients spent in acute care were due to delays in processes and scheduling.

If a conventional hospital suddenly doubled its bed capacity (and associated staffing) there would be a period during which bed availability was no longer an issue. But because the discharge process is commonly driven by the need to free up beds for newly arrived patients, it is likely that, within a few months the hospital would
again be full, with staff needing to hunt for beds to accommodate admissions from the emergency department (ED). US health services researcher Milton Roemer first articulated this principle, which is now referred to as ‘Roemer’s Law’, in 1959: “A built bed is a filled bed” (cite in Steen, 2008, p. 1).

It should be borne in mind that having surplus capacity in one part of the system can create as much disruption to smooth flow as constrained capacity in another part of the system. If one business unit of the hospital has a capacity much greater than the other business units it links with, patients will tend not to flow smoothly from one unit to the next; patients end up accumulating in the large units. This may partially explain flow issues from large EDs, or from surgical wards which hold more patients than the operating theatres can accommodate.

Overall, it is likely that the processes for balancing activity and managing patient flow have as much impact on hospital throughput as the size of the hospital system.

**Inflow/outflow**

Problems with patient flow in an acute hospital are usually most apparent in EDs, and significant attention has been given to addressing the problems associated with ED crowding, not least in Australia. At Flinders Medical Centre, a redesign of the way in which patients were streamed at the point of presentation led to significant performance improvements (Ben-Tovim et al., 2007, 2008; King, Ben-Tovim, & Bassham, 2006). Ieraci, Digiusto, Sonntag, Dann and Fox (2008) evaluated the impact of a complexity-based model of streaming emergency department flow in the ED at Liverpool Hospital. Patients were categorised as either high or low case complexity, rather than being managed in a single queue ordered by triage category. Low complexity cases were managed in a ‘fast track’ stream. Analysis of data collected over a six-month period showed reductions in ED waiting time and treatment time.

There is a possibility that EDs in Australia have become ‘victims of their own success’. EDs now draw in clinical work which was previously the responsibility of primary care providers, and are expected to undertake, or at least initiate, extensive diagnostic workups and therapeutic interventions before an admitted patient arrives in the ward. (*NSW Hospital site visits*, 2012).

ED crowding may result from a high proportion of presentations such as:

- People living in residential aged care where the facility has limited clinical cover;
- Patients with one or more chronic diseases who are being supported in the community, but lack the confidence to manage an exacerbation of their illness;
- Communities with limited general practice coverage, particularly out of hours; and
- Clinical services which recommend ED attendance as a back-up option when the client is unable to contact the service (ie. after 5pm and over weekends and public holidays).

Over the last 15 years, EDs have become bigger, better staffed, and deal with a larger proportion of early in-hospital care.

“The so-called “ED problem,” however, is actually a system problem. EDs do not exist in isolation, but are part of a system of care through which patients flow. Increasing capacity in the ED to accommodate more patients, a solution chosen by many hospitals, is like broadening only the large end of a funnel. Increasing input without facilitating a smooth exit (in this case, transfer to other hospital units) worsens the problem.” (Institute for Healthcare Improvement, 2003, p. 2)

These problems within the ED are quite visible, and many of them can be addressed in the short term or medium term. They are exacerbated by problems with outflow from the ED to hospital wards, and indeed, outflow problems may lead to ED crowding in the absence of precipitating factors. (Cameron, Joseph, & McCarthy, 2009) On the other hand, smooth, efficient outflow of admitted ED patients into the hospital is likely to have the effect of ‘pulling’ patients from the ED.

Cameron et al (2009) studied ways to address access block between emergency departments and hospitals in an Australian setting. The authors suggested three possible approaches. The first is to reduce emergency department input; the second is an increase in hospital capacity; and the third focuses on improving the exit of patients from hospital.

Queues of patients form in ED as patients wait to be seen (leading to full waiting rooms and ‘ramped’ ambulances), or wait for a ward bed (resulting in ED crowding). The queues of patients awaiting discharge from
hospital, on the other hand, are much less visible and less ‘noisy’, and receive less attention. While a significant part of the ED outflow problem results from wards which are too full to accept an ED admission as inflow, it is also apparent that part of the ward ‘access block’ problem is due to difficulties with ward outflow and discharge processes, planning and management.

A blocked or overflowing intake channel always appears more spectacular than a blocked exit channel, but it’s usually the blocked exit that needs attention first. In this context, it is useful to examine perspectives that relate to the formation of queues and their analysis, the nature of variability in different hospital activities, and systems thinking for conceptualising how multiple factors interact over time to impact on patient flow.

### Erlang queues

Agner Erlang was a Danish mathematician and engineer employed by the Copenhagen Telephone Company (KTAS). He developed his queuing theory in response to the challenge of assigning an appropriate number of telephone lines and manual operators (‘servers’) to deal with a given level of demand and an acceptable level of abandoned calls. His model, which is relatively simple, encapsulates a number of simplifying assumptions:

- There is a homogeneous service requirement;
- There is a single, homogeneous pool of servers;
- Service completion time is uncontrolled; and
- There is a single service queue.

With a large number of additional servers, there will almost never be a queue, but the excess server capacity cannot be stored, and is wasted. With fewer servers, some customers must wait to place their call (forming a queue). If there are too few servers, the queue grows, and continues to grow. Customers choose not to wait in the queue, and the telephone service loses the business of that call.

There are two notable characteristics of the way Erlang queues behave. Firstly, the likelihood of abandoned calls is non-linear: once a particular level of server utilisation is reached, the number of abandoned calls will increase geometrically. Secondly, dividing the pool of servers into a number of smaller pools will increase the likelihood of abandoned service attempts.

Erlang’s simplifying assumptions provide an appropriate framework for an initial analysis of queuing problems in healthcare. Patients can be viewed as callers, clinicians or staffed beds can be seen as servers, and an elective waiting list or a group of admitted ED patients in need of a bed represent a queue. Bagust, Place and Posnett (1999) made use of the Erlang queuing model to explore the relationship between hospital occupancy and the ability to admit a group of new patients. They developed a theoretical model of a hospital with a single pool of unspecialised beds, a single stream of random emergency admissions, and random discharges unaffected by bed occupancy. They found that if they gave their hypothetical hospital an average occupancy of 85%, there would be four occasions in the course of a year when a new patient could not be admitted immediately. The popular notion of a definitive ‘safe occupancy’ target of 85% arose largely from a misinterpretation (or misunderstanding) of this aspect of their work.

Palvannan and Teow (2010) highlight the benefits of queuing analysis for healthcare managers and clinicians, and discuss patient queues and waiting times in the context of queuing theory. They explore the relationships between service capacity and patient demand, and between system utilisation and waiting time. In their discussion, they emphasise four relationships which may at first appear counter-intuitive:

1. When there is variation, queues are formed even when capacity is greater than demand;
2. A short wait time requires low system utilisation and a high cost structure;
3. Variation in demand and service rate has a significant effect on patient waiting time; and
4. Size and partitioning affect patient waiting time.

Two critical consequences arise from these observations: managing demand to minimise variability can result in significant reductions in queueing and waiting (and hence in improved patient flow), and subdividing services and bed pools into smaller units (“carving out” special resources) has the result of increasing the frequency with which denials of service will occur.
Variability in Patient Flow: Natural and Artificial

There is a commonly held belief that variability in levels of hospital activity is largely the result of unpredictable emergency presentations. However, even though emergency activity is, by its very nature, random and uncontrolled, the degree of natural variability which it displays is not the largest source of variation within admitted care. Much of the variability is artificial, introduced into the system by decisions about when to admit elective cases, how many to admit and what type, and when and how to discharge patients when their care is complete.

Emergency admission activity may be uncontrolled, but it occurs with a largely predictable degree of variability. Elective (‘planned’) admission activity is almost entirely driven by decisions which the hospital makes, and can be highly variable within a day, across the week, and during the year. Discharge activity, which frees up beds for new patient admissions, is entirely the result of decisions made within the hospital, and is also subject to a high degree of variability.

Litvak, Vaswani, Long and Prenney emphasise the importance of variability in health service delivery as a cause of flow disruptions:

“Variability, particularly in the flow of patients through the healthcare delivery process, impedes cost reduction and improvement of patient safety and quality of care. Some patient flow variability is natural, such as the flow of patients admitted to a hospital unit through the [emergency room (ER)]. However, it is the artificial variability where there is room for improvement.

“Artificial variability is the result of mismanagement. It is not driven by the timing of patients’ illnesses but by the mismanagement of scheduling and allocating limited hospital resources. Furthermore, it is simultaneously neither random nor predictable. The flow of elective admissions (such as elective surgical, catheterization lab, oncology admissions) to a hospital is just such an example of artificial variability. In fact, it is often comparable if not greater than the natural variability in ER admissions. While the most visible effects of artificial flow variability on hospital function are in ER overcrowding, boarding, and diversion, this unnecessary variation drives problems in quality, capacity, and cost.” (Litvak et al., 2010, p. 294)

This re-iterates the point that senior managers should take on the role within the hospital to analyse and understand the variability inherent in emergency admissions, elective admissions, and discharges. It is they who must decide whether the degree of variability in controlled activity is acceptable, and to intervene appropriately.

Systems thinking

Systems thinking provides a method for exploring the interaction between interdependent processes and actions within a complex and chaotic environment. It supports analysing a component in the context of the whole system of which it is a part.

The traditional scientific reductionist approach to analysing a problem is to isolate the phenomenon of interest as much as is possible from its surrounding environment, introduce controlled changes, and observe the resultant behaviour. That method is not practical when analysing complex situations; a more holistic approach is needed. In contrast the systems thinking approach relies on an understanding of the way in which the various parts of a system are interrelated, and have an influence on each other.

From the perspective of systems thinking, it is not possible to successfully implement desired changes in a complex interdependent system by implementing a single change in an isolated component part. Such a narrowly focused intervention is likely to result in unintended consequences. Communication about change across the whole organisation is necessary in order to limit unintended consequences, and minimise the silo effect. Gharajedaghi (1999) identifies three categories of system: mindless (mechanistic) systems, unminded (biological) systems, and multi-minded (sociocultural) systems: a hospital is clearly an example of a multi-minded system.

The daily operation of a hospital is a dynamic and complex enterprise. It can be difficult for a manager to obtain an overview of today’s activity; it is particularly hard to get that overview from static measures such as hospital occupancy, ward occupancy, or the number of admissions or discharges. Measures such as these are likely to
become inaccurate even as they are being collated although they may provide a useful guide to recent activity levels.

Rechel, Wright, Barlow and McKee (2010) reviewed approaches to hospital capacity planning in the light of a study of capital investment in healthcare by the European Observatory on Health Systems and Policies and the European Health Property Network. This project considered the literature on core themes, including the planning of capacity, and translating services into assets. The project also analysed case studies from across Europe (including hospitals in Finland, Germany, the Netherlands, Norway, Poland, Spain and Sweden, and regional planning in Tuscany and Northern Ireland).

The authors note that:

“Traditionally, hospitals were designed around specialties and departments rather than around the needs of patients. Patients often spend most of their time in hospitals waiting for something to happen, with large areas provided for this inactivity. The situation is often exacerbated by the inefficient management of admission and discharge."

“In the United Kingdom of Great Britain and Northern Ireland, a patient admitted on a Friday night may have a length of stay that is 25% longer than a patient admitted on a Tuesday. To accommodate this phenomenon, beds and wards in effect become holding areas for “work in progress” and have, in the past, been planned accordingly. A consequence is that in many hospitals the flow of patients is inefficient, dislocated and disorganized.” (Rechel et al., 2010, p. 632)

**Tipping points**

The relationship between increases in workload and impaired patient flow is not linear. Up to a particular level of activity, increasing demand and workload will be accommodated with reasonable increases in effort and activity. However, there will be a level of activity at which the existing system can no longer cope with further increases in workload.

This is what Gladwell (2002) has referred to as a ‘tipping point’. The effects become apparent in a number of ways. Bagust, Place and Posnett (1999) used a theoretical model of an acute care hospital to explore the relationship between bed occupancy and the risk of a delayed admission. They showed that as occupancy levels increased beyond a ‘tipping point’, delayed admissions became increasingly likely. Similarly, those working in EDs recognise that there are limits to the ability of staff and systems to cope with increasing demand; there is a point at which additional increases in demand rapidly start to reduce the productivity of the department (Sinnott, 2004).

There are a number of aspects of the tipping point behaviour of a system which should be borne in mind:

1. The tipping point activity level will not be the same for every hospital or service; the way in which services are organised, the ‘carving out’ of resources for restricted use, and the characteristics of local demand and activity levels can all change the tipping point;
2. The tipping point will not always be the same within a particular hospital; increased variability in demand and service level will lower the critical activity level;
3. A hospital is not a simple system; there will be multiple tipping points in related or interdependent parts of the organisation, which may result in cascading effects which impair patient flow.

**3.2 Reflecting on Industry Techniques for Process Improvement and System Transformation**

This section of the chapter examines the applicability of techniques from industry used for process improvement and system transformation and how they may be used to investigate and address problems with patient flow.

Young et al (2004) discuss the application of industrial techniques to the challenge of improving processes in healthcare. They consider three techniques in some detail: Lean, the Theory of Constraints, and Six Sigma. Lean, which was developed within the Toyota production system, is focused on the elimination of waste and the introduction and maintenance of smooth production processes (“flow”) in manufacturing. Goldratt’s Theory of Constraints arose from the simple idea that a chain is only as strong as its weakest link. In any process, there will be a step which is slower than the others, making it a bottleneck for the overall system. Address that bottleneck,
and the throughput of the process will increase. The six sigma methodology was developed by Motorola in response to a need for an improved approach to quality improvement in the manufacture of complex products with a large number of components. Each of these approaches to process improvement in manufacturing has become a management system used for transforming organisational cultures in a number of sectors including healthcare.

Lean

The development of the Lean method within Toyota involved a change from traditional ‘batch and queue’ processes to ‘just in time’ production (moving towards an ideal with a batch size of 1). The concept of ‘pull’ within Lean means that nothing is produced until it is needed (at a later stage in the system). This concept of ‘pull’ should not be confused with the concept used in hospitals of a ‘ward pull’, which involves a patient being retrieved from ED by a ward, rather than being ‘pushed’ to the ward by the ED. The underlying principle of Lean is to understand the value to the customer of the overall product. Each step in the production system is understood in terms of the contribution which it makes to that customer value. Process steps which do not add value for the customer are considered as candidates for either elimination or redesign. Lean also seeks to reduce variability, both in the product itself, and in the process by which the product is created (for example, in the time taken for a particular process step).

Three categories of waste are identified within the Toyota production system. The first is poor organisation of the production system by management (‘muri’); the second is inappropriate scheduling of production activity (‘mura’); and the third is those aspects of waste which arise from flawed output (‘muda’). The Lean approach originally identified seven types of waste which could arise from flawed output (muda): Transport; Inventory; Motion; Waiting; Overproduction; Over-processing and Defects. The section which follows provides a number of examples of the seven wastes in the context of healthcare and hospitals (Loh, 2010; NSW Hospital site visits, 2012; Z. Radnor, 2011; Weinstock, 2008):

Transport
- Moving medical records between locations for different services during a single patient visit;
- Holding equipment in a central store, instead of close to where it is used;

Inventory
- Keeping a surplus of supplies on hand. Instead, determine how much of an item is needed during a set time period and how much is needed in reserve, and keep only that amount on hand;
- Waiting lists;

Motion
- A patient service officer goes to a ward to clean a bed, but the nurses haven’t had time to strip it, so she goes away again;
- A doctor walking between wards to find their patient;
- A nurse looking for case notes;

Waiting
- An admitted patient waits in a hospital bed for the ‘next step’ in their care. (This could also be viewed as an example of ‘Inventory’ – keeping the patient in the bed can be seen as the storage of ‘work in progress’);
- A surgeon waiting in theatre for a mobile x-ray to be taken;
- Asking patients to arrive too early;

Overproduction
- Keeping investigation slots free ‘just in case’;
- Routine daily chest x-rays on ICU patients, regardless of clinical indication;
- Repeated dilation of a patient’s eye prior to cataract surgery;

Over-processing
- Providing allied health services to address a pre-existing issue not related to the cause for admission can extend patient stay, and delay discharge;
• Asking patients repeatedly for the same details;

Defects
• Readmission because of a ‘failed discharge’;
• Information which is incomplete, missing, or incorrect;
• Having equipment which is poorly maintained, and breaks down;
• Repeating a blood test because the first sample was mislabelled, or the original result can’t be found;

Lean can be viewed (and applied) either as a set of tools which can be used to identify and eliminate waste within a system, or as a technique for focusing on the ‘flow’ of work, and eliminating uneveness within the production system. When properly applied, either approach can result in similar system improvements, although it should be noted that one criticism of the way that the Lean approach has been applied in practice is the over-reliance on the application of Lean tools, at the expense of Lean thinking. (Zoe Radnor & Walley, 2008)

De Souza (2009) reviewed the literature on the application of Lean techniques in healthcare, and examined more than 90 papers on the topic. He noted that there were two intrinsic features of Lean – staff empowerment and gradual, continuous improvement – which had made it more adaptable to healthcare settings. He further noted that the ability of Lean to deliver sustainable results had aided its acceptance. De Souza grouped the theoretical publications as either speculative or methodological, while the case study papers addressed issues which were primarily manufacturing-like, about management and support, patient flow related, or organisational. The reference section of de Souza’s paper lists the sources which were analysed for the review.

Young and McClean (2009) discuss the context of Lean-based improvements in healthcare from the perspectives of evidence, value and metrics. They note that the level of evidence expected (and generated) in the field of improvement is of a significantly lower standard than that expected in the clinical domain. They further note that the concept of added value which is inherent in Lean thinking may be less straightforward in healthcare than in other enterprises. The value which a particular service or intervention offers to a patient may be clinical (resulting in improved wellbeing), operational (involving a cost to the patient, payer or hospital) or experiential (involving a sense of having received a good level of service). There are no convenient mechanisms for comparing these three differing aspects of value (for example, in trading an extra day of stay for a slightly better clinical outcome). Finally, they observe that, while metrics are an essential part of determining whether a particular improvement activity has provided benefit, they may also lead to ‘gaming’ within an organisation to improve performance measures by indirect means.

Theory of Constraints
Burton-Houle (2001) discusses the thinking processes involved in the application of the Theory of Constraints to organisational change. He describes Goldratt’s Theory of Constraints (ToC) as an overarching philosophy which is usually applied to managing and improving an organisation. It provides tools (‘thinking processes’) for problem solving and decision-making. ToC should be applied in order to logically and systematically answer three questions about the process to be improved:

• What to change?
• What to change to?
• How to cause the change?

The goal of ToC is the achievement of system improvement by increasing throughput, and reducing inventory and operating expenses. This is realised by following five focusing steps:

• Identifying the system’s constraint;
• Deciding how to exploit that constraint;
• Subordinating everything else to that decision;
• Elevating the system’s constraint; and then,
• If the previous steps have removed the constraint, going back to the first step.

It should be noted that, if the process has eliminated the original constraint, then another step in the process has become a constraint. The application of this theory carries with it an implied question: “Where in the system do you want your constraint?” Young et al (2004) consider this implication of ToC in a hospital context:
“An interesting strategic perspective is that there will always be a bottleneck; the decision is where you want it. The idea of designing a system with the bottleneck placed where it can best be managed or responded to is powerful. Another perspective is that anything that increases throughput at the bottleneck, almost without regard to cost, adds value to the system so long as it is safe.” (Young et al., 2004, p. 163)

**Six Sigma**
The six sigma approach to managing quality, developed by Motorola in the late 1970s, relies on a careful definition of the customer’s requirements, and uses statistical analysis to assess quantifiable results and establish quality goals. Application of six sigma in practice relies on good data, clearly defined outcomes, and a clear idea of what is meant by a defective product. Those requirements can make its application problematic in some areas of healthcare. Six sigma entails a structured methodology, and uses a five step process referred to as ‘DMAIC’ (define, measure, analyse, improve, control) to reduce variation in activity (Esain, Angel, & Robertson, 2006). One aspect of six sigma which has been found to have relevance in healthcare is its use of a systematic process to identify an error, and then act to reduce or eliminate that error.

**A Caveat for Healthcare Systems**
There are lingering international concerns, particularly among clinical staff, about the applicability of these techniques in a hospital setting. Young et al (2004) note that the value of the techniques in healthcare is hotly debated. Morton and Cornwell (2009) identify a common objection: healthcare is different from airlines or vehicle manufacturers, and as a consequence, it is inappropriate to blindly apply industrial management techniques in hospitals.

Pandit, Pandit and Reynard (2010) argue against a strict (and possibly unrealistic) application of Lean-style standardisation, suggesting that such an approach would run counter to the inherent variability between patients. The authors suggest that, in the context of surgical activity, some degree of wasted capacity is necessary in order to cope with variations in demand.

Similar reservations have been expressed in Australia. Winch and Henderson (2009) caution against the unthinking application of industrial re-engineering to clinical care. They characterise Lean thinking as:

“...highly stylised and simplistic recipe for successful production [which] forms a ‘narrow managerial rationality’ that has been accepted somewhat uncritically, without due consideration or debate, in an environment that is experiencing real difficulties in providing the quality of care demanded by patients and staff.” (Winch & Henderson, 2009, p. 28)

Their description of Lean thinking as a “...highly stylised and simplistic recipe...” suggests that much of the authors’ reticence about the use of Lean in healthcare results from an oversimplified (‘straw-man’) view of how these tools are best applied in practice.

Young et al (2004) conclude that each of the three techniques (Lean, Theory of Constraints and six sigma) relies on a concept of production as a complex interaction of multiple activities which need to be coordinated and balanced. They further note that each of the approaches requires strong leadership, the use of repeatable algorithmic approaches to problem solving, and relies on the active involvement of people in all parts of the system. They conclude that the application of these techniques involves iterative, continuous activities, rather than ‘one off’ quick fixes, and are likely to result in incremental, rather than immediate improvements.

**3.3 Understanding Patient Flow: Using Data for Improvement**
The final section of this chapter briefly considers the importance of data and data tools for effectively investigating, improving and managing patient flow in hospital settings.

