'Winter 2015 - Maintaining Performance'

Strengthening the Health system's capacity to predict, prepare and effectively manage flow, including peak variations in service demand

Background Paper

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About this Paper

It is globally recognised that the Winter period is a time of high demand on health resources. This intense period has immediate and longer term effects on health system performance. A challenge for the health system is that it functions within a broader context of dynamic complexity, which is characterised by delay or distance between cause and effect in space or time. Integration and responsiveness, including willingness and processes for coordinating mutual adaption among key players, are attributes of a performing dynamic system (Scharmer, 2009).

The NSW Ministry of Health 'Winter 2015 - Maintaining Performance' initiative, presents an opportunity to collate and analyse local intelligence generated through the Patient Flow Systems programs, to share lessons learnt and local innovations in order to prepare for future winter periods from an integrated statewide perspective.

The Whole of Health Program hosted two half day forums in May 2015, with the intention of facilitating the sharing of best practice in demand management, presenting current clinical advice relevant to winter 2015 and providing exposure to a range of local operational experiences on maintaining performance. Participants included key stakeholders from Local Health Districts (LHDs), Specialty Health Networks (SHNs), NSW Ambulance and Healthshare. A key learning revealed from this exercise was the variation, differences in processes, capabilities and in collaborative relationships, inside and between stakeholder groups.

A contemporary and integrated approach to maintaining Winter performance for the Health system requires a balance of local contextual strategies, with the addition of coordinated functions based on a shared sense of purpose, that enables both fluidity and structure within the systems response (Uhl-Bien, Marion, & McKelvey, 2007) (WHO, 2015).

NSW Health Winter 2015 Maintaining Performance Forum Action Plan details the commitment to improving the systems capability to plan, respond, recover and learn from cyclic disruptions such as the winter period. This report contributes to Action Item 2:

> Ministry will lead a collaborative to develop a standardised framework for escalation planning and demand management, with accompanying templates in preparation for Winter 2016

Commissioned by The Whole of Health Program, this Background Paper is an informational report that sets out to describe the current reality through a targeted appraisal of the literature. The focus will be on examining escalation planning and demand management processes and their application in maintaining performance within a contemporary public health system.

Building on the extensive work on patient flow systems undertaken by NSW Ministry of Health, and taking into account current policies, standards, guidelines and plans, the Background Papers' intention is to inform debate on current and future approaches to governing system flow, including peak variations in service demand. Drawing on this discussion, the elements of a standardised framework for governing system flow, including escalation planning and demand management in preparation for Winter 2016, will be conceptualised.

The conceptual framework will be reviewed and refined by a state-wide technical expert panel (STEP) convened by The Whole of Health Program. The STEP will provide expert advice in gauging the utility and acceptability of the concepts and will inform the design of resources & tools that will operationalise the framework.

Context

A targeted appraisal of the literature related to escalation planning and demand management and its application in the context of maintaining performance within a contemporary public health system.

To achieve this objective, the search strategy inclusion criteria included full text peer-reviewed journal articles, books, reports, policies and standards. Search limits included literature published since 2000 in Australia and Internationally. All included literature was published in the English language.

As the intent of the Background Paper is to invite debate and discussion on current approaches and inform the development of new operational resources and tools that will support NSW Ministry of Health system performance and complement the Patient Flow Systems Programs, the search included reviewing sources referenced in Commonwealth, Jurisdiction and International policy documents and guidelines.

The key databases searched included Academic Search Complete (EBSCO), CINAHL, MEDLINE (OVOID), ProQuest Health & Medicine and SCOPUS (Elsevier). The databases provided a subject coverage that included the Humanities, Social Sciences, Science, Engineering, Business and Management.

The following words and phrases were explored or emerged through initiating separate or combined searches using Boolean connectors such as AND, OR and NOT.

Health System, Health Service, Hospital, Health care	
Key words	Related Words & Phrases
Planning	Utilisation, Access Patient flow, Care Coordination Demand, Capacity Variation, Escalation Disruption, Incident, Emergency, Disaster Seasonal, Winter, Cold Weather Operational, Continuity, Recovery
Management	Demand Capacity Complexity, Turbulence Surge, Access block, Crowding, Full Incident, Crisis Risk
Governance	Plan, Protocol, Matrix Policy, Guideline, Standard Performance Accountability Framework Monitoring Communication, Relationship, Leadership Integration, Network, Collaboration

Context –System Design

Health care is a system and can be described in the terms of inputs, processes, outputs and outcomes; all the parts come together to fulfil a purpose. It is accepted that unlike mechanical systems, where the level of certainty of a predicted response to a stimuli is high, health care is a human system. Human systems are less predictable and can demonstrate surprising and varied responses to the same stimuli (Institute of Medicine, 2004) (Duckett & Willcox, 2013).

To maximise performance of a complex system, where the interacting parts related within a bureaucratic form of organizing, formal and informal relationships between the varied and disparate parts of the system are important. This requires a blend of administrative and adaptive leadership supported by simple rules that detail the strategic imperative, what is prohibited, the resource limits, and governance structures (Uhl-Bien & Marion, 2009) (Wong, Morra, Wu, Caesar, & Abrams, 2012).

Essentially every part of the health system, be it a health service, program or team, is designed and aligned to meet a need. Needs are framed in different ways by different people and determining which is more important than another is a value choice. The priorities and responsibilities of the health system are determined and considered within a social, political and economic context. In being accountable for finite public resources, a public health system holds responsibility to be fair, to operate ethically, efficiently and provide a quality service (Duckett & Willcox, 2013).

In the Australian public health system, policy is the mechanism by which decisions are framed and governed. A long standing policy challenge is the supply –demand gap, whereby there is a limited supply of health resources compared with demand. Policy, as an intervention, can shape need, converting it into demand and influencing supply of health services, with the overall aim of 'ensuring adequate supply to meet priority needs, for which individuals or society will pay' (Duckett & Willcox, 2013, p. 9).

To service the needs of the NSW public, the health system is organised into Local Health Districts, speciality Networks, support Agencies and NSW Ambulance Service. The expectations of each entity and performance indicators are detailed in annual Service Agreements or Compacts. Their effectiveness on delivering the levels of service, health outcomes and financial performance expected, or agreed are monitored through the NSW Health Performance Framework (NSW Ministry of Health, 2015).

The Framework details how performance will be governed including accountabilities, reporting, monitoring and robust performance management processes. The expectation is that the performance framework is an integral part of the entity's strategic and business planning cycle. The Framework operationalises the NSW Auditor-General's definition of good governance,

> "Good governance is those high-level processes and behaviours that ensure an agency performs by achieving its intended purpose and conforms by complying with all relevant laws, codes and directions and meets community expectations of probity, accountability and transparency. Governance should be enduring, not just something done from time to time" (NSW Ministry of Health, 2012).

Key Point – The demand for, and supply of, health services is a dynamic relationship which is vulnerable to social, political and economic stimulus. In operating within a system, it is critical that the interdependencies between the operating parts are acknowledged, whereby when one part of the system is stressed there are system-wide triggers and consequences.

Policy and service planning are mechanisms utilised by Government to ensure that the supply of health services meets priority needs and Service Agreements. Plans must align with the NSW Health Policy, Performance and Governance Frameworks and be embedded in local strategic and business planning cycles.

Context – System Governance

To understand system governance a targeted search for policies, procedures, reports, guidelines and information bulletins designed to inform public health service planned response to potential disruptions to supply or increase in demand, was undertaken for both NSW (Table 1.), Australia and Internationally (Table 2.).

It is evident that the range of situations that could possibly involve escalation and demand management are extensive. Within the policy and related documents an all-hazards approach is regularly recommended as this provides a framework that can be adapted to the emerging situation.

The comprehensive approach to emergency management detailed in the NSW State Emergency Management Plan (NSW Government, 2012) informs the NSW Health operational and supporting plans. It is proposed that the type and scale of the incident does not affect the core principles. Effectiveness of the four phased approach is dependent on identifying and involving stakeholders at the earliest opportunity, establishing mechanisms for sharing information so as to enhance coordination of effort and continuously improving on the process through testing and evaluating plans.

Prevention: to eliminate or reduce the level of the risk or severity
Preparation: to enhance capacity to cope with the consequences (framework for mobilising of resources)
Response: to ensure the immediate consequences are minimised (framework for coordination and deployment)
Recovery: measures which support restoration and return to function

Adapted NSW State Emergency Management Plan 2012

The NSW Health Enterprise Wide Risk Management Framework (NSW Ministry of Health , 2009) describes the structures and processes able to be applied to any risk, internal or external, clinical or non-clinical. To be effective, risk management process needs to work across disciplines, be robust, transparent and aligned.