Initiatives to improve patient flow are most likely to be successful when they are based on data, rather than instinct, intuition, wisdom, experience or special knowledge. In the absence of one or more objective measures of the problem condition, there will be no way to evaluate the success (or lack of success) resulting from the intervention.
In reality, staff perceptions about causes of interrupted patient flow can be misleading. Chan et al (2008) compared staff perceptions of constraints to patient flow in an emergency department with data about the reasons for patient delays which were collected in real time over a period of 5 weeks as part of a study into patient flow. The observed causes of delay did not correlate well with overall staff perceptions about the causes of delayed patient flow.

The quality of the data to be analysed will depend on the size of the impact for the problem that is being addressed. If the issue involves a large, measurable effect, plotting ‘dirty’ data on a simple run chart might be adequate to identify a problem and measure the impact of the designed solution. For other problems it will be necessary to improve the quality of data in the initial stages, and to apply more sophisticated statistical techniques for the analysis. Data cleansing might require offline editing of the data to match reliable hard copy records, dealing with data entry issues, or introducing a new collection method.

Using a clear and understandable approach for the analysis and presentation of data can be more helpful than sophisticated analysis. Balestracci (2006a) cautions against over-interpretation and misuses of data and states:

“...improvement efforts [may] flounder when:

• results are presented in aggregated row and column formats complete with variances and rankings
• perceived trends are acted upon to reward and punish
• labels such as ‘above average’ and ‘below average’ get attached to individuals or institutions
• stakeholders are ‘outraged’ by certain results and impose even ‘tougher’ standards.

“These are very well-meaning strategies that are simple, obvious... and wrong! They will mislead analysis and interpretation... and insidiously cloud decisions every day in virtually every work environment.” (Balestracci, 2006a, p. 49)

He suggests that gaining an understanding of variation is of greater importance than the application of specific techniques:

“Crude measures of the right things are better than precise measures of the wrong things – as long as it’s ‘consistently inconsistent’ and defined in a way so that all will get the same number, you will benefit from the elegant simplicity of the statistical techniques inherent in quality improvement.” (Balestracci, 2006a, p. 51)

Balestracci also provides useful cautionary advice about the selection and collection of data for analysis:

“There are three questions that should become a part of every quality professional’s vocabulary whenever faced with a set of data for the first time:

1. how were the data defined and collected... and were they collected specifically for the current purpose?
2. were the systems that produced these data stable?
3. were the analyses appropriate, given the way the data were collected and the stability state of the systems?” (Balestracci, 2006b, p. 113)

**PDSA**

The Plan-Do-Study-Act (PDSA) cycle (Berwick, 1996) provides a structured approach to making a change within a system. The process starts with three questions: What are we trying to accomplish? How will we know that a change is an improvement? and What change can we make that will result in an improvement? Once those questions are resolved, it is possible to plan the intended change, implement that change, assess its impact, and then either make the change permanent (if the intervention was successful) or reverse the change and restore the original state (if the desired results were not achieved).

For major system change and clinical redesign the PDSA cycle will be used within a well structured formal initiative (for example in NSW using the AIM methodology). The PDSA approach can also be used effectively for introducing small changes within a work area.
Charting

It can be difficult to easily identify the degree of variation within a system or process, and to decide whether an observed variation is natural (the result of random variability) or artificial (introduced by an external factor). That uncertainty can then make it hard to decide whether a change in that system or process has resulted in a measurable effect, and whether the effect was in the desired direction.

Statistical process control (SPC) charts provide a way of visualising a run of data points, and highlighting whether the variability within that data is natural or artificial. Statistical calculations are used to establish upper and lower control limits (UCL and LCL) which appear as horizontal lines on the chart. A set of decision criteria (Shewhart rules) can then be used to decide whether a significant change has occurred (Koutras, Bersimis, & Maravelakis, 2007). Thor et al (2007) conducted a systematic review of the use of statistical process control in healthcare quality improvement. The review identified and categorised a range of benefits, limitations, barriers and facilitators to the use of SPC, concluding that it provides a versatile tool for managing changes in healthcare for the benefit of patients.

A refinement of the standard SPC approach adds the cumulative change (positive or negative) between successive data points, and plots that cumulative sum (cusum) on a control chart. Burns, Bennett, Myers, & Ward (2005) describe the benefits of using cusum analysis to highlight trends in performance which are less apparent in conventional time-series statistical process control charts.

Another approach, which can help to provide a useful graph of ‘noisy’ data, plots the average of the last few data points, rather than each individual data point. The same number of data points are averaged each time. The ‘moving average’ plot smooths out extreme high and low points, and results in a smoother line on the chart. (Mackay, 2004) MatLab® software is commonly used within NSW Health for the visualisation of complex data as usable chart plots.

Workflow diagrams

It may be difficult to come to an understanding of a complex work process, or the way in which patients move through departments and wards within a hospital. This can particularly be the case when the activities of interest take place in a number of different departments, and no single business unit has a clear view of all parts of the process. Collaboration between all of the relevant business units to draw a flow diagram can help to clarify all of the steps, processes, communications, decisions and individuals involved. There are a number of diagramming techniques that can be used for this purpose.

Flowcharts have their origin in computer science, and were originally used to map the sequence of steps to be followed in a computer program. They are now commonly used to map the steps which are followed in completing a business process (and a patient’s journey from admission to discharge can be viewed as a business process). By convention, specific shapes are used for the start and end of a process, for decision steps, for the collection of information, and for links between parts of the diagram which are drawn on multiple pages. Arrows are used to indicate the flow of work from one step to the next.

Value stream mapping (VSM) is a technique which is used as part of the Lean approach. It maps the steps, delays, materials, and information flows during the process, and in a healthcare setting can also map the movement of the patient. VSM has a particular focus on the addition of value (for the customer) during the process, and should highlight steps which add no value or represent some form of waste.

Although there are software tools available for drawing charts, there are benefits in actively collaborating with others involved in the process to hand-draw a flowchart, on butchers paper, on a whiteboard, or with ‘sticky notes’, during a discussion of the process. Trebble, Hansi, Hydes, Smith and Baker (2010) describe a practical framework for using process mapping to reconfigure the journey of patients in hospital from the perspective of a patient.

Modelling and simulation

Modelling involves the analysis of historical activity data to establish mathematical relationships between input (cause) data and output (effects) data. This relationship is then used to predict the likely impact on hospital workload of a given set of initial circumstances. Simulation is a related approach which applies the model using multiple input scenarios in order to evaluate options for changing the system described by the model. A number
of modelling and simulation techniques have been applied to the task of predicting the activity of hospitals (Fletcher & Worthington, 2009; Mackay & Lee, 2005; Ngo Cong, Di Mascolo, & Gouin, 2007) and activity within hospital departments (Costa et al., 2003; el-Darzi, Vasilakis, Chausalet, & Millard, 1998; Ercole, Menon, & O’Donnell, 2009). Harrison, Shafer and Mackay (2005), for example, applied a stochastic version of the Harrison-Millard multistage model of patient flow to one year’s data from a hospital in Adelaide. The modelled data closely matched the mean, standard deviation and correlation of the occupancy data. The authors noted that the larger divisions were capable of more efficient occupancy levels than smaller ones; that seasonal variations were more significant than daily variations; and that variable discharge rates had more impact on overflows than variable admission rates.

Models tend to become increasingly sophisticated as they are extended and modified to more accurately reflect the behaviour of real world systems. Additional sophistication is likely to require more detailed historical data, and more extensive details about the current state of the system. Depending on the way in which they are presented, more complex models can also become harder to apply in a hospital setting in real time.

Within NSW Health, the Patient Flow Portal includes a module, the Demand and Capacity Predictive Tool, which provides a practical approach to modelling, using previously entered data where possible. The Predictive Tool models likely hospital activity over the next 14 days. The Predictive Tool is discussed in more detail later in this Section.

It should be noted that predictions derived from modelling and simulation may appear inaccurate if decisive actions have already been taken in response to those activity predictions.

**NSW Patient Flow Portal**

NSW hospitals have access to a range of tools designed to help improve patient flow. These tools are contained within the Patient Flow Portal, and use a combination of data entered from three sources:

- Historical activity data extracted from NSW Health’s Health Information Exchange;
- Information obtained from the hospital’s patient administration system; and
- Information which is entered directly into the Portal.

This sub-section provides an overview of these tools, but does not attempt to give a detailed explanation of their use in practice.

**Hospital dashboard**

The Hospital Dashboard module of the Patient Flow Portal uses live hospital activity information to provide a summary view of all parts of the Patient Flow Portal. The data which is displayed includes a prediction of the current day’s bed state, ward occupancy, admissions and discharges, admitted patients in ED and ED patients who have waited more than 4 hours, a bar chart of hourly bed state for the last 24 hours, the number of patients whose EDD is today, and the number of patients with an open ‘Waiting for What’ reason and the sum of their accumulated bed days. The information provided by the dashboard is intended to be a resource to support decision making for short term day to day activity management.

**Bed Board**

The Bed Board uses real time information to provide quick access to details of bed availability, provides an overview of bed occupancy, facilitates the transfer process and provides access to a suite of reports. Occupancy can be viewed by ward for each hospital, for a Health Service or as a state-wide view. Filters allow the view to be tailored for particular clinical specialties, as well as showing lengths of stay across an entire facility.

The Transfers module allows users to request a transfer between wards within a hospital and monitor and update the status online, request, monitor and update transfers of individual patients between facilities, or request a Direct Ward Admission to a hospital.

The Bed Management Module allows users in each hospital to open, close or reserve a bed, or schedule the opening and closing of beds.
Demand and Capacity Predictive Tool (Predictive tool)

The Demand and Capacity Predictive Tool provides a fourteen day view of the predicted capacity and demand for a hospital as a way of helping with the planning of future activity. The focus is on beds which are ‘ED accessible’, and thus able to accommodate an ED patient for an overnight stay; same day, maternity and boarder beds are omitted. The Predictive Tool displays a day as Green if the hospital has adequate bed capacity; Orange if there is limited capacity; and Red if there is a mismatch between demand and capacity (that is, fewer beds available than are expected to be required).

Waiting for what

Many of the waiting periods within a protracted admission episode can be the result of uncertainty about the nature of the next step in the patient’s care pathway, and delays in taking or arranging that step. The ‘Waiting for What’ functionality within the Patient Flow Portal allows unacceptable delays in the next significant step (next action) in a patient’s episode of care to be identified and recorded. This ‘Waiting for What’ information, which is displayed on the bedboard, can help to reduce unnecessary delays in the care of an individual patient. Considered in aggregate, this information can also provide pointers to particular components of care which commonly cause delays in patient flow.

Estimated date of discharge

Recording an estimated date of discharge (EDD) for a patient provides better clarity for all staff, and for the patient, about the intended length of the hospital stay. The EDD is an estimate, not a specification, of the likely length of stay. The value can be modified whenever circumstances require it, and in ideal circumstances the EDD for patients whose care is complex will be reviewed each day by the multidisciplinary care team, and amended if necessary. The EDD provides a roadmap for the patient’s episode of care, and can provide an indication of how soon the bed can be made available for another patient. As a general observation, estimating the likely date of discharge is easier for surgical patients than for those with a medical admission; the estimate is likely to be less precise for longer stays, but should become more reliable closer to the time of discharge.

3.4 Key readings for this chapter


This paper describes the use of the Erlang queueing model to explore the relationship between hospital occupancy and the ability to admit a group of new patients. The authors modelled a theoretical hospital with a single pool of unspecialised beds, a single stream of random emergency admissions, and random discharges unaffected by bed occupancy. They found that if they gave their hypothetical hospital an average occupancy of 85%, there would be four occasions in the course of a year when a new patient could not be admitted immediately. The popular notion of a definitive ‘safe occupancy’ target of 85% arose largely from a misinterpretation (or misunderstanding) of this aspect their work.


This book explores the notion of flow in a number of contexts, and draws together a number of examples as a way of identifying analogous characteristics of flow in disparate settings.


These three papers describe initiatives at Flinders Medical Centre to redesign the way in which patients were streamed at the point of presentation, leading to significant performance improvements.


Cameron, P. A., Joseph, A. P., & McCarthy, S. M. (2009). Access block can be managed. *Med J Aust*, 190(7), 369–74. This paper explores access block between emergency departments and hospitals in an Australian setting. They note that problems with outflow from ED to hospital wards lead to ED crowding in the absence of precipitating factors. They suggest solutions in three groups. The first approach is to reduce emergency department input; the second is an increase in hospital capacity; and third focuses on improving the exit of patients from hospital.


Describes the use of statistical process control charts and Shewhart rules.


This book chapter reviews the importance of variability in health service delivery as a cause of flow disruptions.

Morton, A., & Cornwell, J. (2009). What’s the difference between a hospital and a bottling factory? *BMJ, 339*(jul20 1), b2727–b2727. doi:10.1136/bmj.b2727

This paper explores misgivings about the blind application of industrial techniques to the management of healthcare processes.


The authors highlight the benefits of queueing analysis for healthcare managers and clinicians, and discuss patient queues and waiting times in the context of queueing theory. They explore the relationships between service capacity and patient demand, and between system utilisation and waiting time.


This paper argues against a strict (and possibly unrealistic) application of Lean-style standardisation, and suggests that such an approach would run counter to the inherent variability between patients. The authors suggest that, in the context of surgical activity, some degree of wasted capacity is necessary in order to cope with variations in demand.


This paper evaluates the appropriateness of the level of care provided in an Australian acute referral hospital for 696 episodes of care (7,189 bed days), and found that only 56% of the days of care for patients with stroke, hip fracture or joint replacement were at an acute level. Patients with other diagnoses received acute level care on only 33% of their days of stay. The authors identified that 45% of the inappropriate days that patients spent in acute care were due to delays in processes and scheduling.


This evaluation of the use of Lean within the NHS is critical of an overreliance on the application of Lean tools, at the expense of Lean thinking.


A review of approaches to hospital capacity planning in the light of a study of capital investment in healthcare by the European Observatory on Health Systems and Policies and the European Health Property Network. This project considered the literature on core themes, including the planning of capacity, and translating services into assets.


This paper emphasises that there is a point at which additional increases in demand in an ED can rapidly start to reduce the productivity of the department.
This systematic review of the use of statistical process control (SPC) in healthcare quality improvement identifies and categorises a range of benefits, limitations, barriers and facilitators to its use. The authors conclude that SPC provides a versatile tool for managing changes in healthcare for the benefit of patients.

The authors caution against the unthinking application of industrial re-engineering to clinical care. However, it is likely that much of their concern about the use of Lean techniques is the result of an oversimplified (‘straw-man’) view of how these tools might be applied in practice.

The authors discuss the context of Lean-based improvements in healthcare from the perspectives of evidence, value and metrics. They note that the level of evidence expected (and generated) in the field of improvement is of a significantly lower standard than that expected in the clinical domain. They further note that the concept of added value which is inherent in Lean thinking may be less straightforward in healthcare than in other enterprises.

This paper discusses the application of industrial techniques to the challenge of improving processes in healthcare; it considers three techniques in some detail: Lean, the theory of Constraints, and six sigma.
4 Smooth flow and hospital operations

“The decentralized and fragmented nature of the health care delivery system (some would say ‘nonsystem’) … contributes to unsafe conditions for patients, and serves as an impediment to efforts to improve safety. Even within hospitals and large medical groups, there are rigidly-defined areas of specialization and influence. For example, when patients see multiple providers in different settings, none of whom have access to complete information, it is easier for something to go wrong than when care is better coordinated. At the same time, the provision of care to patients by a collection of loosely affiliated organizations and providers makes it difficult to implement improved clinical information systems capable of providing timely access to complete patient information. Unsafe care is one of the prices we pay for not having organized systems of care with clear lines of accountability.”

(Committee on Quality of Health Care in America & Institute of Medicine, 2000, p. 3)

This chapter presents evidence on four key elements in the patient flow systems (PFS) framework. For each element evidence is considered in relation to strategic, operational and tactical aspects of smooth flow in Hospital Operations. This chapter specifically examines the following key elements: Variation Management; Demand and Capacity Planning; Demand Escalation; and Governance (with a focus on the role of executive management). The selection and focus on these four elements aligns directly with other resources provided as part of the broader collaborative project on patient flow education including the training manual on smooth patient flow.

In order to ensure that smooth patient flow happens by default it is necessary to implement smooth flow by design. The preferred process for each step of the patient journey must be clear to all those involved in providing care, and must become either the easiest option, or the only option. Each of the four elements discussed below are examined from strategic, tactical and operational perspectives that combined provide a systems-based approach to improving patient flow in hospital operations:

**Variation management** ensures that, despite some variability being inevitable, sources of unnecessary variation are identified and eliminated as far as is practicable.

**Demand and capacity planning** ensures that the demand for hospital services is understood, and predicted as much as is possible. If increases (or decreases) in demand are predicted in the near future, the hospital’s capacity should be adjusted to deal with that anticipated change.

**Demand escalation** enables a hospital to respond in a managed way when unforeseen circumstances lead to a level of demand which tests the hospital’s capacity. A sequence of planned actions can then be taken to protect capacity, and restore normal operations once the peak in demand has passed.

**Governance** from an executive viewpoint ensures that these actions in response to the challenges of implementing smooth flow practice, and dealing with increases in workload, are coordinated

4.1 Variation management

Variation management seeks to smooth out peaks and troughs in the hospital’s daily, weekly and seasonal workload in order to distribute the load more evenly over time. This means that workload should be monitored and adjusted to make the best use of available capacity. The key to managing variation is to minimise common cause variation as much as possible, and to remove special cause variation altogether. (NSW Health, 2012)

4.1.1 Summary of evidence

An examination of the evidence in relation to variation management can be divided into two major parts. One is focused on the issues of demand, capacity and activity, and the other on the characteristics and cycles of variability per se (i.e. natural and artificial).

**Demand, capacity and activity**

Three factors combine to determine the way in which patients flow through a healthcare system:
Demand: the rate at which patients present for service or treatment;

Capacity: the potential for a service and its staff to provide a service or treatment (determined by available beds, clinic slots, ultrasound appointments and so on); and

Activity: the actual number of services provided or patients treated.

Crowding in hospitals and hospital clinics and queues or waiting lists are often viewed as a result of a demand which exceeds the system’s capacity. If that were true, patient crowds in the emergency department (ED), queues and waiting lists would grow, and continue to grow. In most cases, the patients in the queue are dealt with, and patients are added to waiting lists and removed from them at roughly the same rate. A significant part of the queueing and waiting problem is a result of a mismatch between the timing of the demand (patient presentations) and capacity (the number of slots or beds available at the time) (Silvester et al., 2004).

Unused capacity cannot be stored for later use. An empty clinic slot, or a bed unoccupied for a day are of no use to a patient tomorrow; they represent unused (and wasted) system capacity. Improving the match between the timing of demand and the scheduling of capacity can reduce (and in some cases eliminate) queues and waiting lists.

Pandit, Pandit and Reynard (2010) describe the impact of a mismatch between demand and capacity in the context of surgical activity, and suggest that some excess capacity might be required to effectively manage a variable demand. In practice, a waiting list of patients who are ready for surgery can act as a buffer to avoid wasted capacity when new demand is lower than usual.

**Variability (Natural and artificial)**

As noted in Section 3.1 above, the nature of variability is not always well understood. The presence of peaks and troughs in hospital activity is often attributed to the irregular nature of patient arrivals at the ED. However, although ED workload is variable, it is not altogether unpredictable. While the workload is subject to random natural variation, there are discernable patterns within it which allow some prediction of future activity.

An equally significant source of variability in hospital workloads is the range of decisions which hospitals make about how to manage workload: when to admit elective cases; what time of day to discharge patients whose care is complete; what day of the week to discharge them; and whether to process clinical work bit by bit, or process it in larger batches.

Discharge behaviour in particular can contribute significantly to artificial variability. Accepted patterns of discharge behaviour introduce peaks and troughs in workload which may disrupt smooth patient flow. Wong et al (2009) used a retrospective analysis of inpatient data in a general internal medicine unit in a Canadian hospital to assess the impact of a range of administrative and organisational factors on patient discharge rates. Data for 5,088 patients, which included diagnosis, length of stay, patient disposition, attending physician, and the date and time of admission and discharge was extracted for analysis from the hospital’s electronic patient record. Around 98% of patients had been admitted from the emergency department. The authors found that the rate of discharge at weekends was more than 50% lower than on Wednesday (which was chosen as the reference rate), while Friday discharge rates were 24% higher. Holiday Monday discharge rates were 65% lower than ordinary Mondays. Clinical teams that were on call, or on call the next day, had 15% higher discharge rates, while teams that were post-call had 20% lower discharge rates. Individual physicians, physician experience and resident scheduling had little or no impact.

It is properly the role of senior managers within the hospital to analyse and understand the variability inherent in these types of activity, decide whether the degree of variability in controlled activity is acceptable, and to intervene appropriately.

**Variability and Flow**

Allder, Silvester and Walley (2010) analysed a range of administrative data from an NHS trust to better characterise the daily, weekly and annual patterns of bed utilisation within a hospital. Their analysis identified both artificial variability within the system (introduced by decisions which the hospital made) and a systemic mismatch between demand and capacity.
For their analysis, they collected data on:

- daily emergency (unplanned) admissions;
- daily elective (planned) admissions;
- daily bed occupancy state at midnight in adult beds, excluding ophthalmology, obstetrics and paediatrics;
- daily discharges, stratified by elective/emergency admission type;
- hourly admissions and discharges; and
- hourly bed occupancy state for sample weeks.

Using these data they generated a frequency distribution of length of patient stay, a Pareto analysis of lengths of stay, and admissions, discharges and relative bed occupancy for patients with greater than seven days length of stay, and less than seven days stay.

Their analysis showed that around 80% of patients had a stay less than seven days, taking up 30% of total bed capacity. Almost half of all patients had a stay of two days or less. Patients staying between seven and 21 days comprised 15% of the total, but used 40% of capacity. They found that the patterns of care differed between the two groups: a large percentage of short stay patients were admitted for stabilisation and tests, while admissions involving extended treatment, particularly for medical cases, took seven days or more.