The Australian/New Zealand Standard 4360:2004 Risk Management describes the main elements of the risk management process as follows:

- Step 1 – Establish the context
- Step 2 – Identify risks
- Step 3 – Analyse risks
- Step 4 – Evaluate risks
- Step 5 – Treat risks
- Step 6 – Monitor and review risks

The NSW Health Risk Matrix provides a consistent process and language for identifying, classifying, determining appropriate response and communicating across the health system.

The term “surge” is used in National and International health care policy to describe the ability of the health service to expand beyond normal capacity to meet an increased demand for clinical care. The NSW Health Pandemic Plan provides examples of strategies for enhancing surge capacity and optimising hospital capacity that can be implemented when the increase in demand for acute care requires adjustments to be made to the routine delivery of hospital and ambulance services. The policy recommends that as much as possible, ‘changes to aspects such as triage and discharge criteria are uniform across NSW to promote equitable delivery

of healthcare according to agreed system-wide guidelines and the overall capacity of the hospital' (NSW Ministry of Health, 2010).

The Hospital Response to Pandemic Influenza, Part 1: Emergency Department Response (NSW Ministry of Health, 2007) policy provides an example of a framework for coordinating and clearly communicating the generic drivers for activation, the purpose of the response and operational requirements of Emergency departments. The policy requires each Emergency Department to consider their own circumstances and develop a plan that will ensure they meet the response objectives.

Queensland Government, Department of Health, Capacity Escalation Response Guideline (2014) recommends that each hospital and health services nominates an executive point of contact and coordination, and that demand is managed prospectively and responsively using policy, guidelines and predictive tools. Three levels of escalation are defined, including quantitative criteria for communicating the consequences of increasing demand and trigger points for commencement of planning to escalate to the next level of response**.** To support a coordinated response the guideline recommends establishing lines of communication between the health service and the local ambulance network.

Australian Capital Territory (ACT) publish a Health Sector Winter Plan (2015) which provides high level detail of planned actions, including preventative, demand and capacity strategies, specific for each of the Agencies and any collaborative initiatives. The Agencies include ACT Government Population Health, ACT Medicare Local, Canberra Hospital and Health Services and Calvary Health Care ACT.

Early identification of pressure points and the provision of timely, consistent and accurate information is central to NSW Ambulance operational governance structure. To clearly communicate to a broad audience, NSW ambulance include quantifiable trigger and escalation criteria, examples of questions that can be applied to ensure reliability of information and colour coded flow charts to demonstrate process steps and accountabilities at all levels (NSW Ambulance, 2015).

In recognition of the impact of increased demand on health services and the wider economy during the winter period, Public Health England produced a suite of complementary plans designed to prevent and minimise disruption through public health campaigns and whole of government planning (Public Health England, 2014a). The plans and strategies are evaluated and improved annually (Public Health England, 2014b). Coordinated effort is facilitated through integrated cross agency planning, applying a common set of prioritisation criteria, recognising that to ensure health care effective management, a common understanding across all health and social services including ambulance, community, aged care, education and GPs is required (Department of Health, United Kingdom, 2009).

The use of structured formal operational processes that clearly identify roles, responsibilities, delegations and communication lines is a feature of all policy documents. The incident control system (ICS) is widely applied both in National and International policy documents (Figure 1.). This is a management-by-objectives methodology that recognises different activities that must occur to successfully manage an incident response. These tasks can be grouped into categories with functional similarities, mainly operations, logistics and planning (The Department of Human Services, Victoria, 2008).

The World Health Organisation (2011) define command and control as the 'decision-making system responsible for activating, coordinating, implementing, adapting and terminating a pre-established response plan' (p.7). Taking command and activating the health services ICS is recommended by WHO as the first priority response to any exigencies or critical event (2011). WHO describe the objectives that managers and planners should aim to achieve through their coordinated response systems as;

(1) The continuity of essential services;

(2) The well-coordinated implementation of hospital operations at every level;

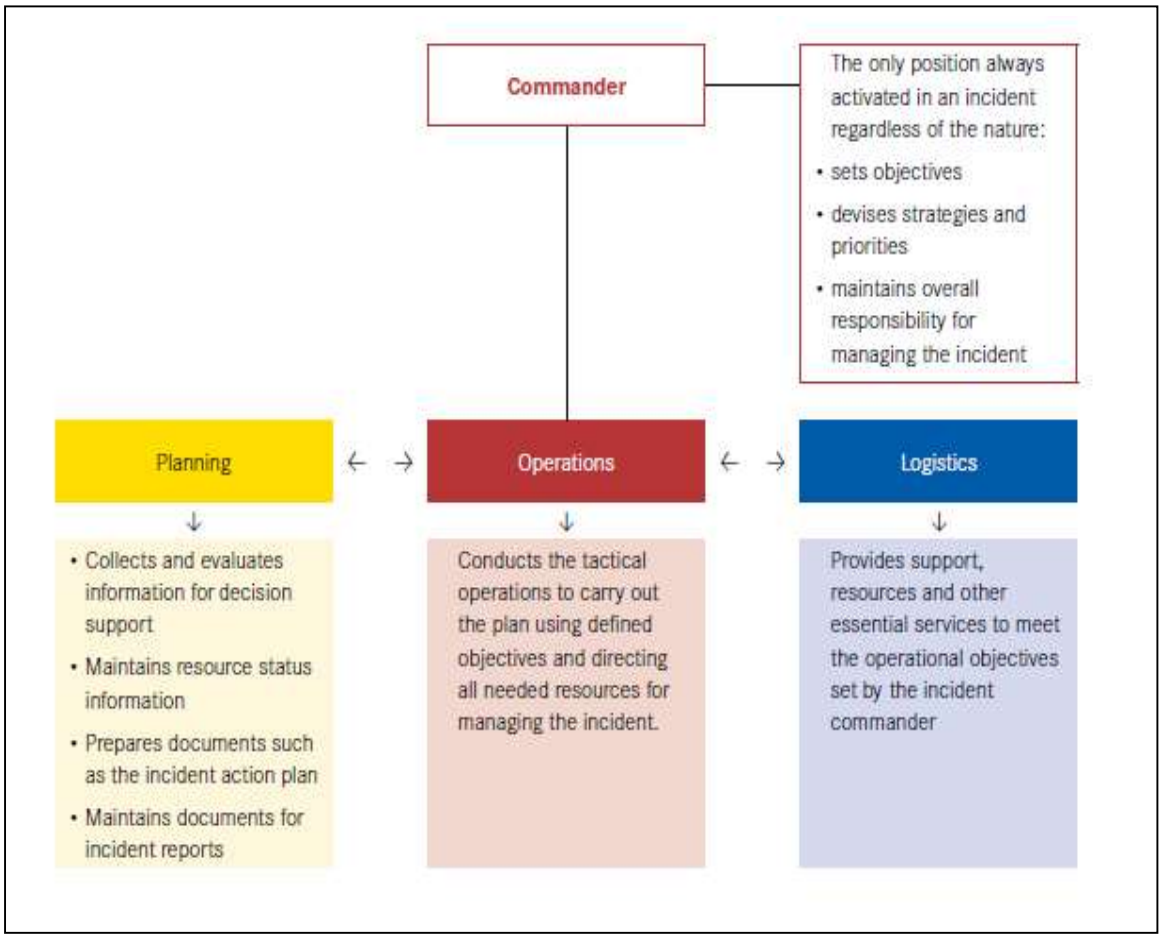
(3) Clear and accurate internal and external communication;

(4) Swift adaptation to increased demands;

(5) The effective use of scarce resources; and

(6) A safe environment for health-care workers (2011, p.9).

Figure 1. Incident Control System (ICS): Hospital resilience code brown policy framework (The Department of Human Services, Victoria, 2008)



In preparing a response plan, it is recommended that the document is kept free of unnecessary detail such as how-to instructions, rather focusing on what the reader needs to know. Who is responsible for what, what they are accountable for and with whom do they need to coordinate with and communicate to. The plan should be complemented with specific action orientated operating procedures or checklists that comply with minimum standards (NSW Ministry of Health, 2013) (California EMS Authority , 1993). These can be developed at the level of implementation and cross checked for alignment within, across and beyond the service boundaries (World Health Organisation , 2011) (Federal Emergency Management Agency, 1996). The following principles are recommended when developing an operations plan for responding to a hazard or emergency;

Do ensure that the interests of the patients are primary in the system	Coordinate in order to ensure close cooperation and to limit conflict
Do examine the existing system; identifying barriers and system opportunities	A uniform core data set is key Ensure purposeful collection and analysis of data Embed evaluation and quality assurance
Don't Reinvent the Wheel	Use Available Guidance and Training Materials Build on What Exists in the Jurisdiction
Don't Go It Alone	Benefits of the Team Approach Ensure the team membership includes a good cross section of the relevant organisations and stakeholder groups
Don't Forget the CEO	Executive support for and involvement in the planning effort is critical Engage cooperation of all agency heads

The NSW Health Patient Flow Systems Program (PFS), inclusive of ministerial policies, guidelines, the Patient Flow Portal (PFP), customised training programs, dedicated care-coordination roles and support tools, has been established so as to provide a comprehensive framework for proactively managing and coordinating patient flow (NSW Health Systems Relationships and Frameworks Branch, 2015). The PFS describes clear pathways for accountability across all layers of hospital and health service clinical and operational management. The PFP is the central intelligence hub with data sources including historical activity data, hospital patient administration system and local entered data. The PFP functions include providing a one page 'dashboard' overview, an up to date view of hospital beds and activity known as Bed Board view, and information about every patient on a ward that directly relates to coordinating care and managing patient flow known as the Electronic Patient Journey Board view. In addition the PFP has predictive and reporting functions.

In 2012, NSW Health commissioned a review of the evidence and best practice related to patient flow. Showell, et al made a series of recommendations, stating that the mostly decentralized and fragmented nature of the health care system meant that any attempt to design patient flow into the system would require a multi-level approach, incorporating strategic, operational and tactical actions (2012). The review explored the nature of variability, including the mismatch between demand and capacity that can arise both *naturally* as patterns or cycles and *artificially* as the consequence of local decisions such as scheduling of elective surgical procedures. The evidence strongly supported measuring in order to understand local sources of variation and utilising this data to inform operational scheduling and workforce planning. Showell, et al included examples of improved performance where health services utilised data for forecasting or looking ahead to plan a response to predicted variations in activity, such as likely increases in demand during the winter period or decreased capacity due to staff leave over Christmas period (2012). Building in 'look ahead' as a routine management practice was also encouraged.

Showell and colleagues (2012) review of best practice identified that from a system perspective, that in the operations of a hospital there are predictable elements within most crisis events and a scaled response is recommended. This includes implementing an established and tested plan when preparing for an impending peak in demand (capacity action plan) or a short term escalation and recovery plan for managing peaks of demand activity. These plans are embedded within and supported by the business continuity, risk management, and workforce plans of the wider organisation.

Governance is a key element of the PFS. NSW Health (2015) recommends and supports hospitals to prepare and operationalise two types of demand escalation plans:

1. *Capacity Action Plan (CAP):* Based on predicted demand and capacity mismatches using the Predictive Tool. Aiming for escalation before the problem occurs and responsiveness to demand. Indicators include capacity imbalance in the next 10 days; public holidays; anything that could cause discharge delays; and integrated with local escalation plans that are used during special events or seasonal variation in demand.

2. *Short Term Escalation Plan (STEP):* 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. Aiming for a proactive response, including escalation before the problem occurs and responsiveness to demand. Tools include ambulance arrivals board and the Patient Flow Portal predictive tool and electronic patient journey board. Indicators include predicted capacity deficit at the end of the day; ED escalation triggered and no inpatient beds available; and discharge delays / lower than predicted discharges.

A recent review of demand escalation planning within NSW Health identified uptake within the system of strategies put in place to support patient flow are having a measurable impact on performance (NSW Health Systems Relationships and Frameworks Branch, 2015). The review also identified the potential for artificial increases in demand due to operational scheduling practices associated with financial year planning, potential for conflict in priorities due to an absence of wider consultation and alignment of demand responses between health services and NSW ambulance, inappropriate use of non-emergency patient transport and predicted increased demand during the Flu season. The absence of standardised or whole of health approach to planning was identified as a key limitation.

Key Point - The governance documents reviewed widely recommended the concept of a standardised system wide response, in that the steps and processes are consistent, being scaled appropriately to match the circumstances. A standard response framework allows for targeted training for all staff (inter & intra Agency) and maximises opportunities for testing, evaluating and refining response procedures. Centralised control underpinned by collaborative leadership between and within effected agencies, supported by explicit and devolved accountabilities that enables local adaptive leadership is a key component.

The first priority of planning is consistently safety for all. This is followed by a common shared goal of pre-empting and minimising service disruptions whilst preserving service quality. Reliable data sources, access to predictive tools, initiating pre-emptive plans, agreed and easily recognisable triggers for escalating and scaling back responses, and established communication with feedback mechanisms are essential items.

Utility of the Incident Control System (ICS) as a methodology for incident response planning is widely accepted. A number of jurisdictions have initiated a coordinated demand escalation planning process communicating agreed easily quantifiable triggers, planned actions and delegated accountabilities. This is supported by local action plans, policies, guidelines and flow charts. To maximise standardisation for a broad audience the use of plain language, action cards, flow charts, colour coding and example prompt questions for clarifying are recommended. An evaluation and lessons learnt approach is recommended, including opportunity for all Agencies to review data and contribute to improving the planning process.

Business continuity planning and management is highly represented; positioned as part of an entity's overall approach to effective risk management, and closely aligned to the entity's incident management, emergency response management, disaster recovery plans and workforce planning. It is recommended that Business planning processes include internal review incorporating historical activity data and predictive tools to inform

scheduling of activities and resource management and external review to ensure alignment with population health, service partner and community priorities.

The embedding of the NSW Health Patient Flow System (PFS), including the Patient Flow Portal, as a central element of health service planning is likely to enhance the systems capability to adapt in response to analysis of lessons learnt and to anticipate and plan responses to fluctuations in demand and or capacity, thereby maximising resource efficiencies and system performance (NSW Health Systems Relationships and Frameworks Branch, 2015).

Table 1. NSW Health Search Results

Maintaining Performance in times of variable demand for Health Services New South Wales Health
Emergency Management
NEW SOUTH WALES STATE EMERGENCY MANAGEMENT PLAN December 2012
New South Wales Health Services Functional Area Supporting Plan (NSW HEALTHPLAN) Document Number PD2014_012 Publication date 05-May-2014
HEALTHPLAN - Medical Services Supporting Plan Document Number GL2010_011 Publication date 26-Aug-2010
HEALTHPLAN - Mental Health Services Supporting Plan Document Number GL2012_006 Publication date 05-Jul-2012
Emergency Management Arrangements for NSW Health Document Number PD2012_067 Publication date 21-Dec-2012
Public Health Services Supporting Plan to HEALTHPLAN Document Number PD2015_002 Publication date 09-Jan-2015
Public Health Emergency Response Preparedness Minimum Standards Document Number PD2013_039 Publication date 14-Nov-2013
Public Health Workforce Surge Guidelines Document Number GL2014_003 Publication date 06-Feb-2014
Risk Management
Risk Management - Enterprise-Wide Policy and Framework - NSW Health Document Number PD2009_039 Publication date 30-Jun-2009
Disaster Risk Management Guidelines Document Number GL2009_004 Publication date 18-Mar-2009

Internal Audit Document Number PD2010_039 Publication date 23-Jun-2010
Standards
Patient Safety and Clinical Quality Program Document Number PD2005_608 Publication date 26-Jul-2005
Emergency Department Data Dictionary Document Number PD2009_071 Publication date 06-Nov-2009
2014/15 Service Agreement Key Performance Indicators and Service Measures Data Dictionary Document Number IB2014_055 Publication date 09-Sep-2014
Pandemic
Influenza - NSW Health Influenza Pandemic Plan Document Number PD2010_052 Publication date 16-Aug-2010
Pandemic Management - Governance Arrangements - Escalation of Health System Response Document Number GL2009_011 Publication date 29-Jun-2009
Hospital Response to Pandemic Influenza Part 1: Emergency Department Response Document Number PD2007_048 Publication date 27-Jun-2007
Influenza Pandemic - Providing Critical Care Document Number PD2010_028 Publication date 20-May-2010
Patient Flow Systems program
Care Coordination: Planning from Admission to Transfer of Care in NSW Public Hospitals Document Number PD2011_015 Publication date 07-Mar-2011
Inter-facility Transfer Process for Adults Requiring Specialist Care Document Number PD2011_031 Publication date 01-Jun-2011
Bed Numbers Data Collection - NSW Procedures Policy Document Number PD2012_054 Publication date 27-Sep-2012
An Evidence-Based Review and Training Resource on Smooth Patient Flow Showell, C., Ellis, L., Keen, E., Cummings, E., Georgiou, A., Turner, P. eHealth Services Research Group, University of Tasmania, New South Wales Government (NSW Ministry of Health) Published October 2012