**Daily bed cycle**

Allder, Silvester and Walley characterised the problems typically associated with the daily bed management cycle thus:

“Most bed management systems devote a lot of time and attention to the daily problem of bed availability. Perceived bed shortages that are apparent in the morning of a typical working day are resolved by the bed management team during 24 hours.” (Allder et al., 2010, p. 442)

They observed that this daily pattern of ebb and flow in bed utilisation for elective cases was evident within the data they analysed.

![Figure 4. Cumulative daily elective (EL) admission and discharges (Allder et al., 2010, p. 442)](image)

They noted that:

“The evidence ... confirms the suggestions in the literature of the lag between admissions and discharges by time of day. Results for unplanned admissions are similar, although the arrival times are more spread through the day. This implies the arrival times that are planned for patients are more problematic than those for emergency patients, from a bed availability perspective. It is also worth noting that half the requests for beds are from patients with a two-day or less LoS, so the management of admission of short-stay patients should have a high impact on the daily bed ‘crisis’.” (Allder et al., 2010, p. 442)

**Weekly bed cycle**

Data about bed utilisation across the course of a week also showed a repeatable pattern.
The authors identified three specific issues within these data:

- Bed occupancy at midnight was significantly less than the peak demand during the daily bed cycle;
- Peak bed demand, which occurred in the middle of the day, required an additional 100 beds (11% of the trust’s bed capacity); and
- The trust operated at peak capacity five days a week, but at reduced capacity during the weekend, with around 20% of capacity unused. Additional empty beds are required at midnight on Sunday to cope with admissions on Monday and Tuesday. The highest occupancy peak was at midday on Tuesday.

**Annual patterns**

The authors looked separately at bed occupancy across the course of the year for short stay and long stay patients. Bed utilisation by short stay patients (staying less than 7 days) occupied between 150 and 200 beds, with utilisation showing predominantly random natural variation across the year, with a small decrease during December/January. Long stay patients (more than 7 days) required between 300 and 480 beds, and showed two clear trends in bed occupancy: first, a significant decrease during the August (UK) holiday period, and second, a drop in December, followed by a significant increase.
Allder, Silvester and Walley interpret their findings as follows:

“The data that focus on hourly and daily demand variation for beds show that the patterns of demand are predictable around known and explainable patterns of referral and in-hospital system behaviour. The implication for this is that much of the effort currently put into bed management repeatedly addresses the symptom of lack of short-term bed availability but treats this as if it is part of the longer term issue of bed capacity. Although there is still much that needs to be done to improve the planning and control of the ‘bed state’, the existing practices do not address the underlying causes of the short-term bed shortage. In effect, it is classic crisis management rather than crisis prevention.

“It is important to recognise the net effect of random variation on bed requirements. Figure [6] shows that the number of beds needed for shorter stay patients naturally randomly varies by about 25% over the period of a year. This variation is a result of other random factors, including random variation in patients’ sickness levels and the resulting random nature of LoS. In the literature the challenges posed by the perception of an 85% bed occupancy target have been targeted. The data show that bed occupancy should fall to relatively low levels during periods of randomly low demand and pressure for beds could increase significantly as well, by chance. This implies that we have to accept that sometimes beds will be empty and a trust, as a whole, should operate at below 85% occupancy some of the time. Equally, when random events create higher occupancy, this is expected. Such occupancy figures must not be treated as absolute limits. The fact that most trusts report very high levels of occupancy most of the time, outside of holiday periods, also hints that the system operates as a ‘push’ system, i.e. new demand creates pressure to discharge old demand. Trusts would not be able to cope with random variation at such high levels of apparent utilisation unless there is hidden waste in the system.” (Allder et al., 2010, p. 443) (Emphasis added.)

It should be noted that these observations are based on a longitudinal study of single NHS trust. However, the data which were collected, and the analysis and interpretation which were undertaken offer approaches which could usefully be applied in characterising and addressing comparable patient flow and bed occupancy challenges in an Australian context.

The US Institute for Healthcare Improvement (2003) maps out a set of basic steps which they recommend in order to optimise patient flow in a US setting. These steps are: to evaluate flow, and assess how often the hospital “gets it right”; to measure and understand variations in flow; and to test changes designed to improve flow. Suggested changes within the hospital include: smoothing the surgical schedule by levelling the number of elective scheduled cases and case hours each weekday and designating separate operating theatres for elective and emergency surgery; and coordinating patient discharge by providing a process for scheduling a date and time for each patient’s discharge (at least one day in advance), orchestrating the discharge, providing a process and a team for discharging patients with more complex issues, and synchronising other patient movements with the discharge schedule. Changes involving providers outside of the hospital involve “extending the chain” of flow improvement to include those providing community services, or receiving patients after discharge.

Artificial variability (variability introduced into the system by decisions made within the hospital) can also be apparent in the scheduling of elective procedures. Litvak et al (2010) suggest that minimising peaks and troughs in the scheduling of patients for elective surgery and other elective interventions, as well as maintaining a separate operating theatre for emergency operations, can have a dramatic impact on the effectiveness of hospital resource use, and deliver significant improvements in patient flow. These interventions are discussed in more detail in Section 5.1.3 below.

4.1.2 Strategic interventions

There are a number of patient flow interventions at the strategic level which can help to manage variability. These are discussed below..

Understanding variability

Hospital managers wishing to first understand, and then address issues of patient flow within their facility might undertake analyses of activity data comparable to those used by Allder, Silvester and Walley as described above.
In order to manage variability, and reduce its impact on the smooth operation of a hospital, it is necessary to first measure and understand that variability. It would be unwise for us to specify what data should be analysed for any individual hospital; the analysis will ideally be determined by perceptions and evidence about where the pressure points are within each hospital’s systems. The following types of data analyses might be considered:

1. Average length of stay (ALOS) by day of arrival and by day of departure. This can be segmented by DRG and by consultant or by both DRG and consultant
2. Hourly bed occupancy and bed occupancy across the week
3. Midnight bed occupancy by day of the year
4. Admission delay by consultant
5. Discharge delay by consultant
6. Discharge day by consultant
7. Weekend discharges, with a calculation of excess days of stay
8. Profile of internal patient transfers
9. Bed turnover time. This may require manual collection.
10. Cleaning time and cleaning delay, both for both standard cleaning and terminal cleaning
11. Variability in ALOS around the time of JMO term changeover

Some additional points should be borne in mind:

- An ‘acceptable’ ALOS is not necessarily good news. It may well be made up of a mix of too-long and too-short stays;
- It is helpful to use data (such as LOS, EDD, theatre lists) to identify the variation in your service demand. This information can be used to highlight opportunities for potential improvements in the facility’s use of capacity; and
- Statistical process control charts (SPC charts) can be used to analyse the demand for each speciality from different sources of admission (ED, non-urgent referral, clinics).

**Smoothing variation**

The activity related to elective and emergency surgery probably represents the largest component of the hospital’s activity that is amenable to direct management control. Managing elective and emergency surgery as two streams of activity, and allocating emergency surgery to a dedicated operating theatre, can minimise disruptions to elective surgery, and help to optimise elective throughput. Ensuring that surgical teams smooth their operating schedules in terms of the number of operations each day, the balance of long and short procedures, and the aggregate expected lengths of patient stay can help to improve overall surgical throughput (Litvak et al., 2006). The scheduling of elective and emergency surgery is discussed in more detail in Section 5.1 below.

A number of other avenues exist for interventions at a strategic level which could decrease variability in hospital patient flow.

- Look for existing practices that create unnecessary peaks and troughs (for example, the medical team on ‘take’ will get all the admissions, regardless of how many there are);
- Identify and minimise peaks and troughs in administrative and support workload, during the day, across the week, and throughout the year;
- Structure planned surgery to match seasonal variations to allow the highest throughput for the facility without exceeding hospital capacity; and
- Facilitate and encourage weekend discharges (by ensuring that the necessary support services are available) and ensure that a significant proportion of discharges are scheduled to occur by mid-morning.

These strategic interventions can have a significant impact on the availability of beds for new admissions.

**4.1.3 Operational and tactical actions**

There are a number of actions at the Business Unit level which can help to manage variation.

Review the variability of scheduled activity during the day, over the course of the week, and month-to-month. Work with those responsible for deciding on the activity schedules to level out the variability.
Avoid or discourage ‘over booking’. Although over booking might appear to be an option for increasing throughput, it will increase the likelihood of cancellations, and the uncertainty that it causes can interfere with smooth flow, resulting in lower throughput overall, and less efficient use of resources.

Evaluate information about length of stay for the business unit. Identify any short term variations, or longer term trends, and try to identify the cause. Work to minimise short term variations.

4.2 Demand and capacity planning

Demand and capacity planning is the way to organise a service in order to build its capacity. It requires a good understanding of the core business which the service provides, and the ability to plan changes in capacity to meet anticipated changes in demand. Good demand and capacity planning requires an effective tool to provide predictions of activity in the near future, a tested plan to respond to those predictions, and practiced actions to implement the response. (NSW Health, 2012)

4.2.1 Summary of evidence

In Section 3.1 above we looked briefly at the principles of queueing theory (Erlang, 1948) and the implications of that theory for healthcare (Palvannan & Teow, 2010). Constantly maintaining sufficient reserve capacity to deal with occasional peaks in activity imposes a significant cost on the organisation. Unused excess capacity cannot be stored for later use, and is wasted. On the other hand, having insufficient capacity to deal with temporary increases in workload can lead to queues and delays, resulting in stress for staff, and increased risk to patients. The pressure of work can also result in inefficiencies, and lead to increased costs.

If a peak in unplanned activity can be predicted in advance, it is possible to adjust resource scheduling and resource use (especially staffing), capacity (by increasing the number of available beds) or demand (by decreasing scheduled activity) to provide a safer and more cost effective response to that variation. One aspect of variation management which is sometimes overlooked is that it is possible to respond to predicted lulls in activity by increasing planned activity, encouraging staff to take leave, decreasing the use of casual or agency staff, or by closing beds.

- Demand & Capacity Planning - Organise your service to build capacity
- Demand and capacity planning is understanding your service’s core business
- A Predictive tool is useful to better help you understand your demand and capacity, and then plan for it.

4.2.2 Strategic interventions

There are a number of patient flow interventions at the strategic level which support demand and capacity planning.

It is important to ensure that effective systems are in place to look ahead to evaluate future activity. Peaks of activity in winter and at holiday times, decreased activity as a result of staff taking planned leave, weekly and daily trends can often be discerned in advance and responded to.

The Demand and Capacity Predictive Tool provides an estimate of likely workload over the next two weeks. Since the quality of its predictions relies on good data, it is important to take a strategic approach to the management of data quality, and the consistency of data entry. Evaluating the quality of data from time to time, providing staff with appropriate training, and ensuring that systems are used consistently can all help to improve the reliability of activity predictions.

It is also important to ensure that the importance of activity prediction, and responding to those predictions, is well understood. ‘Look ahead’ practice should be built into the hospital’s routine management practices

Encourage the scheduling of planned activity well in advance. Leaving the planning of scheduled and predictable activity until the last minute introduces additional ‘artificial variability’ into the workload, and should be actively discouraged. Examples of such artificial variability include elective surgery lists scheduled only a day or two ahead, ‘surprise’ discharges (initiated on the day of intended departure) and failure to set and periodically review a realistic EDD for a patient.
Monitor important aspects of the facility’s activity, and respond to significant trends. For example, periodically review data about outlier patients to evaluate whether the allocation of beds between specialties is appropriate, and if necessary distribute beds more evenly.

4.2.3 Operational and tactical actions

There are some actions at the Business Unit level which can help to improve the match between demand and capacity.

Use the Demand and Capacity Predictive Tool and information about scheduled activity to plan the business unit’s working week. Respond in advance to impending peaks in activity by increasing rostered staffing, or by deferring any discretionary activities. Similarly, respond to anticipated decreases in activity by rostering fewer staff, catching up on deferred tasks, or scheduling additional patients.

<table>
<thead>
<tr>
<th>Busywork</th>
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<tr>
<td>Frantic activity can be a comforting alternative to difficult tasks, but the illusion of intense activity may achieve less in the long run than it seems at first glance.</td>
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4.3 Demand escalation

Demand escalation involves acting early to preserve service capacity in response to unforeseen increases in demand. It requires a system wide approach, and involves initiating pre-emptive actions to manage an impending or actual shortfall in capacity. Demand escalation requires strategic planning in the medium term as a way of managing expected demand, and escalation in the short term to manage any mismatch between immediate demand and available capacity. Demand escalation can provide a viable response to the outcomes of demand and capacity planning. (NSW Health, 2012)

4.3.1 Summary of evidence

An examination of the evidence in relation to demand escalation highlights that in some cases, it appears that discharge activity is driven by the need for beds, and that a common response to an increased demand is to focus on discharge (NSW Hospital site visits, 2012). But not all consultants will respond in the same way, or to the same degree to a request for additional discharge activity. It is thus likely that some patients will be discharged at the earliest possible stage of their care (and perhaps, on occasion, too soon), while other patients will stay longer than is necessary, even when there is a pressure to discharge. It would be preferable to have systems and processes in place to ensure that each patient is discharged at the earliest clinically appropriate opportunity.

Sharma, Stano and Gehring (2008) analysed data from Oregon hospitals in order to evaluate how decisions about admission and discharge varied on days when there was a high demand for beds. They found that, on high demand days, patients were discharged earlier than expected, compared to patients discharged on low demand days. Decisions about admission were not altered in response to demand. The authors’ conclusion was that hospitals appear to ration capacity by hastening discharge, rather than by restricting admissions.

Fusco, Saitto, Arcà, Ancona and Perucci (2003) analysed hospital administrative data to map patterns of utilisation for unplanned, presumed unplanned, presumed planned and planned admissions. Their results suggest that utilisation of bed days is driven more by bed availability than by demand for beds, which underlines the relevance of “Roemer’s Law” (“A built bed is a filled bed”) (cited in Steen, 2008, p. 1).

A relatively small number of long stay patients can have a disproportionate effect on bed utilisation. Quinn et al (2007) conducted a retrospective review of five years of bed occupancy data (around 117,000 episodes) in a large NHS hospital to evaluate the impact of long stay episodes (greater than 100 days) on bed utilisation. They found that there were 648 long stay episodes (0.6% of the total), which used 11% of overall bed capacity, and suggested that a specific focus on long stay episodes might improve bed availability overall.
4.3.2 Strategic interventions

Patient flow interventions at the strategic level to address demand escalation are predominantly focused on medium term planning to deal with anticipated demand. Appropriate interventions are discussed below.

Collect data about worrisome pressure points within the system – those that consistently interfere with flow – and use that information to prioritise interventions to address the most troublesome areas.

Establish a tested plan to decrease scheduled admissions, and place a stronger focus on discharge activity (a Capacity Action Plan) in order to manage an impending peak in activity. Ensure that all those whose work will be affected are familiar with the plan, the reasons for having it in place, and the circumstances under which it will be implemented.

Ensure that there is a daily routine in place to use the Demand and Capacity Predictive Tool to evaluate the likely demand for the facility’s services over the next two weeks. Ensure that there is a structured process to implement the Capacity Action Plan if the evaluation shows an impending mismatch between anticipated demand and planned capacity. The plan may also be put into action in response to known seasonal variations in workload.

Develop capacity across the executive team that will enable them to identify warning signs (triggers and tipping points) in hospital activity, and respond appropriately. Such warning signs might include a sharp increase in average length of stay, an increase in the number of delayed discharges or long-stay patients, a rise in admissions in one or two specialties, or notification of an epidemic in the community.

Ensure that each business unit has a plan in place to address short-term peaks in demand (a Short Term Escalation Plan), as well as a suite of actions to help them recover following those short-term increases, and manage activity until it returns to an acceptable level.

Ensure that there is effective communication across the organisation about challenges resulting from a mismatch between demand and activity, the response that is implemented, and the return of operating procedures to their normal state.

Scale, don’t flip
A well designed system should not change to a different set of operating processes when things get busy.

4.3.3 Operational and tactical actions

There are a number of actions at the ward or service level which can help to manage the escalation of demand. These are discussed below.

Ensure that all staff within the ward or service are familiar with the facility’s Capacity Action Plan, the reasons for having it in place, and the circumstances under which it will be implemented. Ensure that they also understand the response expected from them as part of that plan.

Regularly monitor the likely demand for services over the next two weeks, using the Demand and Capacity Predictive Tool. If necessary, adjust staffing and discretionary activity to respond to that prediction.

Have a plan in place to address short-term peaks in demand (a Short Term Escalation Plan), as well as a suite of actions to help the unit recover following those short-term increases, and manage activity until it returns to an acceptable level.

Ensure that there is a well documented protocol, understood by all staff involved, to be followed when activity peaks unexpectedly.
4.4 Governance (Executive)

Governance is the provision of transparent and accountable leadership within an organisation. This section considers governance as a part of executive management; clinical governance is discussed in Section 5.3 below. In the context of patient flow, good governance means ensuring that every person in the organisation understands that they share in the responsibility for smooth patient flow. Sound governance entails the provision of effective sponsorship, and ensuring that the accountability of individuals and groups is clear. Without good governance, all of the other elements associated with the management of patient flow can fail. (NSW Health, 2012)

4.4.1 Summary of evidence

In the context of patient flow, good governance will ensure that patient flow is seen as being the responsibility of everybody in the organisation. Strong governance will also ensure the provision of effective sponsorship and clear individual and group accountability. The Joint Commission, a non-profit organisation focused on accrediting healthcare organisations in the US, provides standards for leadership in hospitals, and Standard LD.04.03.11 requires that “[t]he hospital manages the flow of patients throughout the hospital.” (Schyve, 2009, p. 31) A Guide to this standard published by The Governance Institute emphasises the need for coordinated system wide action to meet the standard, and the role of governance in that coordination:

“...addressing patient flow is not within the control of a single department or discipline within the hospital. The solution requires the coordinated work of multiple components of the hospital system including, for example, the emergency department, physicians, nurses, patient transport, housekeeping, information technology, and admissions. It is the need to solve this problem at the system level that led to the assignment of responsibility to the collaborative leadership of the organization. In any given hospital, maximizing the effectiveness of the patient flow processes in the system may even require a decrease in the efficiency of a component in the system (such as housekeeping). The success of the patient flow process is measured by the results of this integrated process, not by the isolated performance of each component in the process.” (Schyve, 2009, p. 31)

The proper role of executives is to set goals, and to work with managers to help them achieve those goals. They may need to assist those managers by removing the obstructions which they face. Smooth patient flow needs a system wide approach to avoid an intense focus on optimisation in one area creating constraints or inefficiencies elsewhere. Optimising efficiency within individual departments is unlikely to deliver the level of transition towards smooth flow that is needed to improve patient safety and the quality of care. Only a whole-of-hospital response to flow management will achieve optimal results for the system as a whole, and only those at the executive level have the authority and the breadth of oversight to identify, initiate and guide actions for improvements in the whole system. Only the executive have the breadth of vision to balance flow improvement activities across the whole system (both within the hospital, and with primary and community care).

The hospital’s executive has responsibility for making changes to the hospital’s overall systems (crisis prevention). Reacting to the symptoms of systemic problems as they arise (crisis management) is a far less effective response.

Resorting to low-grade operational activity in a crisis (pushing trolleys, making beds) may be viewed as a comforting activity, and is often intended to demonstrate support for front-line workers. Such interventions require little initiative or high-level thinking, but they may be counterproductive. Staff are likely to see signs of a lack of trust from management in their capabilities (NSW Hospital site visits, 2012). Staff would probably prefer their managers to address systemic problems at a strategic level, instead of providing additional ‘hands on’ support.

Access block and delayed admission for ED patients is commonly the result of poor bed availability within the hospital; bed availability is hampered by delays in patient discharge; discharge is often initiated late in the patient’s stay (on the day of departure or the day before), rather than at admission; low levels of collaboration and cooperation with residential aged care facilities and community services delay admission for complex cases; inappropriately early discharge may increase readmissions (usually through ED). These are not inevitable crisis events; they are characteristics which are designed into the systems which govern the operation of the hospital.
Walters and Dawson (2009) comment on discussions in Australia about the need to address ED crowding as a whole of hospital problem, and comment on changes in ED practice which they have observed in NHS hospitals. They suggest that the whole of hospital response “...needs to involve a dramatic change in clinical culture, including the way in which the ED itself operates and is perceived by those working within it, by the rest of the hospital community and even by government.” (Walters & Dawson, 2009, p. 561) They note that working arrangements in EDs in the UK had become part of the overall hospital dysfunction. They express the view that ED specialists “…had to take on too much of the acute medical load and investigate and manage too many acutely ill medical patients for too long. The rest of the hospital clinical community responded by disengaging from the urgency of acute admissions. This inevitably boggled down AE doctors so that they became less effective at other core work.” (Walters & Dawson, 2009, p. 561)

4.4.2 Strategic interventions

There are a number of interventions at the strategic level which can improve administrative governance as it relates to patient flow.

Ensure that the governance structure within the organisation is clear, and clearly communicated to all staff. Make sure that the organisation’s business goals, particularly those relating to patient flow, are also clearly described, and that all staff understand the part they are expected to play in achieving those goals.

Ensure that there is a consistent, effective and managed approach to implementing change within the organisation. Ensure that for every instance of change the desired new behaviours for all staff are clearly described, modelled and reinforced. Major organisational changes will always be supported by appropriate funding, staffing, training and support.

Progress needs to be monitored, and the stage of the Plan-Do-Study-Act cycle reviewed. When a particular cycle is complete or nearing completion, the degree of improvement needs to be assessed. The cycle may be repeated on that problem, or effort transferred to another pressure point.

All staff need to understand the primary goals of the work on patient flow, and understand that optimising the operation of a single business unit may not help overall patient flow for the hospital, and may have a detrimental effect. For example, reducing overtime expenditure in a pharmacy to improve its financial performance, by limiting dispensing hours and reducing weekend services, may delay patient discharges, and result in additional unnecessary days of patient stay, or increased overtime payments in other services.

The description and promulgation of expected patient flow can be couched as ‘Always events’ (those things that should happen for every patient, for every admission), and ‘Never events’ (those things that should not be a part of patient flow at any time).

‘Always’ events and ‘Never’ events

How are they decided on? How are they communicated?