Seasonal Planning
Surgical Activity During Christmas/New Year Policy Document Number PD2012_038 Publication date 11-Jul-2012
Service Delivery Models
Integrated Primary & Community Health Policy Implementation Plan 2007-2012 Document Number GL2007_019 Publication date 20-Nov-2007
NSW Hospital in the Home (HITH) Guideline Document Number GL2013_006 Publication date 20-Aug-2013
NSW Ambulance
Sustainable Access and Patient Flow 2015 State Resource Kit NSW Ambulance Sustainable Access and Patient Flow Published June 2015
WORK INSTRUCTION – Service Delivery - Demand Surge Management (Sydney Metropolitan area) Issued by Corporate Records Branch Published June 2015

Table 2. Australia & International Search Results

Maintaining Performance in times of variable demand for Health Services Australia
Australian Capital Territory ACT Health Sector 2015 Winter Plan
Queensland Capacity Escalation Response Guideline Queensland Government, Department of Health Document Number # QH-GDL-025-2:2014 Effective From: 23 December 2014 Supersedes: Protocol for Capacity Escalation Response (QH-HSDGDL-025-6-2014)
Queensland Hospital and Health Services workforce surge planning checklist for pandemic influenza Published by the State of Queensland (Queensland Health), May 2014
Victoria State health emergency response plan; Victorian pre-hospital and hospital response plan for emergency incidents. Third edition. A subplan of the State emergency response plan State of Victoria, Department of Health 2013 ISBN: 978–1–921801–23–5 Published Nov 2013
Victoria Hospital resilience code brown policy framework The Department of Human Services Victoria Published 20 October 2008

Victoria Guidelines for the Victorian Emergency Department Care Coordination Program State of Victoria, Department of Human Services, 2009 Published June 2009
Maintaining Performance in times of variable demand for Health Services International
United Kingdom Flu Plan Winter 2015/16 Public Health England Published March 2015
United Kingdom Cold Weather Plan for England 2014 Protecting health and reducing harm from cold weather Public Health England Published October 2014
United Kingdom Pandemic Influenza Response Plan 2014 Public Health England Published August 2014
United Kingdom Pandemic flu: Managing Demand and Capacity in Health Care Organisations. (Surge) Department of Health Published 30 Apr 2009
The World Health Organization The World Health Organization Regional Office for Europe Hospital preparedness checklist for pandemic influenza. Focus on pandemic (H1N1) 2009 World Health Organization 2009
The World Health Organization WHO checklist for influenza pandemic preparedness planning Department of Communicable Disease Surveillance and Response Global Influenza Programme Published 2005
The World Health Organization Regional Office for Europe Hospital emergency response checklist An all-hazards tool for hospital administrators and emergency managers World Health Organization 2011
United States of America Guide for All-Hazard Emergency Operations Planning Federal Emergency Management Agency (FEMA) Washington, DC Published September 1996
United States of America EMS System Standards and Guidelines CALIFORNIA EMS Systems Guidelines Published JUNE 1993

Context – Snapshot of best practice, tends and innovations

A targeted appraisal of published literature was undertaken to better understand current views on best practice and to consider innovations and improvements related to the principles that would underpin a standardised framework for escalation planning and demand management to be applied in the context of New South Wales Health.

The key databases searched included Academic Search Complete (EBSCO), CINAHL, MEDLINE (OVOID), ProQuest Health & Medicine and SCOPUS (Elsevier). The databases provided a subject coverage that included the Humanities, Social Sciences, Science, Engineering, Business and Management. Key words and phrases were explored or emerged through initiating separate or combined searches using Boolean connectors such as AND, OR and NOT.

The following themes were considered relevant and useful:

Planning

The importance of planning is well recognised in the management literature, with evidence of a correlation between planning and increased managerial effectiveness being demonstrated across industries and organisational models. The intent of planning is to ensure efficient organisation of work, coordination of activities, and effective utilisation of resources. This includes making decisions about objectives, priorities, strategies, organisation of work, assignment of responsibilities, scheduling of activities, and allocation of resources among different resources according to their relative importance (Yukl, 2010).

In the context of political and social reforms, resource constraints, new technologies, media headlines and a functional design that includes a complex matrix of interdependencies within and across the delivery systems, planning in the context of health care must factor in unpredictability and competing tensions (Ontario Ministry of Health and Long-Term Care, 2006). Hence, health care system planning aims for predictability with a high level of reliability, balanced through proactive mechanisms for predicting, monitoring and appropriately responding to variations. For example, operational planning details the scheduling of routine work and determines resource allocation, whilst contingency planning details procedures for preventing or managing potential disruptions as they emerge (Yukl, 2010). This approach acknowledges that forecasting is inherently inexact, yet bounded, in that generally true statements can be predicted e.g. average activity in a given month (Institute of Medicine, 2004).

It is widely accepted that all contemporary organizations must deal with change in the environments in which they operate. Risk is the effect of uncertainty on objectives. To avoid adverse risks ranging from disruption to disaster, organizations must anticipate change or uncertainty and build adaptive capacity for change. Although often illustrated as steps, planning is non-linear and dynamic. Feedback loops and operational monitoring allows for timely adjustments, which may require objectives to be modified, followed by strategies and plans. Planning seldom occurs as a single discrete event. It is dependent on access to best available data, usually from a combination of quantitative and qualitative sources. Engagement of stakeholders and experts in the planning process is associated with an increase in the range, depth and diversity of issues explored, more rigorous debate of intended and unintended consequences to the system, and greater ownership and accountability towards the success of the plan (Ontario Ministry of Health and Long-Term Care, 2006).

Resilience

With the purpose of enhancing an organisations resilience to a crisis such as a pandemic, or day-to-day risks such as service interruptions, thorough planning and preparation is essential (Australian Government, 2008). Resilience has emerged as a bridging concept, strategically linking practices across disciplines of study and

work. Resilience is frequently referenced as the capacity of an individual, group, or system to respond and adapt to some type of stress or disturbance in such a way that functionality is maintained (Baggio, Brown, & Hellebrandt, 2015).Hence an organisations resilience is related to its adaptive capacity. Adaptive capacity is about the degree to which the system is socially, i.e. by human action, capable of self organization and can build and increase the capacity for learning, change, and adaptation in response to changing external drivers and internal processes (Hobman & Walker, 2015). The Australian National Audit Office, promotes resilience as a method for public sector organisations to apply, describing resilience as being a holistic approach integrating risk, emergency response, incident and business continuity management (2009). Resilience can be summarised as a dynamic blend of culture and attitude, process and Framework.

Robustness

Robustness is a central component of institutional resilience (Mehrotra, Ahuja, & Sridharan, 2014). Inadequate planning or delayed responses threaten the robustness or ability of a system to withstand stresses. The bullwhip effect is a phenomena identified in product supply chains where a problem is inadequately addressed, resulting in an amplification along the chain leading to a tipping point in the organization's ability to handle problems, which then leads to subsequent drop in quality and productivity. Akkermans & Voss (2013) explored the bullwhip effect in human systems, examining the behaviours of managers and customers. They identified particular vulnerabilities in the practice of managers functioning in isolation or silos, ignorant of the flow on effect of their slow decisions, whereby any delay in implementing corrective behaviours impacted on immediate workloads but also contributed to unintended consequences downstream and beyond their organisations boundaries. In this dynamic system, demand and capacity planning is not a simple or static calculation it requires timely access to quality data, including feedback loops at multiple stages and prepared strategies that can be activated to support an agile response to unexpected variables (Akkermans & Voss, 2013).

Designing a model or roadmap of the patient journey is recommended as an effective mechanism for assisting managers and service planners to identify the consequences, intended and unintended, of local strategies. Working with a large publically funded general hospital in Toronto Canada, Wong et al (2012) focused on the chronic problem of Emergency Department (ED) waiting times. A model was developed based on an in-depth data analysis of the previous 4 years, examining hospital and ministry of health level strategies. This process revealed that hospital level decisions that provided short term symptomatic relief (e.g. aggressive discharge & opening unbudgeted beds) were not addressing the root cause or were they sustainable. Alternative strategies identified by the group that would have a more direct impact included establishing admission guidelines that diverted specific presentations from ED and a redesign of discharge practices including scheduling of medical rounds. Analysis of the Ministry of Health level decisions revealed that the current incentive funding for improving ED wait times may be better invested in rewarding and supporting system wide strategies such as discharge coordination, palliative care outreach or preventative initiatives (e.g. falls). Other patterns that were revealed by the 4 years of data included absence of widely considering the consequences of accepting more scheduled procedural cases as a strategy for generating revenue. Consequences of this decision that became evident when looking at the historical data included the increase use of resources related to the increase inpatient care, use of diagnostic and pathology services, a shift in availability of beds and patients returning to ED outpatient departments. The shift in resource utilisation and work practices actually contributed to bed and budget deficits. The need for hospitals to take into account the downstream costs of increasing volume and for the Ministry of Health to collaborate in forecasting capacity and resource consequences from a system-wide perspective was apparent. Wong et al. (2012) concluded that building a model on reliable data and engaging stakeholders in critical reviewing the trends and then hypothesising the consequences of strategies both at an operational and strategic level are more likely to result in robust system-wide improvements.

Business Continuity

With the objective of maintaining business continuity, it is considered a critical element of good governance that proactive and contingent controls are embedded within an organisations operational model. In the face of change, these controls can enhance an organisations capability to adeptly adapt their operational model; reducing the frequency or severity of a disruptive event, and in reducing the scale facilitating the return to routine operations as soon as possible. These controls do not stand alone, they are embedded within an effective risk framework that sets policy, demonstrates commitment, provides resources, allocates responsibilities, constantly checks progress and supports leadership in seizing opportunities for learning and innovation as it emerges (AS/NZS 5050:2010 Business continuity—Managing disruption-related risk, 2010) .

Business continuity management (BCM) is not simply a functional process it can also be considered as a capability framework for organisational resilience, that underpins adaptability and organisational agility (Torabi, Rezaei Soufi, & Sahebjamnia, 2014). As in other strategies implemented in complex adaptive systems, its effectiveness is directly related to leadership (symbolising the importance), collaboration (reflecting the coupled nature and interdependencies), engagement (engendering commitment and facilitates ownership) and sustainability (embedded into functional management team processes rather than one-off event) (Herbane, Elliott, & Swartz, 2004).

An integrated business continuity management program provides a proactive process that facilitates a greater insight into the strategic, tactical and operational decisions of organisational planning (Sahebjamnia, Torabi, & Mansourib, 2015). The phases of BCM can be applied to support or build confidence in organisations resilience to a range of risks. Gibb & Buchanan (2006) describe the program phases as:

1. Programme initiation – charter & plan;
2. Project initiation – project management methods – scope, objectives, stakeholders etc;
3. Risk analysis - risk identification, risk evaluation and business impact analysis (BIA);
4. Selecting risk mitigation strategies - transfer risk, minimise risk, absorb risk, disaster recovery plan;
5. Monitoring and control - effective communication, command and control structure to be in place to ensure that the requirements of the plan are translated into action;
6. Implementation;
7. Testing;
8. Education and training;
9. Review.

Whole-of-System

The need to move towards a whole of system approach to planning health services is widely published. It is recognised that in adopting systems thinking approach, the requirement to facilitate the appropriate flow from entry, including transfers of care, to exiting the system and entering the next, is crucial.

The Australasian College for Emergency Medicine (ACEM) (2014), Statement on Access Block, supports the necessity for a whole-of-hospital and whole-of-system approach in order to advance the transformational thinking and behaviours required to implement system wide redesign solutions, which are also amendable to be tailored to local needs. Their statement also supports the implementation of over-capacity protocols and hospital avoidance strategies. The need for establishing a sound evidence base to inform and evaluate

strategies to prevent and decrease access block is a priority. This priority is supported by a systematic review of the literature to understand the system wide benefits of implementing a Full Capacity Protocol. Analysis was limited as the reviewers noted that no 2 protocols were the same, nor was there discussion on compliance or accountability. The authors summarised that there appears to be no standard FCP definition, preventing any efforts to benchmark or identify best practice (Villa-Roel, et al., 2012).

Also with the aim of contributing to the evidence base of bed management practices Allder, Silvester, & Walley (2010) examined the patterns associated with bed availability including variations, mismatch and seasonal pressures across an NHS trust. The data analysis showed that variations within the system are not purely random, rather that there were cyclical patterns that showed a natural variation in demand over time. The authors asserted interventions associated with daily and weekly bed management practices are more likely the dominant causal factor for winter bed shortages than the notion of increased demand. To address the natural peaks and troughs of bed availability requires a whole of system strategy that includes review and trending of hospital clinical management and discharge practices alongside a review of and alignment with community and support services (Allder, Silvester, & Walley, 2010).

'Surges' in Demand

Acknowledging that a health services capacity to respond to surges in demand is internationally recognised as part of best practice in responding to a wide range of scenarios (World Health Organisation , 2011), Watson, Rudge, & Coker set out to review the literature and design a standardised conceptual framework that could support policy, practice and evaluation efforts (2013). A systematic review of the literature identified considerable variations in all aspects of surge capacity within health services definitions and practices. The American College of Emergency Physicians' definition of surge capacity as a "measurable representation of a health care system's ability to manage a sudden or rapidly progressive influx of patients within the currently available resources at a given point in time" (ACEP 2006) was frequently adopted in the publications reviewed, however there was an absence of generalisability of approaches across the health services.

The literature review identified an absence of coordination of capacity planning occurring across local, service and system responses, with a noticeable absence of feedback loops. The authors also identified that health services were aware of their vulnerability in basing their response on the analysis of bed and staffing numbers alone, however this continued to be the focus. A four component approach designed to assist planners to problematize the multi-components and interdependencies within health services was examined in detail. Watson, Rudge, & Coker (2013) demonstrated that each component contributes to maintaining both service and systems performance and must be considered in combination when undertaking surge in capacity scenario and response planning:

> Staff – maintaining sufficient staffing level – predictive modelling to include staff absenteeism and leave. Broadening view beyond hospital staff to the health system, for example the role of General Practitioners and emergency services;
>
> Stuff – maintaining equipment and essential resources, including the coordination of resources beyond the hospital taking all levels of health service into consideration within predictive modelling. To manage finite resources a scalable approach to resource utilisation was proposed, from conventional, to contingency to crisis phase, aiming for best standard of care possible in exceptional circumstances;
>
> Structures/Space- maintaining access to appropriate environments for delivering health services. Predictive modelling to consider the configuration of hospital beds and wards and also explore community and home based hospital care options;

> Systems – maintaining performance –command and control, communications, coordination, continuity of operations and community infrastructure – and providing governance – policy, information systems;

Hick, Christian, & Sprung where interested in why, when responding to surges in capacity related to H1N1, some Intensive Care Unit (ICU) services were overwhelmed and somewhere not (2010). Based on the examples of best practice observed and reported, the authors commended a whole system stepwise approach from conventional, to contingency to crisis functions, which could be scaled for a sudden or gradual surge in capacity.

The following were identified by the authors as processes and behaviours of services that maintained performance;

- ✓ evidence of judicious planning; *commitment to protocols for initiating surge capacity responses including adapting staffing profile, resources and patient care spaces; *phased staff plan to ensure adequate clinical supervision; *an established incident management system is in place that allows for using appropriately trained and supported incident command positions with delegated authority; *accepted terminology; *staff educated in standard operating procedures and includes a formal process for testing planned responses, followed by a cycle of evaluation; *coordination agreements and systems with neighbouring/ regional health care facilities are in place including agreement on roles and responsibilities (Hick, Christian, & Sprung, 2010).

Other practices identified in the literature as contributing to system performance and patient safety in times of scaled (rapid or incremental) demand for inpatient services include;

- ✓ Implement policy and protocol that governs the identification and process for safe early discharge of patients. Developing decision support tools, such as a classification system that uses an agreed categorisation based on risk tolerance / likelihood of subsequent medical consequences, to govern the assessment of an inpatients' suitability for immediate discharge (Kelen, et al., 2006);

- ✓ Develop demand forecasting algorithms – dependent on accurate and reliable data. Formatting and distribution of data is targeted to match operational priorities e.g. Director – trending annual resource allocation data; Manager – trending weekly rosters and workload calculations and, Clinician – daily allocation and shift priorities (Miller & Xiao, 2007);

- ✓ Supporting staff through education and training to develop adaptive abilities, improve resilience and better manage resources in high demand periods (Miller & Xiao, 2007);

- ✓ Clearly defined stratification of services under normal operating systems –level of patient acuity, staffing, resources - in preplanning for responding to a surge in demand, utilise this stratification to inform networking / transferring of patients to the most appropriate level of care (Campbell, 2010);

- ✓ Data linkage systems linking ambulance, Emergency Department and hospital inpatients – comparison of manual and automated data collection identified sensitivity of between 95%-99% - concluded accurate data suitable for planning and evaluation (Crilly, et al., 2011);

- ✓ Establishing automated data systems for jurisdiction benchmarking of quality targets – utilise Asplin's (2003) input-throughput-output conceptual model of ED to anlyse patterns, paying attention to transition between components, patient and staff experience data. Include self report data, observations and interveiws (Ekelund, et al., 2011);

- ✓ Include ambulance transportation data, demographics and trended variations for modelling of demand for acute hospital services utilisation (Lowthian, et al., 2011);

- ✓ Networking of medical services and use of telemedicine to support during crisis and provide speciality care in regional areas (Xiong, et al., 2012);

- ✓ Fostering the development of Emergency Department and General Practice co-operatives (Thijssen, Giesen, & Wensing, 2012);

- ✓ Including population based data to understand demographic changes and trends; utilise in predictive modelling of primary and emergency service needs (Lowthian, et al., 2012);

- ✓ Strengthen the rigour of benchmarking and evaluation through identifying the evidence / theory that underpins the surge demand operational model and determine quantifiable critical points and outcome measures - With the intent of collating evidence of what makes a model effective in order to inform the development of an evidence based framework, Mahdavi et al completed a systematic review of more than 4000 papers, only 116 papers met the criteria, with only a few papers reporting achievements which could qualify as empirical evidence and contribute to an evidence based operational model for health services (Mahdavi, Malmström, van de Klundert, Elkhuizen, & Vissers, 2013).