Examples of situations which might be considered as always events and never events include:

- Each admitted patient is always seen by a senior consultant every day;
- Discharge planning always starts within 24 hours of admission;
- An estimated date of discharge is always determined at admission, and documented in the patient’s notes (and electronically if possible);
- The patient’s estimated date of discharge is always reviewed during each ward round, and updated if necessary (in the patient’s notes and electronically);
- The time and date of discharge is always set at least 36 hours in advance (longer for complex discharges involving residential aged care or community services);
- A patient is never discharged until they are medically fit; and
- The patient’s discharge from hospital is never a surprise (to ward staff, support services, the patient’s general practitioner, or the patient and their family.)
4.4.3 Operational and tactical actions

There are a number of actions at the ward or service level which can help to ensure effective governance. These are discussed below.

Work processes should be clearly described, and understood by all staff. The expectations of each staff member in supporting that business process, and the goals which the process is expected to achieve should also be clear, and understood. All staff should understand the ultimate purpose of the activity, and that the purpose is of more significance than the process.

All members of the ward or service should be familiar with the planned ways in which work processes can be changed during a temporary peak in activity, or other crisis (escalation). They should have an opportunity to contribute to the development and periodic updating of those plans.

Each member of staff should understand the structure of the governance framework within which their activities are managed, and understand their accountability and line of authority. They should also understand the scope of delegation within which they are empowered to take independent action to address emerging issues with patient flow, and how they must communicate about those actions to others in the facility.

4.5 Key readings for this chapter

  
  The authors analysed a range of administrative data from an NHS trust to better characterise the daily, weekly and annual patterns of bed utilisation within a hospital. Their analysis identified both artificial variability in the system (introduced by decisions the hospital made) and a systemic mismatch between demand and capacity.
  
  Their analysis showed that around 80% of patients had a stay less than seven days, taking up 30% of total bed capacity. Almost half of all patients had a stay of two days or less. Patients staying between seven and 21 days comprised 15% of the total number of patients, but used 40% of the bed capacity. They found that the patterns of care differed between the two groups: a large percentage of short stay patients were admitted for stabilisation and tests, while admissions involving extended treatment, particularly for medical cases, took seven days or more.

  
  This paper provides an analysis of hospital administrative data which maps patterns of utilisation for unplanned, presumed unplanned, presumed planned and planned admissions. The results suggest that utilisation of bed days was driven by bed availability rather than by demand for beds.

  
  This handbook provides a useful guide to the IHI approach to patient flow optimisation, which is tailored to a US audience.

  
  This white paper reports in some detail on a number of initiatives to improve flow in surgical units in hospitals in California.

  
  This paper describes the impact of a mismatch between demand and capacity in the context of surgical activity, and suggests that some excess capacity might be required to effectively manage variable demand. In practice, a waiting list of patients who are ready for surgery can act as a buffer to avoid wasted capacity when new demand is lower than usual.

This retrospective review of 5 years of bed occupancy data in a large NHS hospital evaluates the impact of long stay episodes (greater than 100 days) on bed utilisation. There were 648 long stay episodes (0.6% of the total), which used 11% of overall bed capacity. The authors suggest that a specific focus on long stay episodes might improve bed availability overall.


This analysis of data from Oregon hospitals provides an evaluation of how decisions about admission and discharge vary on days when there is a high demand for beds. On high demand days, patients are discharged earlier than expected, compared to patients discharged on low demand days. Decisions about admission do not alter in response to demand. The authors’ conclusion is that hospitals appear to ration capacity by hastening discharge, rather than by restricting admissions.


This paper suggests that a significant part of the queueing and waiting problem is a result of a mismatch between the timing of the demand (and patient presentations) and capacity (the number of slots or beds available at the time).


This commentary on discussions in Australia about the need to address ED crowding as a whole of hospital problem, provides a comparison with changes in ED practice in NHS hospitals, where working arrangements in EDs have become part of an overall hospital dysfunction.


The authors used a retrospective analysis of inpatient data in a general internal medicine unit in a Canadian hospital to assess the impact of a range of administrative and organisational factors on patient discharge rates. Data for 5,088 patients, which included diagnosis, length of stay, patient disposition, attending physician, and the date and time of admission and discharge was extracted for analysis from the hospital’s electronic patient record. Around 98% of patients had been admitted from the emergency department. The authors found that the rate of discharge at weekends was more than 50% lower than on Wednesday (which was chosen as the reference rate), while Friday discharge rates were 24% higher. Holiday Monday discharge rates were 65% lower than ordinary Mondays. Clinical teams that were on call, or on call the next day, had 15% higher discharge rates, while teams that were post-call had 20% lower discharge rates. Individual physicians, physician experience and resident scheduling had little or no impact.
5 Smooth flow and clinical practice

“Instead of going back and reading notes, we have the entire team together, and we can work together to help the patients progress. We’re not making phone calls or paging each other to find out what is going on with the patient we are able to catch up with each other and compare notes ... We are more proactive than reactive. The result is a smoother hospital stay, a shorter length of stay, and happier patients.”

(“Multidisciplinary rounds at bedside involve patients, families,” 2009, p. 24)

This chapter presents evidence on three key elements in the patient flow systems (PFS) framework. For each element the evidence is considered in relation to strategic, operational and tactical aspects of smooth flow in Clinical Practice. This chapter specifically examines the following key elements: Standardised Practice; Quality and Safety (from a clinical perspective); and Governance (with a focus on the role of clinical leaders). The selection and focus on these three elements aligns directly to other resources provided as part of the broader collaborative project on patient flow education including the training manual on smooth patient flow.

The majority of the day to day decisions and actions which influence smooth flow are the decisions and actions of the clinicians at the heart of patient care.

**Standardised practice** in a clinical context can reduce uncertainty within the care team, and reduce the level of unpredictability within the patient journey. Variation management (which was discussed in Section 4.1 above) also has implications for clinical practice. The effective management of variations in the scheduling of clinician activity is best undertaken by the clinicians themselves, or at least with their active involvement.

**Quality and safety** are predominantly the responsibility of clinicians (although a patient-centred view of quality and safety is discussed in Section 6.2 below). While care which is of poor quality can be provided safely in some circumstances, unsafe care is never quality care. Many of the actions and interventions which are suggested elsewhere in this resource as opportunities to improve flow also serve to enhance the quality of care, and improve patient safety. Disordered patient flow and a delayed patient journey are unlikely to provide good quality care, and may not represent safe care.

**Governance** from a clinical perspective can ensure that clinicians providing care within a team environment (such as a hospital) are committed to collaborating and communicating with other clinicians to ensure that the patient receives safe, effective and timely care. Good clinical governance can ensure that good collaboration becomes the norm.

5.1 Standardised practice

Standardised practice involves promoting best practice to lock in expected outcomes. Using standardised practices to establish or maintain clinical best practice will ensure that staff and patients have better experiences and better outcomes. At the same time, it will help to reduce the level of waste within the system, and minimise uncertainty for patients and for staff. (NSW Health, 2012).

5.1.1 Summary of evidence

As a general observation, decreases in the variability of clinical practice can result in improvements in quality of care, improved patient flow, and a decrease in staff stress. Decreasing the variability in care pathways need not erode clinical autonomy. Knowing that a package of safe practices, for example the ‘Ventilator Associated Pneumonia’ bundle (Institute for Healthcare Improvement, 2012) will be provided for a patient by default will then allow clinicians to focus on the specific additional requirements of a particular patient.

Standardising the processes used for clinical administration means that there is less risk of an important component of care being lost or forgotten. The sub-sections below highlight a small number of flow interventions in specific areas. The examples are neither prescriptive nor exhaustive. They are merely intended as prompts to assist with thinking about localised opportunities for standardising practice. It should also be
borne in mind that optimisation of patient flow in one isolated area may actually lead to a disruption of flow in the system overall.

**Ward rounds**

Herring, Caldwell and Jackson (2011) described the development and use of a deliberative checklist for ward rounds, (particularly for wards other than surgery). This checklist describes those things which should be considered, discussed, have actions identified and be the subject of communication. The authors’ approach to the use of the checklist entails having a ‘checklist coordinator’ (consultant, intern or senior nurse) complete the list at the patient’s bedside. When the review of a patient is complete, the consultant asks whether all items on the checklist have been completed before moving on to the next patient. If there are gaps, the missing items are completed before the team moves on. The authors provide a sample checklist, but recommend that the list be tailored for particular situations; they suggest, for example, that geriatricians might include more detail about aspects of the patient’s rehabilitation.

A recent guidance document from the Royal College of Physicians and the royal college of Nursing in the UK (Kirthi et al., 2012) advocates for a structured, multidisciplinary approach to ward rounds in Medicine. The document recommends that each patient should be seen daily during a ward round which includes the consultant and a senior nurse.

**Emergency Departments**

Babooolal et al (2012) used discrete event simulation to develop a ‘perfect world’ model of an emergency department (ED) with no external constraints on resources or processes in order to quantify the ‘efficiency gap’ between current performance and the theoretical best possible performance in terms of patient throughput. The model assumed that when a patient’s care in ED was complete and they were ready for discharge or ward admission, they would leave immediately. The model was used to evaluate staffing changes which could lead to performance improvements in the current “real world” ED. The model segmented time of day into three shifts (1800-0200, 0200-1000, 1000-1800) and day of the week into three segments (Monday, Tuesday-Thursday, Friday-Sunday). In designing future staffing arrangements, the model showed that, provided each unit had satisfactory base level staffing by nurse assessors, registrars and consultants, only changes in the number of ED clinical decision makers would affect patient throughput. The model was used to present the hospital’s executive with options for future staffing which balanced cost against patient waiting times.

Holdgate, Morris, Fry and Zecevic (2007) reviewed the accuracy with which triage nurses were able to predict the disposition (accepted for admission or discharged) of patients presenting to an Australian emergency department over two separate one-week periods. Overall, the triage nurses’ prediction matched actual patient disposition for 75% of patients. Prediction of admission was most accurate for patients in high triage categories; their prediction of discharge was most reliable for patients with injuries and febrile illnesses (89%). Predicted discharge was worst in patients with cardiovascular disease (41%). The authors concluded that identifying patients who are appropriate for ‘fast track’ non-admitted care is an appropriate role for triage nurses.

**Ward boarding**

Crowding in EDs and delays in admission to a ward bed (‘ED boarding’) can result in risks to patients, including deferred initiation of treatment, longer hospital stays, and increased mortality. One option that has been tested in some hospitals is to locate boarded patients in a ward corridor prior to formal admission to a ward bed. While this practice carries a perception of increased patient risk, and can create industrial issues (NSW Hospital site visits, 2012), there is partial evidence that boarding patients in ward corridors is not associated with increased risk to patients. Viccellio, Santora, Singer, Thode Jr. and Henry (2009) used a retrospective analysis of four years’ activity data to evaluate clinical outcomes for patients boarded in ward corridors according to the hospital’s ‘full-capacity protocol’. According to this protocol, selected patients would be transferred to the corridor of an inpatient ward when there was not an ED bed available for the next patient. The protocol excluded a number of categories of patient, including those who: required direct admission to ICU or step down care; had diarrhoea, neutropaenia, or chest pain with a positive first troponin test result; needed regular suction or high-flow oxygen, or respiratory isolation; were admitted primarily for control of seizures; or were at risk of elopement. The authors found no evidence that ward boarded patients were subjected to additional risk; they had a shorter time to ward bed admission (426 minutes vs 624 minutes), lower in-hospital mortality (1.1% vs 2.6%) and were less likely to be transferred to ICU (2.5% vs 6.7%). The authors acknowledge that the full-capacity protocol
inevitably selected lower risk patients for ward transfer, but reiterate that they found no evidence that ward boarding contributed to increased patient risk.

The practice of transferring patients from a crowded ED to a ward corridor has been attempted in Australia, but the practice proved unpopular with nursing staff and was not continued (NSW Hospital site visits, 2012). But it does raise questions about the disparity between assessments that inpatient wards are considered to be unsafe and overloaded at a bed occupancy of 105%, while emergency departments are considered to be acceptably safe even when they experience peaks of occupancy of 160% or more.

**Surgery and operating theatres**

Improvement in surgical patient flow can be achieved by matching ward activity to theatre capacity, and avoiding the admission of cases that won't get to theatre, levelling daily surgical activity, and allocating a separate emergency theatre. These improvements are likely to have positive flow-on effects in other parts of the hospital.

Dempsey (2009) notes the impact of clinical variability on the efficient management of peri-operative services, and provides practical suggestions aimed at eliminating variability where possible, and then managing the remainder. Suggested initiatives include redesigning the surgical block schedule to distribute major cases and specialised procedures (such as joint replacements) throughout the week; maintaining a separate (staffed) emergency theatre; establishing common standardised protocols for patient preparation before surgery; standardised surgical preference lists; and focusing on starting operations on time, and managing turnover time between operations. Dempsey suggests that these initiatives should be supported by the collection and analysis of reliable data, during the planning stage, during implementation, and for follow up monitoring. The paper includes three case studies.

Benson, Drew and Galland, (2006) conducted a brief study of the patients who were inpatients on a particular day in a surgical unit in an NHS hospital in order to assess the impact of delayed discharges on surgical throughput. They found that of the 75 surgical inpatients in hospital on the day of study, 9 (12%) were in the category of a ‘delayed discharge’, and 8 of these were delayed because of the need for rehabilitation or a nursing home bed. The authors concluded that ‘delayed discharge’ patients accounted for a disproportionate number of bed days: the total group of 75 patients had a total bed occupancy of 509 days, while the 9 ‘delayed discharge’ patients accounted for 179 days (35%) of that total.

Chow, Puterman, Salehirad, Huang and Atkins, (2011) describe an approach to the improvement of operating theatre scheduling as a way of reducing variability in surgical bed utilisation. The approach uses Monte Carlo simulation and mixed integer programming to predict bed requirements for a specified surgical block schedule. The authors then provide a case study of the use of the scheduling model in a large Canadian tertiary care hospital. The authors include details of the calculations used in their approach as an appendix to the paper.

Guerriero and Guido (2011) presented a structured literature review on the use of operational research to improve operating theatre management. Their review offers insights to improvements in performance at strategic level (assigning operating time to surgical groups), the tactical level (constructing a master surgical schedule) and the operational level (the day to day scheduling of individual patients).

An opinion piece by Herfarth (2003) makes a case for applying Lean improvement principles to the management of surgical workflow in a German hospital setting. He emphasises that, even though the system of care will become more routine, the patient should not become just a ‘case’ or a ‘customer’. Rather, the patient continues to be “…a person with specific problems, who is in need of competent treatment and who may be ill to the point of being unable to function, possibly afflicted with poly-morbidity, family worries and concerns about the future, even fears for his or her very existence.” (Herfarth, 2003, p. 513). He also advocates for better collaboration between members of the clinical team: “In the new system there will no longer be room for certain types of professional politics or professionally motivated egocentricity; cooperation of individual institutions and functional units is crucial. The administrative department must be involved, as the body that understandably expects profits and fears losses, but it must subordinate itself in a supportive way to the new procedure.” (Herfarth, 2003, p. 513).
**Intensive care**

Baker, Pronovost, Morlock, Geocadin and Holzmueller (2009) used a retrospective analysis of administrative data to examine the flow of patients through a 22 bed neuroscience critical care unit (NCCU) in a large US university hospital. They found that patients discharged from the NCCU on days when there were ten or more admissions to the unit were 2.5 times more likely to make an unplanned return within 72 hours. The authors were unable to determine whether pressure to accommodate new admissions to the unit contributed to an increased readmission risk.

McManus, Long, Cooper and Litvak (2004) used a mathematical patient flow model, based on queueing theory and developed in Microsoft Excel™, to evaluate two years of prospective activity data in an 18 bed non-cardiac intensive care unit in a US hospital. They used the model to predict the likelihood of a request for admission being rejected, based on the admission, discharge, and rejection data. The model accurately predicted the risk of a rejected admission request, and allowed an accurate prediction of demand, and calculation of the bed numbers required for the unit’s workload.

Vats et al (2012) reported on the use of Lean techniques and a scenario analysis to implement a standardised process for ward rounds in a US paediatric intensive care unit. The new ward round format stressed essential processes associated with increased timeliness and efficiency, better staff and customer satisfaction, improved throughput, and less time from attending physicians.

**Other Units**

Fitzgerald, Dadich and Sloan (2010) describe the use of a simulation program to model potential improvements in patient throughput in a sonography service in an Australian hospital. The program uses historical data for the service as the basis for the model. The authors conclude that process management tools offer the potential to assist in improving patient flow in a hospital setting.

Holtby (2007) describes a process improvement project undertaken in an inpatient renal medicine unit in a Canadian hospital. The process applied The Model for Improvement developed by the US Institute for Healthcare Improvement (IHI). This Model applies three questions: what are we trying to accomplish? how will we know that a change is an improvement? and what changes can we make that will lead to improvement? followed by a Plan-Do-Study-Act (PDSA) cycle. The first stage of the project saw the development of a flowchart for a renal medicine inpatient stay, including the point at which the patient was functionally and medically stable for discharge. The author noted that the concept of discharge readiness was not clearly documented in the patient record, and was usually determined during impromptu meetings of the clinical team. The second stage of the process documented the key steps during the patient’s admitted episode. Purposive sampling was used to gather a representative spread of patient episodes; data saturation (the point at which no additional information was added from a new case) was reached at a total of 20 patients. Details from the patient records was recorded in a spreadsheet which calculated the number of days of delay attributable to factors which were amenable to change through a process improvement intervention.

Hintzen, Knoer, Van Dyke and Milavitz (2009) described an application of Lean improvement techniques in the sterile products area and inventory area of a university hospital inpatient pharmacy in the US. The initiative resulted in a reduction in waste with an annual value of $275,000, and an inventory reduction of $50,000. The changes allowed two FTE staff to be redeployed to other areas.

**5.1.2 Strategic interventions**

There are a number of interventions at the strategic level which can help to improve patient flow through standardisation of clinical practice.

Support the development of a shared understanding of current clinical practices, the variations within those practices, and any reasons behind those variations. Look at variations both within and between specialities. Factors influencing discharge practice and the timing of discharge may be of particular interest.

Ensure that a framework is in place to facilitate the development and application of standardised clinical practice. For example, ensure that policies and procedures are easy to find when they are needed, and that they are prepared and presented in a way that meets clinicians’ requirements.
Encourage and support the development and use of standardised clinical practice, and explore the reasons which might lead some clinicians to resist their introduction.

5.1.3 Operational and tactical actions

There are a number of actions at the Business Unit level which can help to standardise clinical practice.

Ensure that the majority of repeating tasks within the business unit follow a consistent standardised practice which is documented, understood by all staff, and periodically reviewed for potential flaws or possible improvements. These repeating tasks are likely to include the admission of a patient to the ward, recording, updating and monitoring of each patient’s EDD, care coordination team meetings, and the patient discharge process (there will be many others).

Ensure that individual practices within clinical specialties are periodically reviewed to identify opportunities for standardisation.

Work with others who apply similar clinical practices to reduce between-clinician variation.

Agitated intervention disrupts flow
Smooth flow thrives on standardised practice and predictable process; ‘special case’ workflow rarely ends well

Ideally, ward rounds should occur at the same time each weekday, and follow the same process. Good communication with ward staff and with the multidisciplinary team providing care for the patient should be built in to the routine.

There are a number of problems which affect some ward rounds, and which could impact on the quality of patient care, and could also lead to a prolonged length of patient stay. These include:

- Ward rounds taking place at an unpredictable time;
- Ward rounds which include only medical staff;
- Some patients not being reviewed in a ward round on each day of their stay;
- Failure to provide a safe, complete handover to non-medical staff; and
- Some aspects of the patient’s care not being appropriately reviewed.

VMOs might consider collaborating with colleagues in their speciality group to provide ward round cover on days when they are not on site.

Any standardisation of discharge practice should acknowledge that there are two types of discharge:

- ‘Simple’ discharges (often surgical) which typically follow a short hospital stay, and require little in the way of special arrangements for continuing patient care (Department of Health (UK), 2004); and
- Complex discharges (with associated allied health, pharmacy and community intervention) which require more effort and forward planning. These should be scheduled for a specified time, and care taken to ensure that sure everyone knows the schedule and can respond in time (or advise if they can’t) (Haraden & Resar, 2004).

Identify and minimise peaks and troughs in clinical workload, during the day, across the week, and throughout the year. At a whole of hospital level, this optimisation may require coordination at an executive level. Within individual departments, initiatives to reduce variation in activity will need to take account of the impact any intended changes on other units in the hospital which are recipients or sources of either patients or services.

The prioritisation paradox
Assigning a high priority to one patient or one request will displace other work; when the prioritised task is complete, there may be no indication of which “next step” will contribute most to improved flow.
5.2 Quality and safety (clinical)

Quality depends on the structuring of systems around an expected result of better health care outcomes. Organising for quality involves focusing on customer service, ensuring that the patient is the main focus for decision making, and listening to what staff and consumers want, and changing direction to provide it. (NSW Health, 2012)

5.2.1 Summary of evidence

This section considers quality (as well as safety) primarily from a clinician’s perspective. Quality and safety from a patient-centred perspective is addressed in Chapter 6.

Runciman (2006) reported on an initiative of the Australian Council for Safety and Quality in Health Care which set out to determine shared meanings for terms commonly used in discussions on quality and safety in healthcare. Shared meanings were developed by promoting discussion via a website. Among others, the following meanings were agreed on through this process:

<table>
<thead>
<tr>
<th>Safety</th>
<th>Freedom from hazard.</th>
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<tbody>
<tr>
<td>Hazard</td>
<td>A circumstance or agent that can lead to harm, damage or loss.</td>
</tr>
<tr>
<td>Harm</td>
<td>Harm includes disease, injury, suffering, disability and death.</td>
</tr>
<tr>
<td>Quality (degree of)</td>
<td>The extent to which a service or product produces a desired outcome or outcomes.</td>
</tr>
<tr>
<td>Quality of health care (degree of)</td>
<td>The extent to which a health care service or product produces a desired outcome or outcomes.</td>
</tr>
<tr>
<td>Outcome</td>
<td>The status of an individual, a group of people or a population which is wholly or partially attributable to an action, agent or circumstance.</td>
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Terms in bold were the subject of additional agreed meanings, some of which are shown.

It is important to note that safe care does not necessarily imply high quality care, although poor quality care is unlikely to be safe.

The Australian Commission on Safety and Quality in Healthcare (ACSQHC) (2009) discusses the notion of ‘dimensions of quality’ which was developed by the US Institute of Medicine in 2000:

“The usual six dimensions of quality are: safety, effectiveness, appropriateness, consumer participation (or acceptability), access and efficiency. Sometimes equity is added to this list. The ‘dimensions of quality’ were rapidly included in health policy documents internationally, underpinning various frameworks for strategic change and performance.

“These frameworks represented important reflections on the nature of health care work – early attempts to define what ‘good’ looked like. They were also used as checklists for scoring achievements and developing indicators. However, their utility for strategic use – for allocation of resources, for prioritising or promoting one activity over another – was limited due to their essentially reductive nature.” (Australian Commission on Safety and Quality in Health Care, 2009, p. 3)

Further problems arose with the incorporation of a patient focus into issues of quality and safety. Most patients were primarily concerned about their own care, and not overly concerned about issues such as access, equity or efficiency which were focused on system level issues, and groups of patients. Similarly, clinicians tended to focus more on the care of the individual patient in front of them, rather than on system issues.

ACSQHC’s Australian Safety and Quality Framework for Health Care (2010) now focuses on safe, high quality care which is always consumer centred, driven by information, and organised for safety. These goals are supported by more narrowly defined action areas such as developing methods and models to help patients get health services when they need them, partnering with patients, families and carers to share decision making about their care, improving continuity of care, minimising risks at handover, and using agreed guidelines to reduce inappropriate variation in the care delivery.

Cardiff, Sheps, Nyce and Dekker (2008) reviewed literature related to safety in complex systems, and interviewed nurses, nurse managers and senior decision-makers about their perceptions of safety. In the literature, strategies for improvement were predominantly framed as quality improvement interventions, a view that was shared by the senior managers surveyed. Nurses at the ‘sharp end’ of care viewed safety in a broader...
context, emphasising the value of flexible work practices and experience as contributing to safe practice. The authors emphasise the importance of dealing with quality and safety as related, but separate aspects of care.

This resource considers the quality of care from both a clinical perspective, and from the perspective of the patient. This section is primarily focused on clinical aspects of quality; a patient-centred view of quality is provided in Section 6.2 below.

Improvements in the quality of care result in improvements in safety, although safe care can be provided within a low-quality system. It is also evident that improving quality by improving predictability can improve safety (because staff know what to expect, and are more able to identify inappropriate variances). At the same time, a lack of predictability can contribute to inappropriately prolonged stays that can be unsafe because of increased risks (for example, healthcare associated infections (HAIs), de-conditioned patients, increased risk of adverse events, worsening dementia);

*Interruptions increase risk*

Much of the communication about patient flow is ad hoc, informal and unscheduled. Poorly structured communication about flow can lead to an increase in the number of communication events without increasing the content or quality of that communication. The resulting increase in interruptions can lead to a reduction in the quality and safety of care.

Westbrook, Coiera et al (2010) used a prospective observational study to evaluate the association between interruptions and task completion in an Australian ED. They found that clinicians who were interrupted during clinical tasks reduced the total time which they spent on those tasks. They also found that 18.5% of interrupted tasks were then abandoned.

Westbrook, Woods, Rob, Dunsmuir and Day (2010) assessed the impact of interruptions on the activities of nurses preparing and administering medication in two teaching hospitals in Sydney. They used an observational study to monitor behaviour, and used data in patient chart to identify errors. They found that each interruption resulted in a 12.7% increase in clinical error, independent of the hospital or the nurse. Increases in the frequency of interruptions were associated with an increase in the severity of the errors identified.

<table>
<thead>
<tr>
<th>Go away, I'm busy</th>
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<td>The interruption of interruptions</td>
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**Length of stay**

Although it may seem trite to make the statement, it should be remembered that patients should stay in hospital as long as is required for their episode of acute care, but no longer. The reason for this restatement of the obvious, is that unnecessary delays in patient discharge appear to create far less concern than delays in admission, although the former may quite regularly result in the latter (for another patient).

There are significant risks for patients who are discharged before their hospital episode of clinical care has been brought to a safe conclusion, or before they and their carers are mentally, physically and practically prepared for the transition from hospital. Discharge planning can be complex for some patients and rushing that process can increase the likelihood of error (particularly errors of omission). The response to this challenge should be to routinely begin discharge planning early in the patient’s admission, rather than ending up having to rush the discharge planning process, or to extend the patient stay unnecessarily to facilitate its completion.

Significantly, each day that a patient stays in a hospital bed adds to the likelihood of an adverse event for that patient. This is discussed in more detail in Section 6.2 below.

The research conducted during site visits provided evidence of both:

- Patients being moved on from hospital at a time which experienced staff described as “almost too soon”; and
- Patients whose clinical care was complete, and who were ready to leave hospital being delayed because of clinical scheduling issues and the timing of administrative or operational activities.
Neither of these situations represents good, safe clinical practice.

**Errors**

A number of unsatisfactory outcomes are associated with extended patient stays in hospital.

These include:

- Healthcare associated infections (some involving multiply resistant organisms such as MRSA or VRE);
- Falls;
- Circulatory problems resulting from prolonged inactivity;
- Decubitus ulcers (pressure sores); and
- Social isolation and disempowerment.

These problems are in addition to the well documented adverse impacts of a protracted patient say in an ED.

Clarke and Rosen (2001) searched for evidence linking shorter hospital stays with adverse patient outcomes. Based on their review, they concluded that reducing days of stay at the low intensity end of a hospital stay did not appear to adversely affect the patient’s health outcome.

Schilling, Campbell, Englesbe and Davis (2010) conducted a retrospective cohort study to assess the whether any of four factors had an independent impact on hospital inpatient mortality. They found that the largest increase in mortality risk was from seasonal influenza (0.5% increase), followed by admission during a weekend (0.32%) and high hospital occupancy at the time of admission (0.24%). Higher nurse staffing levels decreased the absolute risk of mortality by 0.235% for each additional nurse (full-time equivalent) FTE per patient day.

Gilligan and Walters (2008) reported on the impact of an NHS Trust’s participation in an Institute for Health Improvement (IHI) Impact Collaborative, which was designed to improve patient flow through the Trust’s hospitals. The primary flow objective was to reduce the number of medical outlier patients. The three options suggested as ways to achieve this were to reduce emergency admissions, increase the number of medical beds, or reduce length of stay. The third option was adopted. Staff collaborating on the initiative worked to reduce unnecessary delays and waste by focusing on physician practice, improved discharge, and better bed management.

One change introduced that the authors identified as having an immediate impact was to introduce a daily review of patients in Medicine by a senior physician. This change led to an immediate reduction in outlier patients, as well as a reduction in overall bed numbers. In the longer term, the initiative provided an associated benefit by reducing overall patient mortality.

**ED-Hospital transitions**

Managing the quality of clinical care during the transfer of patients between locations within a hospital can be challenging. Patient movements are always a time of increased risk.

Horwitz et al (2009) surveyed the medical staff in a United States hospital to identify the incidence of failures when patients transitioned from the emergency department to inpatient care. Of the 139 clinicians who responded, 29% reported an adverse event or "near miss" with a patient of theirs during transfer from emergency department to inpatient care. These incidents included errors in diagnosis, treatment and disposition. Vulnerable areas included communication, environment, workload, information technology, patient flow and assignment of responsibility. A table in this paper highlights specific vulnerable components of the transfer from ED to a ward, and offers some potential solutions.

Safe clinical practice during transfers depends on good communication, and on good working relationships between the staff involved in the transfer. Poor communication or strained relationships between staff can reduce the quality of care, and create a risk to patient safety.

Abraham and Reddy (2010) adopted a socio-technical approach and used qualitative data collection techniques (including observations of patient transfers and interviews with staff) to explore the challenges associated with the movement of patients between departments. They found that the patient transfer process was hindered by ineffective interaction between departments, ineffective information handover, and ineffective information and communication technologies (ICTs). The paper includes a description of the process of transferring a patient

67/134
from ED to the neuro-surgical intensive care unit (NSICU) that will be familiar to some staff in Australian hospitals:

“Once a NSICU bed becomes available, the ED nurse (EN) immediately contacts the NSICU nurse (NN) receiving the patient to give “report”. NN informs EN that she cannot take report at that time because she is busy with her other patients in the department. NN asks EN to call her after 15 minutes. EN calls back after 15 minutes. However, NN still does not take report and promises to call back EN once she becomes available. As a result, the patient stays in the ED for couple of hours after the bed has been assigned.” (Abraham & Reddy, 2010, p. 117)

Staff satisfaction
In a hospital where systems have not been deliberately designed to support smooth flow, staff may experience pressure to ‘hurry’ the patient through the system. In practice this results in activity which does not directly contribute to patient care, but is seen as necessary to maintain patient flow through the system. These activities are frequently described as “workarounds” or “nagging”, and are likely to include a large number of telephone calls.

For example, at a time of peak activity, with delays in ambulance offload, an ED Nurse Unit Manager (NUM) may receive telephone calls from six or more senior staff asking about delays in patient flows, and urging the NUM to hasten the movement of patients out of the ED to admitted care wards. These calls take up valuable time which would be better used in providing clinical care or processing the administrative requirements associated with patient movements.

Similarly, junior medical officers (JMOs) or registrars may be asked by NUMs, often forcefully, sometimes more than once, to take action to get a patient discharge under way. In some cases, situations such as these have become a standard practice seen as necessary to keep patients flowing through the system. These practices can lead to increased levels of stress, and result in a decrease in work satisfaction for all staff involved.

An editorial by Litvak and Laskowski-Jones (2011) highlights the challenges to patient safety which can result from fluctuating workloads, and the inherent challenges in attempting to vary nurse staffing to match variable numbers of admitted patients. The authors suggest that improved management of patient flow to reduce peaks and troughs in workload is the most effective way to maintain safe nurse-patient ratios.

Virtanen et al (2008) evaluated the relationship between high bed occupancy in 16 Finnish hospitals and anti-depressant use by staff. The study used activity data from 203 wards in five metropolitan and 11 regional hospitals from 2000 to 2004; the measure of crowding was average bed occupancy for each ward over six months. Staff who spent at least six months on a ward were included in the study; the sample comprised 6,699 nurses and 641 physicians. Anti-depressant use was determined from national dispensing records, and the primary outcome was starting a new course of anti-depressant treatment after exposure to high bed occupancy (above 85%). After correction for potential confounding factors, exposure to bed occupancy above 95% for an extended period was found to be associated with a 1.7 times increase in the risk of new anti-depressant treatment.

Smother flow will result in safer patients, and improvements in the quality of the care which is provided to them. Smother flow will also lead to fewer interruptions for busy staff, and a decrease in the unpredictability of daily activities.

5.2.2 Strategic interventions

There are a number of patient flow interventions at the strategic level which can improve aspects of quality and safety from a clinical perspective.

Be clear about what aspects of quality the organisation values, and also about what it expects as a standard of clinical care. These expectations should be understood by all clinical staff.

Assess and evaluate incident data, outcome data and patient and staff feedback to measure relevant aspects of the quality of care. Share the results with clinical staff, and take a planned approach to addressing shortcomings at a system level.
Promote and support the adoption of standardised clinical practice wherever possible. Standardised practice can enhance clinical outcomes, and the resultant reduction in variability will lead to smoother patient flow.

### 5.2.3 Operational and tactical actions

There are a number of actions at the ward or service level which can help to enhance the quality and safety of care.

Ensure all staff providing care for a patient understand their needs - clinical, physical and emotional - and meet those needs while providing care.

Compare the clinical care provided with best practice models of care, and update the approach to care where indicated.

Ensure that staff are provided with the opportunity to contribute to the development of policies and procedures, and are allocated time to contribute.

### 5.3 Governance (Clinical)

Governance is the provision of transparent and accountable leadership within an organisation. This section considers governance as a part of clinical care; executive governance is discussed in Section 4.4 above. In the context of patient flow, good governance means ensuring that every person in the organisation understands that they share in the responsibility for smooth patient flow. Sound governance entails the provision of effective sponsorship, and ensuring that the accountability of individuals and groups is clear. Without good governance, all of the other elements associated with the management of patient flow can fail. (NSW Health, 2012)

#### 5.3.1 Summary of evidence

The concept of clinical governance is relatively new; interest in clinical governance grew in the NHS in the 1990s, largely in response to the inquiry into paediatric cardiac surgery deaths at the Bristol Royal Infirmary. Clinical governance “…integrates clinical decision-making within an organisational framework and requires clinicians and administrators to take joint responsibility for the quality of clinical care delivered by the organisation.” (NSW Health Quality and Safety Branch, 2005, p. 14) A literature review by Braithwaite and Travaglia (2008) found that effective clinical governance depended on four components: its use to promote quality and safety; the creation of clinical governance structures to improve safety and quality; the effective use of data and evidence; and the sponsoring of a patient-centred approach.

There is a tension between clinician autonomy, and the clinician’s intention to provide the best possible care for the single patient in front of them, and the need to provide multidisciplinary care within a large organisation, and its associated obligation to ensure that clinician actions will not unduly harm the capacity of the overall system to function effectively (for their own immediate patient, and for all other patients). This tension plays out in a situation where a consultant may wish to have a patient stay a little longer, with the possibility of achieving a marginally better or more stable clinical outcome, while a patient awaiting admission from the ED is deteriorating clinically as a result of the delay in receiving care (and the ED case may be the next ward case for the consultant).

Many of the actions and omissions which influence the flow of patients through a hospital are part of everyday clinical practice, and administrators are unlikely to influence that practice by direct exhortation or direction. The clinical governance frameworks which are already in place are probably the most appropriate avenues for pursuing those improvements in patient care which can contribute to improved patient flow.

The quality of clinical care provided within a hospital environment relies on effective clinical governance. This governance should be clinically driven, rather than a having an administrative focus, but should also take into account the requirement to make effective use of the organisation’s resources, as well as having cognisance of the needs of the patient.

Good clinical practice is now seen to include responsibility for the safe operation of aspects of the healthcare system, as well as direct responsibility for the individual patient receiving care.
VMOs are given permission to be unpredictable
Some VMOs may appear to have an unpredictable schedule for their ward rounds; this behaviour requires permission, or at the very least, acceptance, from a senior level.

5.3.2 Strategic interventions

There are a number of interventions at the strategic level which can improve focus on aspects of clinical governance which support patient flow.

Ensure that an appropriate structure is in place for clinical governance within the organisation. This structure should be broadly accepted by the majority of clinicians, provide an effective mechanism for dealing with issues relating to clinical governance, and have applicability to all clinical staff providing services to patients within the hospital. A senior clinical member of the executive team will probably be the conduit between the clinical governance structure and the executive.

Ensure that patient flow issues which have the potential to affect the quality of care and patient safety are included on the agenda of the body responsible for clinical governance.

One aspect of clinical governance will address issues of significance to professional peers, but good governance is also needed for the behaviour of multidisciplinary teams.

A designated member of the executive team should initiate or continue a conversation with VMOs about issues related to patient flow, in order to help them understand how their behaviour affects flow, and how changes in the way they work could help the hospital overall, with possible mutual benefits. The continuing conversation could also include a request for help in improving the organisation of the clinical work of their peer group (for example through discussions within the Department of Medicine).

Make sure that the hospital’s expectations about clinical practice are clearly stated, and understood by all clinical staff, particularly as they apply to matters related to patient flow.

5.3.3 Operational and tactical actions

There are a number of actions at the ward or service level which can help to enhance clinical governance. These are discussed below.

Ensure that all clinical staff understand the hospital’s clinical governance structure. Also ensure they understand that they work as part of the hospital’s clinical team, and that they understand the hospital’s expectations about their clinical practice.

Make sure that standardised work practices, and clinical accountability within those practices is clear and transparent.

Emphasise that the Nurse Manager has both administrative and clinical responsibility for the management of patient movements in and out of her ward, unit or service.

5.4 Key readings for this chapter


The authors adopted a sociotechnical approach and used qualitative data collection techniques (including observations of patient transfers and interviews with staff) to explore the challenges associated with the movement of patients between departments. The authors found that the patient transfer process was hindered by ineffective interaction between departments, ineffective information handover, and ineffective information and communication technologies (ICTs).

This Framework focuses on safe, high quality care which is always: consumer centred, driven by information, and organised for safety. These three goals are supported by more narrowly defined action areas such as developing methods and models to help patients get health services when they need them, partnering with patients, families and carers to share decision making about their care, improving continuity of care, minimising risks at handover, and using agreed guidelines to reduce inappropriate variation in the care delivery.


The authors used discrete event simulation to develop a ‘perfect world’ model of an emergency department (ED) with no external constraints on resources or processes in order to quantify the ‘efficiency gap’ between current performance and the theoretically possible best performance in terms of patient throughput.


This retrospective analysis of administrative data examines the flow of patients through a 22 bed neuroscience critical care unit (NCCU) in a large US university hospital. The authors found that patients discharged from the NCCU on days when there were ten or more admissions to the unit were 2.5 times more likely to make an unplanned return within 72 hours, but were unable to determine whether pressure to accommodate new admissions to the unit contributed to an increased readmission risk.


This brief study of inpatients in a surgical unit in an NHS hospital found that of the 75 surgical inpatients in hospital on the day of the study, 9 (12%) were in the category of a ‘delayed discharge’, and 8 of these were delayed because of the need for rehabilitation or a nursing home bed. The authors concluded that the 9 ‘delayed discharge’ patients accounted for 179 bed days - 35% of the total.


This literature review found that effective clinical governance depends on four components: its use to promote quality and safety; the creation of clinical governance structures to improve safety and quality; the effective use of data and evidence; and the sponsoring of a patient-centred approach.


This paper combines a literature review of safety in complex systems, and interviews with nurses, nurse managers and senior decision makers about their perceptions of safety. In the literature, strategies for improvement were predominantly framed as quality improvement interventions, a view that was shared by the senior managers surveyed. Nurses at the ‘sharp end’ of care viewed safety in a broader context, emphasising the value of flexible work practices and experience as contributing to safe practice. The authors emphasise the importance of dealing with quality and safety as related, but separate aspects of care.


This paper describes an approach to the improvement of operating theatre scheduling. The approach uses Monte Carlo simulation and mixed integer programming as a way of reducing variability in surgical bed utilisation. The authors also provide a case study of the use of the scheduling model in a large Canadian tertiary care hospital. Details of the calculations used in their approach are included as an Appendix.

This review of the evidence linking shorter hospital stays with adverse patient outcomes suggested that reducing days of stay at the low intensity end of a hospital stay did not appear to adversely affect the patient’s health outcome.


This paper provides practical suggestions aimed at eliminating variability where possible, and then managing the remainder. Suggested initiatives include redesigning the surgical block schedule to distribute major cases and specialized procedures (such as joint replacements) throughout the week, maintaining a separate (staffed) emergency theatre, establishing common standardised protocols patient preparation before surgery, standardised surgical preference lists, and focusing on starting operations on time, and managing turnover time between operations.


This paper describes the use of a simulation program to model potential improvements in patient throughput in a sonography service in an Australian hospital.


A report on the impact of an NHS Trust’s participation in an initiative which was designed to improve patient flow through the Trust’s hospitals, with the primary flow objective of reducing the number of medical outlier patients. Length of stay was reduced by reducing unnecessary delays and waste by focusing on physician practice, improved discharge, and better bed management. A new daily review of patients in Medicine by a senior physician had an immediate impact, leading to an immediate reduction in outlier patients and a reduction in overall bed numbers.


This structured literature review on the use of operational research to improve operating theatre management offers insights into improvements in performance at the strategic level (assigning operating time to surgical groups), the tactical level (constructing a master surgical schedule) and the operational level (the day to day scheduling of individual patients).


This opinion piece makes a case for applying Lean improvement principles to the management of surgical workflow in a German hospital setting. The author emphasises that, even though the system of care will become more routine, the patient should not become just a ‘case’ or a ‘customer’.


This paper describes the development and use of a deliberative checklist for ward rounds, particularly for those other than surgery, which lists those aspects of care which should be considered, discussed, have actions identified and be the subject of communication.


This paper describes the application of Lean improvement techniques in the sterile products area and inventory area of a university hospital inpatient pharmacy in the US. The initiative resulted in a reduction in waste with an annual value of $275,000, and an inventory reduction of $50,000. These changes allowed two FTE staff to be redeployed to other areas.

This paper reviews the accuracy with which triage nurses are able to predict the disposition (accepted for admission or discharged) of patients presenting to an Australian emergency department over two separate one-week periods. Overall, the triage nurses’ prediction matched actual patient disposition for 75% of patients. Prediction of admission was most accurate for patients in high triage categories, and the prediction of discharge was most reliable for patients with injuries and febrile illnesses (89%).


This paper describes a process improvement project in an inpatient renal medicine unit in a Canadian hospital. The first stage saw the development of a flowchart for an inpatient stay, including the point at which the patient was functionally and medically stable for discharge. The author noted that the concept of discharge readiness was not clearly documented in the patient record, and was usually determined during impromptu meetings of the clinical team. The second stage of the process documented the key steps during the patient’s admitted episode.


The authors surveyed clinicians to identify the incidence of failures when patients transitioned from the emergency department to inpatient care. Of the 139 clinicians who responded, 29% reported an adverse event or “near miss” with a patient of theirs during transfer from emergency department to inpatient care. These incidents included errors in diagnosis, treatment and disposition. Vulnerable areas included communication, environment, workload, information technology, patient flow and assignment of responsibility.


This editorial highlights the challenges to patient safety which can result from fluctuating workloads, and the inherent challenges in attempting to vary nurse staffing to match variable numbers of admitted patients. The authors suggest that improved management of patient flow to reduce peaks and troughs in workload is the most effective way to maintain safe nurse patient ratios.


This paper describes the use of a mathematical patient flow model to evaluate two years of prospective activity data in an 18 bed non-cardiac intensive care unit in a US hospital. The authors used the model to predict the likelihood of a request for admission being rejected, based on the admission, discharge, and rejection data. The model accurately predicted the risk of a rejected admission request, and allowed an accurate prediction of demand, and calculation of the bed numbers required for the unit’s workload.