- ✓ Use of whole-of-patient journey decision support systems that are designed to provide a view from admission to discharge, identifying delays and events within the sequence, allowing for timely intervention and supporting real-time enhancements and process improvement - A hospital in Alanta, Georgia engaged with a decision support system to support optimisation of their workflow without changing physical layout, instead focussing on the processes, operations tracking and staffing, resulting in a reduction in length of stay by 33 percent and improved financial performance. The model, which has been generalized, has been tested and implemented in other Emergency Departments. Evaluation of the system is in progress (Lee, et al., 2015).

Crowding

Crowding is a phenomenon that involves the interaction of supply and demand and is often associated with a reduction in timely access and quality care in Emergency Departments (Moskop, Sklar, Geiderman, Schears, & Bookman, 2009a).

In undertaking a systematice reviw of the scientific literature, Hoot & Aronsky (2008) adopted the definition of the word “crowding” proposed by the American College of Emergency Physicians, “Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the emergency department, hospital, or both.” The authors reviewed 4,271 abstracts and 188 full-text articles, with 93 articles meeting the inclusion criteria. A total of 33 articles studied causes, 27 articles studied effects, and 40 articles studied solutions of ED crowding. The review concluded that ED crowding was a complex multi-faceted problem with no one cause, effect or solution. For example the studies reviewed identified that the causes of crowding included non-urgent visits, “frequent-flyer” patients, influenza season, inadequate staffing, inpatient boarding, and hospital bed shortages. Commonly studied effects of crowding included patient mortality, transport delays, treatment delays, ambulance diversion, patient elopement, and financial effect. Commonly studied solutions of crowding included additional personnel, observation units, hospital bed access, non-urgent referrals, ambulance diversion, destination control, crowding measures, and queuing theory (Hoot & Aronsky, 2008).

In 2009 Moskop et al., undertook an ethical and policy analysis of ED crowding. The findings supported that the inability to transfer emergency patients to inpatient beds was a root cause. Examples of adverse moral consequences associated with ED crowding included, increased risks of harm to patients, delays in providing needed care, compromised privacy and confidentiality, impaired communication, and diminished access to care (Moskop, Sklar, Geiderman, Schears, & Bookman, 2009a).

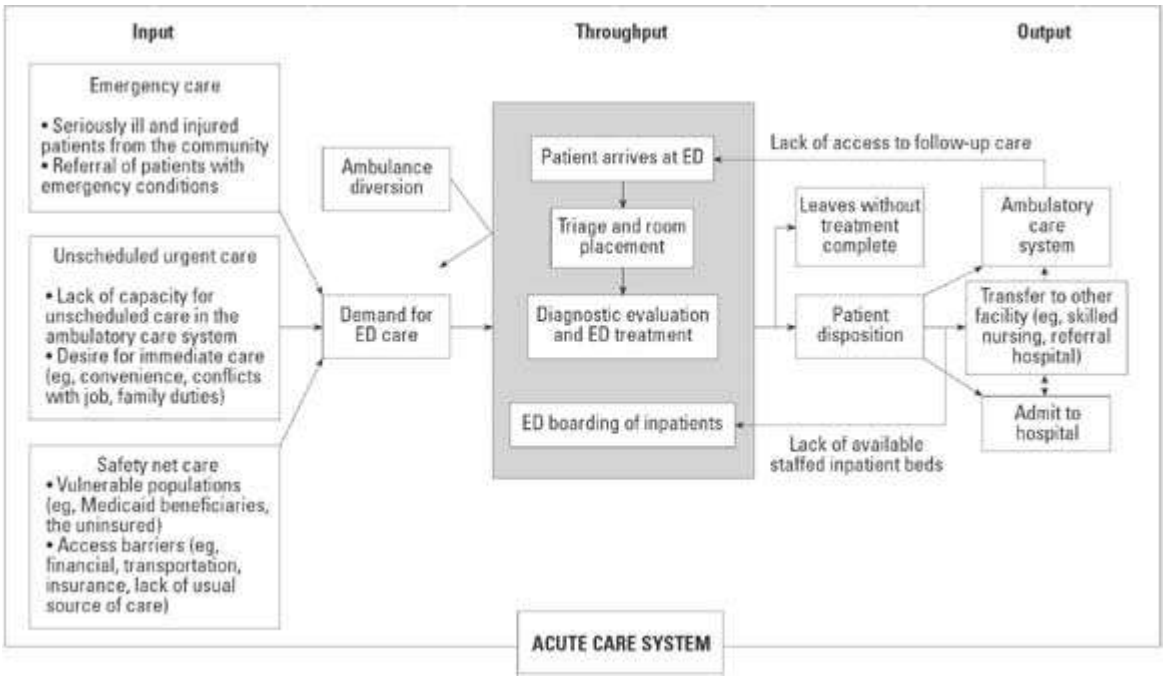
In the second part of their study Moskop et al., set the context of the US health system as “a miracle of disorganization” and stated that although ED crowding was a root cause of patient safety risks, operational and financial inefficiencies, the limited avaiablity of evidence due to variations between how hospitals report and managed ED crowding was a barrier to addressing ED crowding as a national priority (2009b). The study described the suite of operational strategies supported by the Institute Of Medicine including; addressing ED and inpatient crowding as a systems problem through establishing a coordinated bed management program supported by multidisciplinary teams; improving the reliability and use of data to predict weekly or daily peaks and valleys in demand for admission; adopting “smoothing” strategies to distribute admissions more evenly across the workweek; creating inpatient units to relieve ED crowding (e.g. clinical decision units or observation units); and implementing “full-capacity protocols” in periods of severe hospital and ED crowding (Moskop, Sklar, Geirderman, Schears, & Bookman, 2009b). The evidence to support the efficacy of these strategies is described as limited and the practice of hospitals customising their approach minimises opportunity for building a comparable body of evidence to support their impact.

In addition Moskop et al., review of the financial incentives established within the US Health Care system, including maximising revenue by operating at the highest capacity, and reducing loss of revenue where emergency admissions are competing for book elective surgery beds, suggests that the system is set up to maintain the status quo of ED crowding (2009b). The authors conclusion included considering following the NHS model of 4 hour admission or discharge from ED perfromance targets and incentives program, and the adoption of accepted strategies used for capacity surges such as pandemic including the reverse triaging of patients to identify those suitable for safe discharge and engaging with the public informing them of the hospital status, associated risks and alternatives.

In 2012, Higginson undertook a literature review to examine ED crowding and to determine whether the 4 hr standard had had an effect on ED crowding in the NHS (2012). The literature identified was prodminantly descriptive or retrospective papers (65%) and from North America and Australasia (89%). There remains a lack of consistency of definition and quality in measurement which limits the standard of the research. In summary the main causes of ED crowding was high level of hospital occupancy and crowding was associated with adverse consquences for patients and staff. The interventions primarily focused on ED strategies despite the main causes being identified outside of the ED. The evidence supporting the solutions was weak, it was identified that the 4 hour standard may contribute to mitigating ED crowding. The author concludes that ED crowding is an international phenomena of which there is limited quality research to inform policy, evaluation or performance monitoring. The findings support investigating real-time monitoring for hospital and ED occupancy and engaging in coordinated preparedness planning similar to Pandemic to support an organisational wide response (Higginson, 2012).