A report on an initiative of the Australian Council for Safety and Quality in Health Care about shared meanings for terms commonly used in discussion about quality and safety in healthcare.


This is a retrospective cohort study into which factors had an independent impact on hospital inpatient mortality. The largest increase in mortality risk was from seasonal influenza (0.5% increase), followed by admission during a weekend (0.32%) and high hospital occupancy at the time of admission (0.24%). Higher nurse staffing levels decreased the absolute risk of mortality by 0.235% for each additional nurse FTE per patient day.

The authors describe the use of Lean techniques and a scenario analysis to implement a standardised process for ward rounds in a US paediatric intensive care unit. The new ward round format stressed essential processes, and was associated with increased timeliness and efficiency, better staff and customer satisfaction, improved throughput, and less time from attending physicians.


This retrospective analysis of activity data was used to evaluate clinical outcomes for patients boarded in ward corridors according to the hospital’s ‘full-capacity protocol’, which excluded a number of categories of patient, including those who: required direct admission to ICU or step down care; had diarrhoea, neutropaenia, or chest pain with a positive first troponin test result; needed regular suction or high-flow oxygen, or respiratory isolation. The authors found no evidence that ward boarded patients were subjected to additional risk; they had a shorter time to ward bed admission, lower in-hospital mortality, and were less likely to be transferred to ICU.


This paper evaluates the relationship between high bed occupancy and antidepressant use by staff in Finnish hospitals. After correction for potential confounding factors, exposure to bed occupancy above 95% for an extended period was found to be associated with a 1.7 times increase in the risk of new antidepressant treatment.
6 Smooth flow and patient centred care

“It’s obvious in one way: you need to work on reducing the number of steps and identifying and cutting out hidden waits. What is challenging is that we are all so busy that as we strive to be efficient personally, we can actually make things worse,.....In order to keep the flow, you must reflect on the impact any changes you make will have on the whole system, not just your own work.”

(NHS Institute for Innovation and Improvement, 2008, p. 19)

This chapter presents evidence on two key elements in the patient flow systems (PFS) framework. For each element the evidence is considered in relation to strategic, operational and tactical aspects of smooth flow in patient centred care. This chapter specifically examines the following key elements: Care Coordination; and Quality and Safety (with a focus on the perspectives of patients). The selection and focus on these two elements aligns directly to other resources provided as part of the broader collaborative project on patient flow education including the training manual on smooth patient flow.

From a patient-centred perspective, it can be stressful to be uncertain about the next step in care, or to have no knowledge of that next step. This stress can be magnified if it is apparent that members of the care team are also uncertain about the intended course of the patient’s hospital journey.

Care coordination can reduce the level of stress for the patient, particularly if the patient is involved in the process of care coordination.

Quality and safety from a patient perspective requires a focus on the patient experience, ensuring that there is good communication about the care process, and that unnecessary delays in care are minimised. Placing the patient in a clinically appropriate location (minimising or avoiding days of stay as an outlier) can also enhance patient safety.

6.1 Care coordination

Care coordination is the process of navigating each patient’s journey through the health system in order to minimise any unnecessary waits or delays. Effective care coordination must involve all of the relevant staff in the planning of a patient’s care from admission. The coordination process should begin when the patient first enters a service, and continue through to the time of discharge and beyond. (NSW Health, 2012)

6.1.1 Summary of evidence

Within NSW hospitals care coordination starts at the time of admission (or pre-admission for scheduled services), and includes a review by the care coordination team. The clinician with primary responsibility for the patient’s care should determine an estimated date of discharge to be included in the patient’s electronic record. As the end of the patient’s hospital stay approaches the discharge planning which began early in the admission includes a liaison and coordination with community providers about the transfer of care and referrals for that care. Finally, at the time of discharge, there is a transfer of care out from the hospital to community providers.

Care coordination relies on policies and practices which help to navigate patients through the health system to minimise waits, avoiding or reducing delays. The patient’s healthcare journey through a hospital is complex; sometimes decisions or practices inherent in the system can make it even more complex and protracted. Coordination of care can reduce unnecessary waiting between steps in the patient’s care process, resulting in a shorter stay for the patient, and better use of hospital resources. The diagram below maps many of the points along the journey that offer opportunities for improved coordination.
Coordination of care to reduce hospital visits

Peter et al (2011) evaluated a nurse-led ambulatory care coordination program, based in the Princess Margaret Hospital in Perth WA, for children with complex care needs. The program provided telephone support, a personalised integrated healthcare plan, regular monitoring and assessment, and continuum of care coordination. The authors used a pre- and post- clinical cohort study, comparing emergency department (ED) presentations, hospital admissions and lengths of stay in the 10 months prior to program implementation with the 10 months following implementation (for the same group of 101 children). The period following the introduction of the program saw a reduction in ED presentations (from 470 pre-program to 398 post), hospital admissions (410 to 375) and bed days (3,699 to 1,598). An analysis of service costs showed a saving of $1,942,000 (net of program costs).

Schjøttz et al (2011) used a historical cohort study to compare hospitalisation rates (for angina, heart failure, chronic obstructive pulmonary disease, and hypertension) and readmission rates for patients over 65 years in the Danish healthcare system (DHS) with those in the US Kaiser Permanente (KP) healthcare system. They found that DHS had substantially higher rates of hospitalisations, readmissions, and mean lengths of stay per hospitalisation, than KP. Hospitalisation rates in DHS, standardised for age and gender, were 2.5 times higher than those in KP (5.21 vs 2.02 hospitalisations per 100 people), although mortality up to 30 days post-discharge was not consistently different in the two systems. The authors suggest that reductions in hospitalisations in DHS could improve patient welfare and free up resources for community care of chronic disease.

Care coordination in the ED

Corbett, Lim, Davis and Elkins (2005) conducted a before and after (pre- and post-) study of the impact of emergency department based care coordination in a Victorian hospital. The introduction of a care coordination service resulted in a reduction in the number of patients admitted from the emergency department, and a reduction in inappropriate and unnecessary emergency department presentations. Both patients and hospital staff expressed a high level of satisfaction with the service.

Care coordination and multidisciplinary ward rounds

The safe and effective coordination of patient care during a hospital episode is entirely dependent on good communication between all members of the health professional team providing care to the patient. Paper or electronic records shared between team members cannot provide an effective substitute for interactive face-to-
face communication. In this context, the Garling Report (Garling, 2008) included firm statements about the importance of multidisciplinary ward rounds and effective handover of patient care:

“1.110 The evidence shows that a team-approach to treatment is likely to produce the best results. One proven technique is the multi-disciplinary ward round which includes the consultant and registrar, junior doctors, nursing staff, pharmacists and, where relevant, allied health professionals such as speech therapist or physiotherapist.

“1.111 I am satisfied that NSW public patients will have much better outcomes from their stay in hospital where this model of care is adopted, because it gathers together everyone involved in the patient’s care at one time and in the presence of the patient where communication is going to be most effective. So I recommend that there should be a state-wide policy for multi-disciplinary daily ward rounds be introduced. The policy should require that ward rounds occur in the early morning, be multi-disciplinary, that accurate and complete notes are taken which are approved by the supervising doctor [within] 24 hours.

(Garling, 2008 (Overview, pp 17.))

The NSW Health document *Multidisciplinary Ward Rounds: A Resource* (NSW Health, 2011) identifies four types of ward round: a teaching round, focused on the training of junior medical staff; a review round not attended by medical staff; a traditional round involving different health professionals; and a ‘working round’ where the medical team review their patients. It was the third of these (the ‘traditional ward round’) which attracted Garling’s interest.

A cardiologist told Garling about the challenges in ensuring effective communication between doctors and nurses during the course of a patient’s hospital care:

“... if there is no nurse on the ward round, it can sometimes be difficult for the doctor to locate a nurse afterwards to whom he or she can communicate what is required for each patient. Even if the doctor does locate a nurse, it may be a junior nurse or a nurse who is not responsible for the particular patient and who may therefore be reluctant to accept responsibility for the information. I was told that sometimes doctors ‘give up’ in the hope that the nurses read the clinical notes.” (Garling, 2008, p. 528)

And even notes taken during a ward round may not provide a reliable record of clinical discussions:

“...the most junior member of the team writing the notes may miss the point entirely or not record all that is said. The registrar or specialist in charge of the ward round rarely makes time to check or amend what is written.” (Garling, 2008, p. 530)

These observations and others led Garling to make his Recommendation 55: “Daily multi-disciplinary ward rounds should be introduced at which accurate and complete notes are taken which are approved by the supervising doctor within a specified timeframe” (Garling, 2008, p. 530), which resulted in the publication of *Multidisciplinary Ward Rounds: A Resource*, (NSW Health, 2011), a document intended to assist facilities with the implementation of daily multidisciplinary ward rounds.

There is some evidence from the US of improvements in patient flow and patient outcomes as a result of interdisciplinary ward rounds. Dutton et al (2003) describe the successful introduction of multidisciplinary ‘discharge rounds’, as an adjunct to existing ‘work rounds’, in a US trauma centre. These daily discharge rounds included medical staff from multiple clinical teams including orthopaedic surgery, the discharge coordinator, physiotherapy and speech pathology, and the ward nurse caring for the patient. Introduction of these discharge rounds resulted in a 15% reduction in ALOS, and a 36% increase in admission volume, with bypass status almost totally avoided. The primary reasons which the authors identified for the success of the rounds were faster and more direct communication about care within the treating team, and daily participation of senior physicians in decision making about discharge. Halm et al (2003) describe the process used to facilitate the introduction of multidisciplinary ward rounds in a US heart hospital. The authors noted an improved focus of patient and family outcomes by all disciplines, earlier recognition of patients at risk, and improved communication.

However, there are a number of complicating factors, which Bradfield (2010) explores in some detail in his comments on the Garling Report. First, Bradfield considers the inherent challenges involved in moving to daily
ward rounds. He suggests that consultants will require convincing evidence before agreeing to daily ward rounds, but cautions that the level of evidence is not strong. Intensive care units usually conduct several ward rounds each day; in cardiology units, daily ward rounds are common. However, in aged care wards and mental health wards, less frequent ward rounds have been the norm. While there is good evidence of benefit from daily rounds in trauma medicine (Dutton et al., 2003) and cardiology (Halm et al., 2003) there appears to be less evidence for the universal introduction of daily rounds.

“Of course, the devil is in the detail. Achieving this will require health services to redesign long-established ward-based routines and practices. Arguably, more direct and rigorous evidence is needed before this could be justified. Moreover, change is seldom easy.”

(Bradfield, 2010, p. 193)

Bradfield goes on to consider challenges involved in engaging a multidisciplinary team in ward rounds. The principal difficulty which he identifies relates to medical culture:

“Fifty years ago, public hospital doctors were honorary visiting medical officers who ‘donated’ their services. Even today, many doctors working in private hospitals continue to function relatively independently from the hospital. Medical students, often taught by these doctors, are trained to be relatively autonomous decision-makers, rather than employees or team-members. Therefore, both pre-vocational and vocational medical training inculcate personal responsibility for decisions and patient outcomes, which often dissuades doctors from embracing multidisciplinary teamwork. If the responsibility that senior doctors feel for their patients could be extended to a holistic team approach that transcends the traditional doctor–patient relationship, junior doctors would likely follow, as they would learn and develop these skills through observation and experience.”

(Bradfield, 2010, p. 194)

He does not make an argument that more frequent ward rounds are not possible. Neither does he suggest that a move to multidisciplinary rounds cannot be made. Rather he cautions about the level of commitment and support from those at senior executive levels.

“Visible involvement of the chief executive and senior executive management is essential in setting standards for service delivery and demonstrating a hospital-wide commitment to improving patient safety. Executive managers often share the commitment of clinicians to improving clinical outcomes and work practices. They are keen for their hospital to be seen as committed to achieving better outcomes for patients and staff, while maintaining a sharp focus on organisational performance.”

(Bradfield, 2010, p. 195)

While confounding factors such as those identified by Bradfield may make universal implementation of multidisciplinary difficult, it did appear from the evidence gathered during site visits (NSW Hospital site visits, 2012) that more could be done to address Garling’s recommendation.

Coordinating rehabilitation

New and Poulos (2008) reviewed the state of rehabilitation services in NSW and Victoria, and suggested that the issues that they found were likely to apply in other States of Australia as well. They observed that it was common for patients to experience functional decline (‘deconditioning’) during their acute hospital stay, that could result in a prolonged recovery period. An extended stay could then increase the likelihood of preventable complications such as pressure ulcers, falls, malnutrition and contractures. The authors note that “under-resourcing of allied health staff in some acute care hospitals results in patients receiving minimal therapy and discharge planning once they have been identified for rehabilitation or other subacute care. This contributes to functional decline and increases subsequent length of stay in subacute care.” (New & Poulos, 2008, p. 341) The authors suggest that it is preferable for rehabilitation facilities to be physically associated with acute care facilities. They express the view that rehabilitation in a separate facility must currently wait until the acute care episode is complete, leading to a hiatus in both acute care and rehabilitation. They also note that transfer to a separate rehabilitation facility usually happens late in the day, which effectively introduces an additional day’s delay in the patient’s care. New and Poulos also identify a problem with exit block from rehabilitation care for young people, as a result of the lack of suitable options for supported accommodation. As a result, younger
patients either have an extended stay in rehabilitation, or are transferred (inappropriately) to residential aged care. The authors make a number of recommendations for the redesign of rehabilitation services in Australia.

**Planning discharge**

- Nurse led, criterion based, or event based discharge is a concept which struggles to find relevance in an Australian setting.
- The potential for active roles for both patient and carer in discharge planning are frequently ignored. This leads to the disempowerment of both patient and carer, and a culture of dependence and entitlement.

The UK Department of Health’s *Discharge from hospital: pathway, process and practice* (2003) provides good practice guidance for discharging patient from NHS hospitals. The guide notes that despite 30 years’ research literature into effective discharge, failure of routine discharge arrangements is still common, with older patients being most commonly affected. The failures include discharges which are: too soon; delayed; poorly managed from the patient’s perspective; or to an environment which is not safe for the patient. Despite being tailored for an NHS environment, the guide provides useful suggestions about strategies for engaging staff in both hospital and community settings, as well as patients and carers, in managing improvements in discharge practice.

Not every patient discharge is a complicated process. It has been estimated that up to 80% of acute hospital discharges are straightforward, and are amenable to some degree of streamlining and standardisation. The UK Department of Health has published a toolkit for multidisciplinary care coordination teams (2004) which focuses on practical steps for improving simple discharge. The document highlights a number of common myths and inhibitors relating to discharge, and provides a step by step guide to making simple discharge work, relevant case studies, and a collection of practical tools to improve discharge.

Mukotekwa and Carson (2007) used soft systems methodology to analyse the discharge planning process in an NHS hospital. Their analysis showed that discharge planning could be improved by better co-operation between the healthcare professions, taking a more holistic approach to the needs of patients, making better use of nursing staff resources, and making better use of information and communication technology (ICTs) as a means of communication.

A recent Cochrane review (Shepperd, Parkes, McLaren, & Phillips, 2010) evaluated randomised controlled trials which compared individualised discharge planning with usual discharge care (not individually tailored). The authors of the review concluded that the evidence suggested a structured discharge plan tailored to the individual patient could probably bring about modest reductions in hospital length of stay and readmission rates for older people who were admitted to hospital with a medical condition. The evidence about the impact of discharge planning on mortality, health outcomes and cost was inconclusive. It should be noted that a larger impact might have been observed if “individualised discharge planning” had been compared with “uncoordinated discharge planning”.

Within NSW hospitals, differences in the timing of discharge summary preparation and dispatch leads to variable delays in the process of patient discharge (NSW Hospital site visits, 2012). Sites may varyiously: require discharge summary completion before the discharge prescription can be sent to pharmacy; wait for the discharge summary to be completed before the patient leaves hospital (and the patient takes the discharge summary with them); or complete the discharge summary and e-mail it to the general practitioner within 48 hours of discharge. There are doubtless valid local reasons for each approach.

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<th>Resourceful patients</th>
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<td>Patients and their carers may be able contribute to the planning of their return home; they haven’t got much else to do.</td>
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The International Centre for Allied Health Evidence at the University of South Australia has published a Discharge Planning Checklist for Patient and Carer (International Centre for Allied Health Evidence, University of South Australia, 2012). This checklist is intended to prompt the patient and carer to think about practical issues related to their return home from hospital. These issues cover getting home successfully, staying at home safely, avoiding isolation, having someone to provide care, whether the patient has a role as a carer, details of the
patient’s general practitioner, medications, services and equipment that could help them manage at home, pets, garden and house care, transport, and things they should do before going home.

The checklist is intended to be completed by the patient and their carer, rather than by hospital staff. It is likely that thinking about and discussing these issues in the days leading up to discharge will eliminate a number of confounding issues around the time of the patient’s departure from hospital, and increase their level of confidence about the transition.

**Coordination of post-hospital care**

Moran, Davis, Moran, Newman and Mauldin (2012) highlight the risks associated with poorly coordinated transfer of care from hospital to post-hospital providers (including the risk of readmission) and recommend automated notification to primary care providers about the patient’s discharge at the end of a hospital episode.

Travers et al (2008) used a computer simulation model of the Australian health and aged care system to model access to permanent high care places in residential aged care (RAC). Their model conceptualised three competing queues for high care places, fed by applicants from acute hospitals, the community, and within aged care facilities. Their modelling suggested that acute hospitals act as a safety net, accommodating some people with high care needs for whom there is not a currently available RAC place. Since this is the case, hospitals should work to ensure that there is effective synchronisation of hospital discharges for patients needing residential care with the appearance of vacancies for residential places. Hospitals might also consider reserving residential aged care places for hospital use if patients who are ready for discharge to residential care are slow or reluctant to make their choice of facility.

Walker and Haslett (2003) explored the impact of admissions policy for a sub-acute facility on the mix of patients transferred from acute care, and on funding. Improved bed management in the sub-acute facility meant an increase in bed availability. This resulted in patients being transferred from acute care at a higher (unfunded) level of acuity.

### 6.1.2 Strategic interventions

There are a number of patient flow interventions at the strategic level which can improve aspects of care coordination from the perspective of the patient.

It is well understood that discharge planning should begin at the time that the patient is admitted to hospital. However, early planning for discharge is often forgotten or neglected. Decide what strategic intervention is appropriate and possible within your facility to ensure that early discharge planning becomes the accepted and unquestioned norm.

Similarly, the patient’s EDD should be determined (ideally by the treating specialist) early in their admission, and documented in the hospital’s patient administration system. For patients whose treatment is complex, the EDD should be updated regularly, and the updated estimate recorded. Decide what strategic intervention is appropriate and possible within your facility to ensure that assigning, recording and updating a clinically appropriate EDD becomes the accepted and unquestioned norm.

Good coordination of care across organisational boundaries is an important contributor to care quality, and to patient safety. From a strategic perspective, it is important to ensure that effective processes are in place to advise the patient’s general practitioner (GP) and community services providers that they have been admitted to hospital, and that there is good communication to transfer the care of the patient to their GP at the time of discharge.

### 6.1.3 Operational and tactical actions

There are a number of actions at the Business Unit level which can help to manage the coordination of patient care. These are discussed below.

*Early in the admission:*

Each patient should be admitted to hospital for a reason, and that reason should be clearly understood, and documented. For an uncomplicated admission (minor surgery, for example) the clinical goal will be clear from
the outset, and the likely length of the admission known. For a more complicated case, the ultimate clinical goals and the likely length of stay may not be immediately apparent, but should be clarified in the first few days. A senior clinician with an understanding of the likely course of the admission should provide an estimate of the patient’s date of discharge (EDD) at the time of admission. The EDD should be recorded in the patient administration system, and updated as the clinical goals for the patient become clearer.

There may be factors in the patient’s social or health background which may lead to additional complications. These should be identified early, and documented (for example, using a Transfer of Care Risk Screen Assessment.

It is important to advise the patient’s general practitioner and community service providers of the admission. They need to know that the patient will miss appointments, and may be able to provide details of the patient’s long term care plan which can contribute to the quality of the hospital episode.

During the admission
All staff who have a significant role in the patient’s care should be involved in planning that care. If the patient has multiple morbidities and complex care needs, then their community care providers should also be involved. The patient’s care should be reviewed during care coordination team meetings by measuring progress against the plan, particular for longer stay patients. Any significant barriers to progress should be identified and monitored using the ‘Waiting for What’ function of the Patient Flow Portal, and the EDD updated. The EDD should also be discussed with the patient, to ensure that they have realistic expectations about their hospital stay, and that they are mentally prepared for discharge.

Discharge planning
Discharge planning should begin at the time of admission. A few days before the patient’s discharge date, make sure that factors which might complicate discharge are identified and addressed. Completing a Transfer of Care Checklist should identify any confounding factors. Also have the patient and their carer review the practical support that the patient will need after discharge.

Where appropriate, involve the general practitioner and community service providers in the discharge planning process, and ensure all of the necessary referrals, appointments and support service bookings have been made a day or two before the patient’s departure.

Although there may be a large amount of paperwork, including a discharge summary, to be completed around the time of discharge, it is important to put this effort into context. This work is not just “filling in forms” but a way of thinking about and planning for the support that the patient will need in their journey back safely to the place where they belong, and will do best.

It is important to emphasise that patient flow issues can only be resolved by involving people at all stages of the flow pathway. This is of particular relevance when dealing with issues involving inter-hospital transfer and discharge (referral) to lower levels of care, such as rehabilitation, residential aged care or community care.

Communication and relationship management.
Bear in mind that the quality of communication between members of the clinical team across the hospital is a patient safety issue (Abraham & Reddy, 2010; Horwitz et al., 2009). Ensure that everyone understands the importance of respectful communication about patient care and its coordination:

- Among peers within the ward or service;
- Forwards and backwards along the line of the care process;
- Upwards and downwards in the organisational hierarchy; and
- With care providers outside the hospital.

Understand how people in the previous step of the process complete their tasks. What pressures are they under? What other things do they do, and for whom? Do they know and understand how their work affects your step of the process? Knowing the answers to those questions will help you understand care coordination as a shared process within the system, rather than the work of individuals.
What do the people in the next step of the process need from you? When do they need it, and how does a delay in completion affect their work? Do they know and understand what pressures you are under, the other things that you do, and for whom? Knowing the answers to those questions will help you understand care coordination as a shared process within the system, rather than the work of individuals.

6.2 Quality and safety (from a patient’s perspective)

Quality depends on the structuring of systems around an expected result of better health care outcomes. Organising for quality involves focusing on customer service, ensuring that the patient is the main focus for decision making, and listening to what staff and consumers want, and changing direction to provide it. (NSW Health, 2012)

6.2.1 Summary of evidence

This Section considers quality (as well as safety) primarily from a patient’s perspective. Quality and safety from a clinical perspective was addressed in Chapter 5.

The theoretical aspects of the relationship between quality of care and the safety of patients and staff, and the relationships between quality and safety, are discussed in some detail in Section 5.2 above. In this sub-section some additional evidence and insights are provided on quality and safety from the perspective of patients and their carers and families.

Complaints (patient experience)

Patients are often not involved in the processes which assist and guide their progress through the hospital system. They may initially be given an unrealistic expectation of their likely length of stay, and of their clinical outcome when treatment is complete. They may also be deprived of an early discussion of the discharge process, the likely date of discharge, and the arrangements for their continuing care (including self-care) after leaving hospital.

Patients are often not warned in advance of their likely discharge date; they may be noted as receiving “continuing care” until the day before discharge or the day of discharge. This practice leaves no time for patients or carers to prepare mentally or practically for a return home, or a move to another facility.

Patients and carers do not see the complex inter-related network of requests, orders, and services which are associated with their discharge. The last step in their departure is often a wait for discharge medications, which may have been ordered at short notice. This delay may lead them to view the pharmacy and pharmacists as the ones standing between them and home.

It should be noted that the problems described above are less likely for routine surgical admissions. Patients admitted for elective surgery are commonly advised by their surgeon of their expected length of stay, the range and likelihood of possible clinical outcomes, and what to expect in the period after surgery.

Unnecessary within-hospital patient transfers

Blay, Duffield and Gallagher et al (2011) reviewed issues associated with patient transfers within hospitals and examined the risks and problems which may occur. These included increased workload after hours and at weekends, safety concerns, and an increase in handovers. The authors highlight that an increased number of patient transfers within the hospital resulted in an increased number of clinical handovers between staff, and also resulted in increased risk. The authors noted that the resulting increase in the number of staff contacts with patients was likely to lead to an increase in the risk of healthcare associated infections. An increase in patient transfers also increases the risk of delirium in older patients, which could lead to disorientation and an increased risk of falls. By convention the work involved in patient transfers is not considered in measures of nursing workload. Short stay units such as medical assessment units, extended short stay surgical units and surgical assessment units need to be rigidly controlled to avoid their use as a holding bay for ward admissions.

Outlier patients and length of stay

Moving outlier patients to the ‘correct’ ward subsequent to admission appears to be common practice within NSW hospitals (NSW Hospital site visits, 2012), although this is not universal practice in all settings.
Patient moves take time and add risk
Moving a patient makes nursing work for the wards at both ends, needs careful communication, and may prolong the patient’s stay.

Anecdotaly, patients in some Canadian hospitals are almost never moved from their first bed location (Ash, 2012), and in the context of a discussion about the effects of bed management on ED crowding, Proudlove, Gordon and Boaden note that “. . . in some trusts, patients outlying on inappropriate wards (particularly medical patients on surgical wards) may be transferred to another ward, in others this is not the case as it is considered disruptive (a widely quoted figure is that a move will add a day to a patient’s length of stay).” (Proudlove, Gordon, & Boaden, 2003, p. 149)

Rapid response teams (RRTs) or medical emergency teams (METs) have become common in larger acute hospitals. Their role is to provide ICU-level ‘rescue’ care for patients whose condition has deteriorated. Litvak and Pronovost (2010) suggest that at least a part of the need for these teams has resulted from the increase in the number of patients receiving inadequate care because they are housed away from the ‘home’ ward of their speciality:

“...some deteriorate despite adequate clinical care. These patients would benefit from having an organized system to identify and treat patients whose conditions worsen, such as an RRT or code team. Second, patients deteriorate because of inadequate care; in other words, the level of care (eg, clinician training, staffing) provided to the patient in the inpatient unit is inadequate for the patient’s condition...

“Underlying inadequate care is that patients have been admitted to a unit that provides inadequate care. A triage error or inability to admit or transfer a patient to the preferred unit is the main driver of patient misplacement. Underlying the triage error is the way patient flow is managed or mismanaged. Every physician and nurse would prefer that patients are cared for in a unit that can provide the appropriate level of care, where sufficient physician, nurse, and monitoring resources are available. Physicians commonly request that their patients remain in the ICU or are admitted to a specific nursing unit, often with monitored beds, believing care is better in some units than others.” (Litvak & Pronovost, 2010, p. 1375)

Patient wellbeing
Huang, Thind, Dreyer and Zaric (2010) used a retrospective analysis of 13,460 adult patients admitted to a Canadian hospital via EDs over the course of a year to assess the impact of delays in admissions. They found that the 1,558 patients who experienced a delayed admission had an inpatient stay that was 12.4% longer and 11.0% more costly. The cumulative effect was a total of 2,183 additional inpatient bed days, at a cost of $2,109,173.

As part of a larger ethnographic study Kydd (2008) explored the social and emotional impact that being a ‘delayed discharge’ had on frail older people. Over the course of a year, she conducted participant observation on a ward for older people, conducted interviews, and collected field notes. She found that many patients who were a ‘delayed discharge’ or ‘bed blocker’ were in a process of transition to a new way of living. Patients found this to be a worrying experience. Most patients were anxious about their future, but did not discuss their anxiety with staff. She observed that:

“[d]uring this period, the researcher got to know 14 of the patients fairly well. They were frail older people, classed as ‘delayed discharges’. They were all aware that they had to move on. Not one of them knew where they would end up, but most wanted to go to the local care home as it would be easier for their relatives to visit. Those who wanted the local home appeared to be unconcerned as to the home or the staff, apart from whether the staff would like them.” (Kydd, 2008, p. 122)

She noted a previous characterisation of a transition as ‘having an ending’; a period of confusion and distress; and possibly a new beginning. The intermediate state can be ‘a period of confusion and distress’, particularly if the transition is prolonged, and lacks a clear end goal.
Kydd makes a number of recommendations for practice in the care of ‘delayed discharge’ patients:

- It is essential that all staff are aware of the anxieties associated with being in transition. For frail older people, the move into care is a major milestone at the final stage of their lives. A culture of learning on transitional states needs to be fostered and should include encouraging unqualified and qualified staff to attend training events.
- Patients’ care plans should address the effect being in transition has on them.
- Patients’ groups should be encouraged to provide a forum for them to express their concerns about being moved on.
- It is also essential that staff take notice of the effect they have on the patients in their care and at all costs should focus on care delivery. In order to do this, staff should be supported in their work and provided with a forum, perhaps during staff handover, to air any worries they may have.” (Kydd, 2008, p. 126)

Victor, Healy, Thomas and Seargeant (2000) used a retrospective case note review of 456 patients aged 75 and over who were admitted from their own homes, and discharged from a speciality aged care ward. Of these patients, 27% had a delay in their discharge process of three days or more. Their analysis identified three factors which predicted delayed discharge: not having a family carer; a move to residential aged care; and insufficient staffing for the discharge assessment team. Vulnerability factors (multiple dependency; multiple pathology) and predisposing factors (age; living alone) were not predictive of a delay.

6.2.2 Strategic interventions

There are a number of patient flow interventions at the strategic level which can improve aspects of quality and safety from the perspective of the patient.

Firstly, monitor and minimise the number of times a patient is moved during their hospital stay. As noted above, it has been suggested anecdotally that each relocation to a different ward adds one day to the patient’s overall stay (Proudlowe et al., 2003), as well as adding to nursing duties, confounding attempts to manage consultant ward rounds effectively, and increasing the patient’s exposure to the risk of hospital acquired infections. Balance the impact (on the patient and the hospital) of a delay in the admission process with the impact of multiple moves which might deliver minimal clinical benefit.

Focus the attention of the facility on open and frequent communication with the patient. This can help to minimise the patient’s level of uncertainty, as well as reducing the length of time which the patient spends in the transition phase. (See Kydd (2009) above). Make sure that the patient’s family carer is also involved in this communication, and help both patient and carer to have realistic expectations of the acute care episode.

The relationship between the facility and other healthcare organisations and providers is an important aspect of patient flow. Establish or enhance good relationships between the hospital and its general practice, community health and residential aged care partners. Good working relationships based on trust can have a beneficial impact on patient flow at both the admission end of the patient journey, and on discharge. Consider offering support to aged care facilities from consultants specialising in aged care.

Other strategic interventions include making use of quantitative data to evaluate the quality and outcomes of care which the facility provides. Data about the incidence of patient falls and medication misadventure may suggest that there are delays in care, and feedback about the patient’s and carer’s experience of a hospital episode can provide evidence of success in the management of flow.

6.2.3 Operational and tactical actions

There are a number of actions at the ward or service level which can help to enhance quality and safety from the perspective of the patient.

As an ideal, all of the activities within the ward or service will be patient centred, and focus on the clinical, physical and emotional needs of the patient.
Ensure that patients whose hospital stay is protracted are treated with respect. Careless use of terms such as ‘delayed discharge’ and ‘bed blocker’ can become pejorative, and leave the patient with the feeling that it’s their fault that they are still in hospital.

Maintain open and frequent communication with the patient about the course of their care, and any delays. This can help to minimise the patient’s level of uncertainty, and reduce time which the patient spends in the transition phase (see Kydd (2009) above). Include the patient’s family carer in this communication, and help both patient and carer to have realistic expectations of the acute care episode.

Remember that the patient’s experience of care is an important aspect of the quality of the care that is being provided, and that, once the realistic goals of their acute episode have been achieved, they will most likely be safer and happier at home.

6.3 Key readings for this chapter


This paper reviews issues associated with patient transfers within hospitals, and examines the risks and problems which may occur. These include increased workload after hours and at weekends, safety concerns, and an increase in handovers, with an increased number of patient transfers resulting in an increased number of clinical handovers between staff, and also resulted in increased risk. By convention the work involved in patient transfers is not considered in measures of nursing workload.


This before and after study of the impact of emergency department based care coordination in a Victorian hospital shows a reduction in the number of patients admitted from the emergency department, and a reduction in inappropriate and unnecessary emergency department presentations. Both patients and hospital staff expressed a high level of satisfaction with the service.


This booklet provides good practice guidance for discharging patients from NHS hospitals, and includes useful suggestions about strategies for engaging staff in both hospital and community settings, as well as patients and carers, in managing improvements in discharge practice. The guide notes that despite 30 years’ research literature into effective discharge, failure of routine discharge arrangements is still common, with older patients being most commonly affected.


This toolkit for multidisciplinary teams focuses on practical steps for improving discharge for the 80% or so of acute hospital discharges which are straightforward, and hence amenable to some degree of streamlining and standardisation. It highlights a number of common myths and inhibitors relating to discharge, and provides a step by step guide to making simple discharge work, as well as case studies, and a collection of practical tools to improve discharge.


This retrospective analysis of 13,460 adult patients admitted to a Canadian hospital via EDs showed that the 1,558 patients who experienced a delayed admission had an inpatient stay that was 12.4% longer and 11.0% more costly. The cumulative effect was a total of 2,183 additional inpatient bed days, at a cost of $2,109,173.

This ethnographic study explores the social and emotional impact that being a ‘delayed discharge’ has on frail older people. Many patients who were a ‘delayed discharge’ or ‘bed blocker’ were in a process of transition to a new way of living, and found this to be a worrying experience. Most patients were anxious about their future, but did not discuss their anxiety with staff.


These authors suggest that at least a part of the need for hospitals to provide rapid response teams (RRTs) or medical emergency teams (METs) is the increase in the number of patients receiving inadequate care because they are ‘outliers’, housed away from the home ward of their speciality:


This paper highlights the risks associated with poorly coordinated transfer of care from hospital to post-hospital providers (including the risk of readmission) and recommends automated notification to primary care providers about the patient’s discharge at the end of a hospital episode.


This paper uses soft systems methodology to analyse the discharge planning process in an NHS hospital, and shows that discharge planning could be improved by better co-operation between the healthcare professions, taking a more holistic approach to the needs of patients, making better use of nursing staff resources, and making better use of ICTs as a means of communication.


This review of rehabilitation services in NSW and Victoria suggests that there are common issues likely to apply in other states of Australia as well. Patients who experience functional decline (‘deconditioning’) during their acute hospital stay have an increased likelihood of preventable complications such as pressure ulcers, falls, malnutrition and contractures.


This evaluation of a nurse-led ambulatory care coordination program for children with complex care needs, which provided telephone support, a personalised integrated healthcare plan, regular monitoring and assessment, and continuum of care coordination, showed a reduction in ED presentations (from 470 pre-program to 398 post), hospital admissions (410 to 375) and bed days (3,699 to 1,598), with a saving of $1,942,000 (net of program costs).


The authors evaluated the appropriateness of the level of care provided in an Australian acute referral hospital for 696 episodes of care (7,189 bed days). Acute level care was provided of 56% of days for patients with stroke, hip fracture or joint replacement, and on 33% of days for other patients. Most of the inappropriate days that patients spent in acute care were due to delays in processes and scheduling (45%) or the patient being more appropriate for rehabilitation or subacute care (30%).

This historical cohort study compares hospitalisation rates (for angina, heart failure, chronic obstructive pulmonary disease, and hypertension) and readmission rates for patients over 65 years in the Danish healthcare system (DHS) with those in the US Kaiser Permanente (KP) healthcare system. The DHS had substantially higher rates of hospitalisations, readmissions, and mean lengths of stay per hospitalisation, than KP. The authors suggest that reductions in hospitalisations in DHS could improve patient welfare and free up resources for community care of chronic disease.


This Cochrane review evaluates randomised controlled trials which compared individualised discharge planning with usual discharge care (not individually tailored). The review concluded that a structured discharge plan tailored to the individual patient could probably bring about modest reductions in hospital length of stay and readmission rates for older people who were admitted to hospital with a medical condition. The evidence about the impact of discharge planning on mortality, health outcomes and cost was inconclusive.


This paper describes a computer simulation model of the Australian health and aged care system which models access to permanent high care places in residential aged care (RAC), and conceptualises three competing queues for high care places, fed by applicants from acute hospitals, from the community, and from within aged care facilities. The model suggested that acute hospitals act as a safety net, accommodating some people with high care needs for whom there in not a currently available RAC place.


This retrospective case note review of 456 patients aged 75 and over who were admitted from their own homes, and discharged from a speciality aged care ward showed that 27% had a delay in their discharge process of three days or more. The authors identified three factors which predicted delayed discharge: not having a family carer; a move to residential aged care; and insufficient staffing for the discharge assessment team.


This paper explores the impact of admissions policy for a subacute facility on the mix of patients transferred from acute care, and on funding. Improved bed management in the subacute facility meant an increase in bed availability, and resulted in patients being transferred from acute care at a higher (unfunded) level of acuity.
7 Embedding and sustaining a smooth flow culture

“Time is precious. The cumulative impact of time spent checking, doing work again, looking for things and carrying out unnecessary steps is time lost...What can I do? The challenge is that a lot of things that don’t add value to patients are built into customs, habits and the way ‘things are done’. They also tend to be the ‘hassle factors’ in people’s jobs. One starting point is to visually map the processes and procedures you do and make time to look out for things that don’t add value.”

(NHS Institute for Innovation and Improvement, 2008, p. 17 emphasis added)

“Developing the ability to shape, predict, and manage variability [in patient flow] and to allocate resources appropriately at the front line of care can improve patient outcomes, increase staff morale and retention, reduce costs, and improve quality of life for both patients and caregivers.”

(Institute for Healthcare Improvement, 2003, p. 4)

This concluding chapter aims to briefly present some key points that should be considered in order to embed and sustain a smooth flow culture. The chapter re-iterates a number of the challenges to ensuring smooth patient flow and the evidence supporting a system-wide approach involving actions and interventions at strategic, tactical and operational levels. The chapter also addresses the importance of change management processes, engagement and communication with all stakeholders. The chapter concludes by briefly outlining some of the key considerations for supporting smooth flow amongst three groupings of staff working in NSW hospitals. These groupings are: Local Health District and Hospital Executives; Patient Flow Team Staff; and Clinical and Support Staff.

7.1 Smooth Flow Relies on Awareness, Understanding and Preparedness to Change

This evidence-based review and training resource promotes the need for system redesign to support enduring and workable changes to patient flow but its focus has not been to provide detailed advice on how to undertake major redesign activities. Rather this resource has aimed to enhance and consolidate research evidence on the theory and practice of patient flow systems and to make this available as an accessible training resource for healthcare professionals working in hospitals within New South Wales (NSW). By providing this resource and the broader education package of which it is a part, it is anticipated that it will raise awareness, improve understanding and stimulate preparedness amongst NSW hospital staff to work towards smooth patient flow.

This resource and the broader education package have been designed to stimulate a greater sensitivity amongst healthcare professionals working in NSW hospitals to how their work practices and the work practices of others directly impact on flow. Patient flow issues relate directly to the quality and safety of care in ever busier hospitals; smooth flow can sustainably release system capacity by reducing waste, duplication and delay in the provision of healthcare services.

This greater sensitivity will ensure that all staff are able to recognise activities that interrupt smooth flow, and acknowledge how they and others may use hospital beds as a means of storing clinical ‘work in progress’ for one individual patient to the detriment of other patients elsewhere in the system. This resource anticipates that it will stimulate healthcare professionals to reflect on which of their current work practices enhance smooth flow and which do not, to reflect on how they could try to understand and measure the differences and how to recognise what actions are within their own control and which require broader engagement with their colleagues.

In this concluding chapter, it is useful to briefly remind ourselves what smooth flow looks like, how it can be interrupted and what can be done when it occurs.

In an ideal world, the smooth flow of patients through a hospital is characterised by a low level of variability, no delay or small delays between successive steps in each patient’s care journey, good communication (between staff, and with patients and carers) about the entire process of care from admission through to discharge and beyond. Litvak et al describe a hypothetical perfect healthcare system in which there is no variability, and no waste:
“Suppose all patients are homogeneous in disease process. That is, they all have the same disease, the same degree of sickness and the same response to therapy. Suppose they all appear for care at a uniform rate. Furthermore, suppose all medical practitioners and health care systems have the same ability to deliver quality care. In this best of all situations, it would be possible to achieve 100% efficiency in health care delivery. There would be no waste. Cost would be minimal and quality maximal within the boundaries of knowledge and technology.” (Litvak et al., 2006, p. 47)

In the real world, however, perfect efficiency is not possible, because healthcare is subject to natural variability. Not all diseases are the same, not all providers are the same, and not all patients are the same. In addition to this inescapable deviation from theoretically perfect efficiency, patient flow can also be disrupted by unwarranted artificial variability in the care process, by unnecessary delays between successive steps in the care process, and by poor communication between staff, and with patients.

Kirby and Kjesbo (2003) discuss a number of the constraints which poor patient flow imposes on an acute hospital. They propose a number of interventions which could improve patient flow, and suggest that effective capacity improvements of between 5% and 20% could be achievable.

![Figure 9](image)

**Figure 9. Opportunities to improve patient flow (Kirby & Kjesbo, 2003, p. 39)**

O’Connell, Ben-Tovim et al (2008) make the case that clinical process redesign can improve hospital performance in the face of rising demand.

“The growing demand for health care ... is external to health services, and is therefore beyond their control. Concentrating solely on the difficulty of external forces can simply induce a sense of helplessness that is unwarranted. Within health services, there are substantial opportunities to improve the safety, quality and accessibility of the care provided.” (O’Connell et al., 2008, p. S11)

They provide a diagram of a typical patient’s hospital journey, which illustrates many of the problems and disconnections in care that can result in a disordered and poorly coordinated patient episode (See Figure 8 in Chapter 6). Each of the areas of disconnection they identify is amenable to active management to either address the immediate problem, or to develop a systemic response to reduce the impact of a problem.

In this resource actions and interventions to improve patient flow have been broadly grouped as strategic, or tactical or operational. In the context of this discussion, strategic interventions are those which take place over a prolonged timeframe, and from a broad organisation wide perspective. Responsibility for actions with a strategic focus rests with executive managers. Operational and tactical interventions are those recurring, daily and weekly actions which address patient flow challenges as they arise, or as they become imminent. These actions are primarily the domain of wards and services within the hospital, supported by patient flow managers, bed managers and discharge planners.
7.2 Taking Action: Towards Smooth flow

1. During implementation

It is essential to engage stakeholders within the hospital, and to break down the silos which divide staff internally. However, engagement is also needed with the organisations and individuals who are looking after patients before they arrive at the hospital, as well as those who will be providing care after the patient leaves. The key idea here is to conceptualise smooth flow as a continuum which extends beyond both the ‘front door’ and ‘back door’ of the hospital and thus requires engagement with stakeholders outside the hospital.

2. In routine use

Following the implementation of improved practices for managing pre-hospital and post-hospital patient care it is essential to have in place convenient mechanisms to maintain communication and collaboration in the longer term. Conversations with colleagues outside the hospital should occur even when there are no current problems with the movement or care of an individual patient. This communication provides an opportunity for discussions on ways of further improving flows when colleagues are not under immediate pressure to resolve an individual patient movement.

3. Ongoing improvement

The usual representation of the Plan-Do-Study-Act cycle as a cycle of activity rather than a linear trajectory is quite deliberate. This representation underlines the cyclical nature of process improvement. Improvements which result from a redesigned process are likely to highlight shortcomings in other processes. Even processes that have been previously redesigned have the potential to subsequently be made more effective and so can be revisited in this cyclical approach. In addition, no system sits within a static environment, and new challenges will arise for which the current (redesigned) system may no longer be a suitable fit.

Whose responsibility is it to ensure good patient flow?