Higginson’s finding were supported by Slote Morris, Boyle, Beniuk, & Robinson (2012). Using a widely accepted model that demonstrated the interdependent components of the health system (i.e. inputs, throughputs and outputs) allowed for the ED to be examined within the system . This model illustrated that it is both volume and the nature of the demand that contributes to ED crowding (Asplin, et al., 2003). This supports the relationships with broader social and political factors, such as ageing population, changes to health care funding and restructure of community services.

Figure. The input-throughput-output conceptual model of ED crowding (Asplin, et al., 2003)



The authors found that although the ED crowding literature provided numerous examples of interventions within the input, throughput and output components of the health system about what could be done to improve crowding in EDs, however the poor quality of the evidence made it difficult to know what should be done. Interestingly the majority of input focused strategies were not under the control of the ED, for example improving community support for chronic illness. Similarly output solutions focused on discharge practices, building relationships with the wider health system or improving community transport. ED had the most opportunity for leverage in throughput strategies including use of protocols and algorithms, redesigning flow of patients, using different staff and using staff differently and clinical leadership. The authors concluded in re-stating the need for systematic evaluation of interventions, acknowledging the risks of supporting current solutions and maintaining practices based on poor evidence (Slote Morris, Boyle, Beniuk, & Robinson, 2012).

With the objective of responding to the need for a quantative, objective crowding measures that can be used across multiple sites and that are feasible and reproducable, (Beniuk, Boyle, & Clarkson, 2012) engaged recognised experts in the emergency medicine field to participate in a three round Delphi study to prioritise a list of quantified crowding measures. The text box below summarises the 40 participant's demographics.

40 participants came from six different countries:
USA (42.5%), Canada (25%), UK (20%), Australia (7.5%), The Netherlands (2.5%) and Hong Kong (2.5%);
They were 23% female;
Largely identified themselves as academics (83%), clinicians (71%) and researchers (63%);
Mostly had medical degrees (89%);
When asked to rank on a 10 point Likert scale, from 1 (low) to 10 (high), their level of exposure to and/or understanding of Emergency Department Crowding (EDC), the median response was 8.94, indicating a high degree of expertise.

This study provided consensus on eight quantifiable measures labeled the International Crowding Measure in Emergency Departments (ICMED). The measures provide a comprehensive view of ED operations, they are independent but intrinsically linked. The authors recognised that in operating within a health system external factors may also influence ED operations, however these measures may be useful as a status indicator (Beniuk, Boyle, & Clarkson, 2012).

Exert from Emergency department crowding: prioritising quantified crowding measures using a Delphi study (Beniuk, Boyle, & Clarkson, 2012):

> Delphi study Round 1.
> There was an 87.5% response rate (35 responses) in round one. Respondents identified 27 unique defining characteristics (seven input, nine throughput, three output and eight other measures) and 101 operational definitions (31 input, 36 throughput, 18 output and 16 other measures). The defining characteristics were categorised as 'input' measures, 'throughput' measures, 'output' measures and 'other' measures. This categorisation was introduced by Asplin et al in 2003 and has since been used extensively in the literature. Input measures are those that affect the flow of patients into the department, such as the volume and type of care required. Throughput measures are those which affect the flow of patients and their care processes once they are in the department. Output measures are those which affect the flow of patients out of the ED; either discharged out into the community or transferred to another care site. Any data that did not fit into one of the three categories above was grouped together and labelled 'other' measures. The categorised data were supplied to participants for evaluation in round two.
>
> Round 2.
> Round two had a 50% response rate (20 complete responses). Using the inclusion criteria, respondents narrowed the list to 16 defining characteristics (five input, five throughput, two output and four other measures) and 35 operational definitions (11 input, 11 throughput, six output and seven other measures). Only one output measure remained after round two and this single defining characteristic had 12 accepted operational definitions. Participant feedback suggested that this measure should be divided into two distinct defining characteristics. For this reason, two output measures were included in round three.
>
> Round 3.
> There was a 70% response rate in round three (28 responses). Respondents identified three input measures, three throughput measures and two output measures for inclusion in the prioritised list of crowding measures. The measures and their participant consensus rates were:
>
> (1) Ability of ambulances to offload (70.4%);
> (2) Patients who leave without being seen or treated (77.8%);
> (3) Time until triage (74.1%);
> (4) ED occupancy rate (100%);
> (5) Patients' total length of stay in the ED (88.9%);
> (6) Time to see a physician (85.2%);
> (7) ED boarding time (88.9%); and
> (8) Number of patients boarding in the ED (88.9%).

To begin to validate the tool Boyle, et al., (2015) recently published a study designed to test the feasibility of actually collecting the ICMED's eight data measures. The study included independent obervations of the measures and comparing this with the perceptions of senior clinicians. The study was set in four regional hospitals in the east of England. The study identified all measures, except 'left before being seen' as feasible to be collected in real time. The study demonstrated an association between the measures and clinicians concerns about crowding and danger. The authors calculated that the optimal number of violations for predicting crowding was three, with a sensitivity of 91.2 (95% CI 85.1 to 97.2) and a specificity of 100.0 (92.9–100). Although promising, the authors caution that the vailadation of the measures is not complete and the results should be considered exploratory (Boyle, et al., 2015).

The International Crowding Measure in Emergency Departments (ICMED) (Boyle, et al., 2015)

Measure	Operational definition
Input measures	
1. Ability of ambulances to offload patients	An ED is crowded when the 90th centile time between ambulance arrival and offload is greater than 15 min
2. Patients who leave without being seen or treated (LWBS)	An ED is crowded when the number of patients who LWBS is greater than or equal to 5%
3. Time until triage	An ED is crowded when there is a delay greater than 5 min from patient arrival to begin their initial triage
Throughput measures	
4. ED occupancy rate	An ED is crowded when the occupancy rate is greater than 100%
5. Patients' total length of stay in the ED*	An ED is crowded when the 90th centile patient's total length of stay is greater than 4 h.
6. Time until a physician first sees the patient	An ED is crowded when an emergent (one ortwo) patient waits longer than 30 min to be seen by a physician
Output measures	
7. ED boarding time†	An ED is crowded when less than 90% of patients have left the ED 2 h after the admission decision
8. Number of patients boarding in the ED‡	Boarders are defined as admitted patients waiting to be placed in an inpatient bed. An ED is crowded when there is greater than 10% occupancy of boarders in the ED

*For example, in an ED with 50 patients inside, if more than five patients had been there longer than 4 h, then this would count as a violation.
†For example, in an ED with 10 patients who are waiting for admission, if more than one of these patients had waited longer than 2 h, then this would count as a violation.
‡For example, in an ED with 50 patients inside, if more than five patients are waiting for admission, then this would count as a violation.
ED, emergency department.

Evaluation

To model best practice of evidence-based policy making Public Health England undertook a multi-method evaluation of the first Cold Weather Plan for England published in 2011. (Public Health England, 2014a). The plan was designed to promote actions to support vulnerable people and alleviate pressures on health and social care systems. To inform future versions of the plan, the evaluation aimed to explored awareness of the plan, the success of the dissemination strategy and, experiences of implementing the plan. The six strands of this evaluation included, for background summary methods- the Met Office (UK) report, mortality surveillance data, syndromic surveillance data; and for core evaluation methods- analysis of web hits and access of the CWP from DH and HPA websites, an online self-completion questionnaire survey, and the National Cold Weather Seminar on 3rd July 2012.

The following six recommendations, although specific to the Cold Weather Plan (CWP), have been included as the principles are relevant to the purpose of this review:

1. *Partnership working*: Department of Health (DH) should build on partnership working and promote the integration of actions into local strategies and plans. Local arrangements will need to be developed to ensure that cold weather planning features as an integral element of wider winter resilience planning locally. The CWP should be embedded in local Joint Strategic Needs Assessments and engage GPs and Clinical Commissioning Groups;

2. *Data and information sharing*: for cross-agency partnership working and the identification of vulnerable groups locally, it is vital for local agencies across health and social care to be able to share relevant data. The plan should highlight the importance of data sharing and offer guidance according to information governance. There should be active engagement with existing information sharing platforms to support on-going exchange of information and best practise between local agencies;

3. *Met Office cold weather alerts*: alerts should be geographically specific and the frequency should be reduced (i.e. alerting at start and end of winter period, only when there is a change in alert level, alerting to renew/extend expiring alert, focussing on periods when threshold levels are reached). It was felt that the different types of alerts, forecasts and warnings produced by Met Office for responders should be clarified and specific recommendations were made around this;

4. *Actions at each alert level*: DH should encourage local emergency planners to implement CWP actions proportionately to local cold weather and risk assessments. This allows some flexibility in implementation depending on likelihood and impact of cold weather locally;

5. *Timing of release of the CWP*: the timing of release of the CWP was an important issue- delaying release had a knock-on effect on preparation and groundwork. A late September to mid-October release was suggested;

6. *Future evaluations*: DH should consider annual evaluations and reviews that are sustainable, rapid and easy to conduct. Among other things, the direct and indirect costs of implementation, evaluation of variables relating to mental health, long-term cost benefit analysis, mortality mapping for rural-urban differences need to be factored into future evaluations;

People and Culture

Understanding the past to influence the future

An organisation builds its organisational memory during its decision making processes. One way of examining a crisis is as an interactive experience that brings members of community together, informing a distributed cognition/ understanding about events and the decisions made. This results in a high-level common understanding towards the situation, a shared memory. This memory forms part of the informal network that influences future organisational responses and how the human system self-organises itself after a crisis or disturbance. Awareness and eliciting an understanding of this shared memory is critical in the preparing of an organisational response to future planned or potential disruptions (Chaung & King, 2013).

Inviting questioning and challenging status quo

Drawing on the understanding that our thinking is influenced by the labels we use to describe shared actions or common objects, Sulfaro, Foley, & Kunz Howard (2013) suggest that in order to transform thinking and adopt a patient flow mindset requires more than a change of labels or the language used. For example words like triage, waiting room, and bed, are all discrete isolated words that build an expectation of incremental or staged movements rather than flow. In contrast, Sulfaro, Foley, & Kunz Howard propose that rather than politely hiding behind labels, clinicians should be enquiring, challenging the system with questions like, “What are the quickest, safest, most efficient department locations and resources needed to move this patient through the system?” (2013).

Distributed Leadership

In reviewing the research of health care crisis management training, in particular preparing for a situation that shifts from normal to non-normal and then into crisis, Bergstrom et al (2012) found that it is not uncommon for the training to focus on leadership, situation awareness, communication and decision making. This training is completed as a team in simulated environments mirroring aviation industry methods. Drawing on organisational contingency theory and studies of high reliability organisations the authors recommend that to improve effectiveness additional attention needs to be paid to the social process of escalation if the goal is a coordinated response. Using the military as an example, the authors illustrate that during peace time the organisation functions in an hierarchical, protocol driven and disciplined manner. However on the battlefield, in response to fluid and haphazard situations the structure flattens, rank is less explicit and those who are lower ranked yet better positioned or equipped may assume a leadership role. The authors indicate that decentralisation of decision making or distributed leadership, especially in regard to safety issues, facilitating rapid response and potential anticipation and prevention of harm. Embedding opportunities for all perspectives to be heard, including feedback loops, when preparing for and responding to crisis is likely to enhance safety and facilitate recovery (Bergstrom, Dekker, Nyce, & Amer-Wahlin, 2012).

Implementing Change

In operating in a complex and adaptive system whereby there are multiple interacting and interdependent parts, the logic of command and control does not always support leaders in their efforts to implement change. A systematic review of the literature targeting how implementation science has promoted the uptake of research and evidence based practice into routine practice so as to improve the quality and effectiveness of healthcare, resulted in 57 studies being examined (Braithwaite, Marks, & Taylor, 2014). The following enabling features were associated with successful implementation of changes designed to improve care quality and patient safety:

Conducting effective and detailed planning and project management;

Good communication and collaboration between stakeholders involved in the implementation effort;

Ready access to tools, checklists, algorithms, standards, clearly defined roles or articulated expectations;

Well defined implementation strategy that utilizes teamwork, champions and staff capabilities;

Implementation strategy and the organization itself must be flexible, as conditions change over time; and

Monitoring, evaluation and feedback are central to the success.

Engagement = Certainty (Roles, Responsibilities, Purpose) + Communication + Trust

Times of high demand or unpractised routine can be stressful for staff. Managers, responsible for coordinating the implementation of plans designed to restrict or alter service structures have reported experiencing tension when there is conflict between their sense of accountability for the patient, their unit, the service and the system (Young, 1996). This may be related to concerns regarding quality of care or resource implications, whereby the manager is aware that the plan may exhaust staffing or budget. The authors recommended investing in supporting managers to understand and utilise their power and accountability, in particular their authority to adapt responses to accommodate local priorities and their accountability to clearly communicate any concerns or amendments they have initiated (Young, 1996).

It is well recognised that facilitating information transfer horizontally and vertically through different levels of the health system is a wicked problem. Information transfer has been described as both multi-dimensional, with dimensions including informational, management and relationship, and disordered with elements within each dimension linking and combining in order to reach its destination (Gardner, Banfield, McRae, Gillespie, & Yen, 2014). Improved performance is associated with knowing what to communicate (e.g. ready access to templates or prompts), feeling confident in how to communicate (e.g. opportunity to practice responses) and taking time to establish why there is a need (e.g. building relationships and shared purpose).

Within the model of operations it is important to note that in the context of demand management the methodology may require an explicit command and control approach. This may appear in contradiction to the patient/ person centred philosophy underpinning contemporary health care services and may influence a patient's experience of care. Open and transparent communication with patients, carers and engagement as stakeholders within health service planning have been widely reported to be effective in building trust and establishing a sense of community.

In recognition of the human side of the health system, acknowledging that a robust evidence based governance framework is only as good as the people who engage with it, Western Australia commissioned a report investigating strategies for maximising staff engagement and active participation in reform efforts. The paper explored resistance to change and slow adoption of evidence into practice, including the views held by some that clinical decisions should not be linked to resource decisions and persistent resistance to systematised approach to care planning. The authors note that no single intervention could be recommended as a solution, however a customised matrix approach that addresses local stressors and frustrations is supported. Interviews with clinicians and managers reinforced the importance of the presence of administrative and adaptive leadership in building an environment of shared purpose, open communication and trust (Department of Health, State of Western Australia, 2015).

Limitations

The purpose of the targeted appraisal of published literature was to better understand current views on best practice and to consider innovations and improvements related to the principles that would underpin a standardised framework for escalation planning and demand management to be applied in the context of New South Wales Health.

The limitations of this appraisal include the fit-for-purpose scope and time constraints. Papers were examined from a range of disciplines for being relevant, appropriate or useful, with most being framed at the explorative or descriptive level of research. Exploratory research is most suitable for investigating areas where there is little currently known and where developing of theory is required. Descriptive research starts to build on the emerging theoretical constructs, describing the features of sample groups or phenomena and identifying relationships between variables. The papers also included historical accounts, opinions, viewpoints and case studies. This is an appraisal not a systematic review of the literature, the inclusion criteria was broad and it was not the intent to synthesise findings or determine overall effects.

Key Points

A common theme from the papers appraised was the absence of consensus in the definitions or measures related to how health services organised or coordinated their response to rapid or gradual variations in demand. Nonetheless this should not be unexpected when examined in the context of a health service accountable for maintaining operational performance within a dynamic human system with extensive internal and external interdependencies, requiring a balance of structure, to ensure business continuity, with flexibility.

A system designed to deliver quality and quantity of services consistently in the context of variable conditions requires:

- Leadership (symbolising the importance),
- Collaboration (reflecting the coupled nature and interdependencies), identifying and involving stakeholders at the earliest opportunity;
- Engagement (engendering commitment and facilitates ownership) establishing mechanisms for sharing information so as to enhance coordination of effort; and
- Sustainability (embedded into functional management team processes rather than one-off event) continuously improving on the process through testing and evaluating plans.

Two features of organisations thriving in contemporary complex and changing environments are robustness which represents strength and ability to withstand and recover, and resilience which represents adaptive capacities and ability to learn and grow. This has relevance to the development of the workforce and the service.

Those who plan best are those where planning is collaborative, iterative and integrated. Quality data and intelligence is required for the identification and analysis of patterns and predictive modelling that informs evidence based and transparent decision making. Operational planning relies on continuous monitoring to identify positive and negative variations, and feedback loops that enable questioning and challenging at all levels.

It is evident that health service systems who have been successful in maintaining performance are those which have agreed formal structures, such as protocols and frameworks, **and** strong informal structures such as leadership and relationships. A pragmatic understanding of the whole system, including the past, real-time and future, is critical. Feedback loops, at multiple levels and inclusive of multiple voices, are mandatory. The standardisation of language and identifying and defining critical control points and requisite actions will support a coordinated system response and enable monitoring and continuous improvement.

The literature appraised suggests that most health services are yet to coordinate functions or demonstrate all of the aforementioned features. Achieving consensus on definitions and first steps in whole-of –system planning that takes into consideration the internal and external demands placed on the system and awareness of the predictable patterns of variation are in the early stages.

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