The overall flow of patients through a hospital depends on effective well managed care processes at every step along the way. Ensuring continued provision of smooth patient flow requires dedicated attention from staff within business units; appropriate management attention, policies, practices and support from the executive; and coordination from those with particular responsibility for ensuring that smooth flow is maintained.

Achieving Smooth patient flow really is everyone's responsibility.

What must be done?

It is easy to say patient flow is everyone’s responsibility, but it is considerably harder to make this a reality with the range of competing priorities and pressures across the range of NSW hospital staff. The evidence in the literature suggests a number of potential ways forward.

Van Dyke (2011) reported on an 18 month ‘Urgent Matters’ (UM) learning network, a program funded by the Robert Wood Johnson Foundation, involving 6 US hospitals. The evaluation used two rounds of interviews with patient flow staff and others with a role in the implementation of the network. The interviews aimed to identify facilitators and barriers to patient flow improvement strategies. The facilitators included: participation in the UM learning network, strategic selection of planning team members, executive support and the availability of resources, staff-driven improvement strategies, an aligned reporting structure, implementation of simple process changes, and a flexible and robust information technology system. Identified barriers included staff resistance, entrenched organisational culture, lack of staffing resources, previous failures to improve patient flow, and lack of data to monitor progress.

An observational study by Cameron, Scown and Campbell (2002) describes an initiative undertaken by Melbourne Health in 2001 to address access block while maintaining elective surgical throughput, using $104 million of external funding. A clinician led taskforce used proven change management techniques to pursue 51 separate interventions addressing elements of emergency demand, elective surgery, capacity management and sub-acute care. The primary goals of the work were to reduce ambulance bypass, reduce the proportion of patients waiting more than 12 hours in ED, avoid a decrease in elective surgery throughput and decrease the number of theatre cancellations. Each of these goals was achieved. The authors suggest that the ability to sustain improvements after the initial initiative requires further study.
Alikhan, Howard and Bowry (2009) described a coordinated approach to improving patient flow at a Canadian hospital. Previous improvement attempts had focused on marginal process improvement, with patient flow managers controlling access to beds, and a centralised cleaning team. These initiatives had resulted in little measurable improvement. A new organisational focus on ED performance led the organisation to adopt a new approach in 2008. The decision was based on a realisation that there was a need for a different approach.

“Reorientation from a ‘project’ with a start and end date to a change management strategy was required if access and flow optimization, as a dimension of patient care quality, was to be regarded as everyday business. Engagement of frontline staff and physicians in a collaborative partnership to identify root causes and potential solutions was required to embed sustainability upfront. The discontinuation of strategies that served only to address symptoms versus fundamental root causes of patient flow issues ensued. This included Patient Flow Managers who distracted from the principle that decisions about safe, effective and efficient patient transitions are the responsibility of everyone, not only a critical few. This move drew initial skepticism as it appeared to be ‘going against the flow’ of commonly accepted ‘fixes’ to access and flow issues.” (Alikhan et al., 2009, p. 21)

The new approach entailed changes to the organisational structure around flow and bed management, mentoring and coaching for frontline staff, escalation policies, action groups focused on optimising the discharge process, length of stay, admissions, ED-general medicine flow and ED-neurosurgery flow, and a target of achieving between 40% and 60% of each day’s discharges prior to 11.00 am. Overall, the improvement process relied on a tailored application of Lean, six sigma and the Plan-Do-Study-Act cycle, together with manageable, meaningful performance metrics, and a focus on communication. Many of the improvements were built on existing best practices within the hospital, but were system-wide, rather than department focused. In each case, success depended on the active engagement of staff across all levels of the organisation.

7.2.1 Local Health District and Hospital Executives

Executives need to understand the relationship between the routine operational and tactical activities related to patient flow, and the need for a strategic approach to support business units, and identify systemic barriers to better flow management. They should:

- Decide who in the organisation is responsible for the strategic management of smooth patient flow (as their primary activity).
  - Having made this decision, it is then necessary to take action to train, empower and support the strategic flow manager.
- Decide (or not) to empower all staff to take action to enhance smooth patient flow.
  - Having made this decision, it is then necessary to take action to train, empower and support all staffing this endeavour.
- Clearly state what is and is not acceptable to the executive in the context of patient flow.
  - These things should be clearly expressed as ‘Always events’ (things that should happen regularly by default) and ‘Never events’ (things that should be avoided at all costs buy all staff). Always events and never events are discussed in more detail in Section 4.4.2.
- Take responsibility for difficult conversations with groups and individuals who may initially be reluctant to support the enhancement of smooth patient flow.
  - These difficult conversations may need to involve senior consultants, VMOs, general practitioners, residential aged care facilities, patient transport services and other hospitals providing step down care or higher-level care.
- Acknowledge full accountability for the site’s KPIs, and accept it is more appropriate to see them as a medium term indicator of effective system redesign, rather than a measure of how hard patients have been ‘pushed’ through the system.

Strategic activities related to patient flow involve the identification of symptoms of impaired flow, the collection, analysis and interpretation of reliable data, and collaboration with staff involved in the problem areas to identify which part or parts of the system are the likely root cause of the problem.

Intractable problems rarely exist within a single business unit. Depending on the findings, small changes may help, or significant project activity may be required. The measures which were initially used to identify the problem should also demonstrate improvements if the intervention is successful.
7.2.2 Patient Flow Team Staff

Those directly involved in the overall management of patient flow must understand both the strategic actions and interventions to support smooth patient flow that require executive support and engagement, and the operational and tactical actions to support smooth patient flow that require business units support and engagement.

At a strategic level:
The **strategic patient flow manager is not** the person who is responsible for identifying problems, or for applying available techniques and tools to address these problems. Problems must be owned and managed in the part of the organisation where they exist or have an impact. The role of the **strategic patient flow manager is** the person who is responsible to help, guide, mentor and facilitate other staff as they identify problems, select and use tools to identify and analyse the problems, and design and implement solutions. This role is about ensuring colleagues are empowered to identify problems and develop and own their solution.

At operational and tactical levels:
Continue existing actions to keep patients flowing through the system, but progressively encourage the identification and resolution of problems, as a substitute for finding workarounds and contributing additional effort.

7.2.3 Staff in Wards and Services

It is important that clinical and support staff and their managers

- Understand the importance of their roles as contributors to smooth flow, remembering that the overall goal of the hospital is to provide safe, effective, timely patient care.

- Learn to classify their daily activities as one of three types of activity:
  - Value adding, and contributing to patient care;
  - Non-value adding, but supporting patient care; or
  - Contributing no value to patient care, either directly or indirectly

- Learn to identify waste in the workplace, and the most appropriate way to address it.

Tactical activities to manage patient flow (for example, planning for the week; adjusting elective activity) can help to reduce variation in workload, and maintain activity at manageable and relatively stress free levels. This tactical focus is a key part of the bed manager and patient flow manager roles, but can easily be overtaken by operational activities if the system functions poorly.

Operational activities to improve flow tend to focus on immediate problems which arise during the daily activities of the hospital. There will be occasions when operational interventions will be necessary to maintain patient flow. However, these occasions should be rare, and the result of unusual circumstances.

When chaotic flow related activities become the norm, when staff regular experience calls to ‘hurry up’, and/or to ‘discharge some patients quick’), then it’s probably time to start working **on** the system, as working harder **in** the system is ultimately not a sustainable approach and responds to symptoms rather than the causes of flow problems.

7.3 Key readings for this chapter


This paper describes a coordinated approach to improving patient flow at a Canadian hospital. Previous improvement attempts which focused on marginal process improvement, with patient flow managers controlling access to beds, and a centralised cleaning team had resulted in little measurable improvement. The
new approach, which relied on a tailored application of Lean, six sigma and the Plan-Do-Study-Act cycle, involved changes to the organisational structure around flow and bed management, mentoring and coaching for frontline staff, escalation policies, action groups focused on optimising the discharge process, length of stay, admissions, ED-general medicine flow and ED-neurosurgery flow, and a target of achieving between 40% and 60% of each day’s discharges prior to 11.00 am.


This observational study describes an initiative undertaken by Melbourne Health in 2001 to address access block while maintaining elective surgical throughput. A clinician led taskforce used proven change management techniques to pursue 51 separate interventions addressing elements of emergency demand, elective surgery, capacity management and subacute care. The initiative reduced ambulance bypass, reduced the proportion of patients waiting more than 12 hours in ED, avoided a decrease in elective surgery throughput and decreased the number of theatre cancellations.


This paper discusses a number of the constraints which poor patient flow imposes on an acute hospital, and suggests a number of interventions which could improve patient throughput, with potential improvements in effective capacity of between 5% and 20%.


This book chapter hypothesises an ideal world, with a hypothetical perfect healthcare system in which there is no variability, and no waste, and contrast that with the real world situation where variability is the norm.


This paper makes a strong case for the ability of clinical process redesign to deliver improvements in hospital performance in the face of rising demand. The paper includes a diagram of a typical patient’s hospital journey, which illustrates many of the problems and disconnections in care that can result in a disordered and poorly coordinated patient episode.


This paper uses interviews with patient flow staff and others with a role in the implementation to identify facilitators and barriers to patient flow improvement strategies. Facilitators included: participation in the an improvement learning network, strategic selection of planning team members, executive support and the availability of resources, staff-driven improvement strategies, an aligned reporting structure, implementation of simple process changes, and a flexible and robust information technology system. Barriers which were identified included staff resistance, entrenched organisational culture, lack of staffing resources, previous failures to improve patient flow, and lack of data to monitor progress.
8 Reference List of Key Sources


98. NHS Institute for Innovation and Improvement. (2008). *Seven Ways to No Delays*. NHS.
102. NSW Hospital site visits (2012). University of Tasmania.


# Glossary

Terms to define in the glossary, and/or explain in the text before first use

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation/Definition</th>
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<tbody>
<tr>
<td>4 hour rule</td>
<td>Australia’s health ministers have agreed to a four hour National Access Target for emergency departments. This means that within 4 hours, patients are to be: admitted; referred for treatment; or discharged (where clinically appropriate). This target is being implemented progressively from 1 January 2011.</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Accident and emergency unit. UK term (and archaic Australian term) for ED</td>
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<tr>
<td>ALOS</td>
<td>Average length of stay</td>
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<tr>
<td>Artificial variation</td>
<td>Variation which is introduced into a system as a result of characteristics that can be controlled. These include:</td>
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<tr>
<td></td>
<td>• the way elective admissions are scheduled</td>
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<td></td>
<td>• staff working hours</td>
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<td></td>
<td>• planned staff leave</td>
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<td></td>
<td>• the availability of equipment</td>
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<tr>
<td>Common cause variation</td>
<td>Variation which is normal and expected</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency department (common usage in Australia)</td>
</tr>
<tr>
<td>ER</td>
<td>Emergency room. US term for ED</td>
</tr>
<tr>
<td>ICTs</td>
<td>Information and communications technologies</td>
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<tr>
<td>JMO</td>
<td>Junior Medical Officer</td>
</tr>
<tr>
<td>KPI</td>
<td>Key performance indicator</td>
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<tr>
<td>LOS</td>
<td>Length of stay</td>
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<tr>
<td>Natural variation</td>
<td>Inevitable variation inherent in characteristics of a system. In healthcare, these causes include:</td>
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<tr>
<td></td>
<td>• differences in symptoms and diseases that patients present with</td>
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<tr>
<td></td>
<td>• the times of day that emergency patients arrive</td>
</tr>
<tr>
<td></td>
<td>• the socio-economic or demographic differences between patients</td>
</tr>
<tr>
<td></td>
<td>• staff skills, motivation</td>
</tr>
<tr>
<td>RAC</td>
<td>Residential aged care</td>
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<tr>
<td>Special cause variation</td>
<td>Variation which results from unexpected events</td>
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<tr>
<td>VMO</td>
<td>Visiting Medical Officer</td>
</tr>
</tbody>
</table>
10 Appendix 1: Core Concepts

The prioritisation paradox
Assigning a high priority to one patient or one request will displace other work; when the prioritised task is complete, there may be no indication of which “next step” will contribute most to improved flow.

VMOs are given permission to be unpredictable
Some VMOs may appear to have an unpredictable schedule for their ward rounds; this behaviour requires permission, or at the very least, acceptance, from a senior level.

Go away, I’m busy
The interruption of interruptions

Scale, don’t flip
A well designed system should not change to a different set of operating processes when things get busy.

Resourceful patients
Patients and their carers may be able contribute to the planning of their return home; they haven’t got much else to do.

Busywork
Frantic activity can be a comforting alternative to difficult tasks, but the illusion of intense activity may achieve less in the long run than it seems at first glance.

Agitated intervention disrupts flow
Smooth flow thrives on standardised practice and predictable process; ‘special case’ workflow rarely ends well

‘Always’ events and ‘never’ events
How are they decided on? How are they communicated? (Herring et al., 2011)

Patient moves take time and add risk
Moving a patient makes nursing work the wards at both ends, needs careful communication, and may prolong the patient’s stay.

It’s the system, stupid
If a hospital has impaired or clogged patient flow most days, that’s almost certainly because of the way systems are designed; changing systems is a smarter way to respond than working (even) harder.

Hassle doesn’t help
Hassling and nagging staff who are already working under pressure is unlikely to improve their individual task performance, or the performance of the system overall.
11 Appendix 2: Seven elements designed to support effective patient flow

(NSW Ministry of Health, Patient Flow Systems Framework)

Variation Management
Smoothing the peaks and troughs to distribute the load

What is Variation Management?
• Monitoring and adjusting workload as needed to provide the greatest capacity
• Minimising common cause variation and eliminating special cause variation is core to managing variation within your service.

Variation Management in practice
• Use data (such as LOS, EDD, theatre lists) to identify the variation in your service demand. This information can be used to highlight potential improvement in capacity usage opportunities.
• Reduce elective surgery variation by smoothing the peaks and troughs in activity.
• Schedule booked work evenly over time without exceeding agreed capacity across the month.
• Monitor booked admission activity and adjust to provide the greatest capacity.
• Schedule services to meet your known demand (e.g. radiology, clinics, transport).
• Work within prescribed specialty limits. Exceeding capacity should require negotiation at a hospital executive planning level.
• Structure planned surgery to match seasonal variations to allow the highest throughput for the facility without exceeding hospital capacity.

Goal
• Have a defined number of overnight booked admissions per day of the week to ensure your expected demand matches your expected capacity. All relevant staff should be aware of these planned numbers.
• Provide the Patient Flow Manager with access to booked cases (both surgical and medical) by day for the next fourteen days to assist with predictive planning.
• Each ward Nursing Manager knows their Average Length of Stay and regularly reviews their LOS profile to manage long staying patients and improve performance.
• Use SPC charts to analyse speciality demand via different admission modalities.
**Demand & Capacity Planning**

Organise your service to build capacity

**What is Demand & Capacity Planning?**

- Demand and capacity planning is understanding your services core business
- A Predictive tool is useful to better help you understand your demand & capacity, then plan for it.

**Demand & Capacity Planning in practice**

- Identify demand peaks and capacity gaps. Use a predictive tool to monitor and assist in making escalation decisions earlier.
- Use a predictive tool to look at demand 14 days in advance and ensure you have escalation plans manage capacity and demand mismatches.
- Manage workload / activity across the week rather than a day at a time.
- Analyse demand capacity at hospital, ward, specialty and local health district level.
- Include Executive action when decisions are required to preserve capacity and act early.
- Look at options to utilise capacity when there is an unscheduled drop in demand.

**Goal**

- Nursing Unit Managers and Patient Flow Managers understand the LOS profile for the hospital, specialties and the expected Planned & Emergency demand. There are action plans in place if it fluctuates significantly beyond expected thresholds.
- An established method to predict capacity and demand fourteen days ahead. An established communication pathway to inform appropriate staff of the predictions.
- Using trends in Outlier data to model what specialty bed configuration is required.
- Managing predicted events (e.g. medical team change over, public holidays, major events, etc.)
Demand Escalation
Act early to preserve capacity

What is Demand Escalation?
• A system wide approach to pre-emptively initiate actions to manage capacity shortfall
• Demand escalation includes both strategic planning to manage expected demand and short term escalation to manage immediate demand mismatches
• Demand Escalation is a response to demand and capacity planning.

Demand Escalation in practice
• Create facility escalation plans at two levels:
  1. Capacity Action Plans (CAP) aimed at controlling admissions and discharges to meet expected demands
  2. Short term escalation plans (STEP) to address a short term unforeseen demand/ capacity mismatch.
• Develop an executive team that can respond to tipping points and triggers such as an increase in hospital average Length of Stay.
• Limit impact of mismatch demand with proactive management decisions supported by reliable predictive tools, days ahead.
• Utilise predictive tools & communication strategies for proactive management and action of identified issues early.
• Plan a recovery strategy that allows facilities to work within their current capacity or take steps to mitigate demands for a known period.

Goal
• Establish a clear short term escalation plan that is well understood by all relevant staff in the organisation and is a whole of hospital approach.
• Establish capacity action plan that utilises the Demand and Capacity Predictive Tool to manage demand and capacity mismatches 7 to 14 days ahead
• Integrate local escalation plans (that are used) during special events or seasonal variation in demand.
Governance
Transparent accountable leadership

What is Governance?
• Ensuring that patient flow is everybody's responsibility
• Provision of effective sponsorship and clear individual and group accountability
• Without Governance all the other elements can fail.

Governance in practice
• Know your core business goals for patient flow and be able to define it and are empowered to take action.
• Make your work processes clear and transparent to ensure everyone is aware of what is expected from them.
• Develop a patient flow governance structure that exhibits clear leadership to enable reinforcement.
• Manage organisational change by expressing, modelling and reinforcing behaviours.
• Define clear pathways for accountability to ensure expectations are clear across all layers of clinical and operational management.
• Involve staff in the development of escalation plans and governance structures to ensure staff understand their role and take ownership.

Goal
• The Patient Flow Manager has a defined role that is understood by relevant staff. They are empowered to make decisions affecting patient flow.
• The Nurse Manager has the responsibility to manage all flows in and out of their ward, unit or service.
• There is a clearly established governance structure and accountabilities for patient flow that are understood by staff in the organisation.
Standardised Practice
Promote best practice to lock in expected outcomes

What is Standardised Practice?
- Standardised Practice is maintenance or establishment of clinical best practice
- It will ensure staff and patients have better experiences and better outcomes
- Reduces the waste and uncertainty within the system.

Standardised Practice in practice
- Study current practices using tools such as process mapping to better understand how your organisation does business.
- Identify and define standard practice for key tasks including:
  - Referrals for admission
  - Multidisciplinary team meetings
  - Routine Patient Flow activities
  - Discharge risk screening
  - Multidisciplinary Team reviews & meetings
  - Patient Care Coordination
  - Allocation of Estimated Date of Discharge
  - Booking procedures
  - Escalation of delays
  - Patient flow and Access meetings
- Understand clinical variation within specialities and compare with best practice to highlight areas for improvement
- Improve care in all domains by reducing variation in care delivery and system processes.

Goal
- Maintain a consistent bed allocation process that is used 24 hours a day, every day of the week. Bed allocation should take less than three communication points.
- 80% of patients discharged from the hospital by midday each day. Transfer of care planning for all patients begins at admission with an Estimated
- Date of Discharge allocated within 24 hours.
- Establish Minimum standards and business rules for patient flow processes that are understood by all relevant staff.
Quality
Structuring systems around an expected outcome

What is Quality?
• Quality is structuring systems around an expected outcome of better health care outcomes
• Focusing on customer service
• Ensuring the patient is our main focus for decision making
• Listen to what staff and consumers want and change direction to provide it.

Quality in practice
• Use quantitative data such as clinical outcome evaluations to assess system success in managing to minimise adverse patient events, i.e. falls, medication errors.
• Use qualitative data such as the patient / carer/ staff experiences survey to assess system success.
• Improve the patient’s experience by better understanding service provision from the perspective of the patient and carer.
• Lock in more consistent outcomes by standardising clinical practice wherever possible and reviewing practices regularly.
• All practices should be patient centred and focus on the needs of the patient.

Goal
• Communicate the results of the Staff & Patient, Carer Survey to staff to inform system redesign.
• Utilise best practice clinical care and new models of care to improve patient safety and timely provision of care.
• Document processes for staff to provide input in the development of policies and procedures.
Care Coordination
Navigating patients through the health system to minimise waits

What is Care Coordination?
• Navigating the patient through the patient journey
• Avoiding or reducing delays
• Involving all relevant staff in the planning of a patients care from admission
• It should commence from the entry to a service and progress through to discharge and beyond.

Care Coordination in practice
• On admission, all patients have a Transfer of Care Risk Screen Assessment completed to identify patients in need of further requirements.
• If a patient uses Community Services and has a General Practitioner, inform them of the admission.
• A Patient’s Estimated Date of Discharge (EDD) is allocated, displayed at the bedside, recorded in the Patient Administration System (PAS), reviewed regularly and changed when clinically appropriate. EDDs can be reviewed using the Patient Flow Portal.
• Plan multidisciplinary team review and use the EDD to coordinate referrals and services during the patient’s stay.
• Use the Patient Flow Portal to document delays in the patient’s journey using the “Waiting for What” function.
• Discuss the patient’s EDD with them. If the patient requires services in the community, the Service Provider should be aware of the patient’s EDD. They should be involved planning the patient’s transfer of care.
• Involve the GP in the transfer of care planning process and ensure they receive the appropriate referral letter and patient information.
• Referral and liaison to Community Health Service Providers needs to occur early and appropriately.

Goals
• Establish a Transfer of Care Risk Screen that addresses the five risk areas
• Structure Multidisciplinary Team Reviews in each ward/unit an allocated responsible person for the coordination
• record all patients Estimated Date of Discharge (EDD) using your Patient Administration Systems (PAS)
• Ensure a Transfer of Care Checklist is completed for all patients
• Provide all referrals, appointments and follow up information to the patient
## Appendix 3: Comprehensive Bibliography

<table>
<thead>
<tr>
<th>Number</th>
<th>Author(s)</th>
<th>Title</th>
<th>Journal/Book Details</th>
</tr>
</thead>
</table>


115/134


121/134


383. NHS Institute for Innovation and Improvement. (2008). *Seven Ways to No Delays*. NHS.


392. NSW Hospital site visits (2012). University of Tasmania.


127/134


