

Special Delivery Unit

Technical Guidance Introducing Demand and Capacity Planning



Meitheal Speisialta Spriocanna
Special Delivery Unit

'Is some strange magic at work that conjures up empty beds so suddenly?

Sadly not - it's just system dynamics'

Every weekday...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 target will be breached...

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. Two hours later, people are calm. Somehow, free beds have appeared and everyone leaves exhausted, knowing this daily ritual will be repeated.

Walley (2007)

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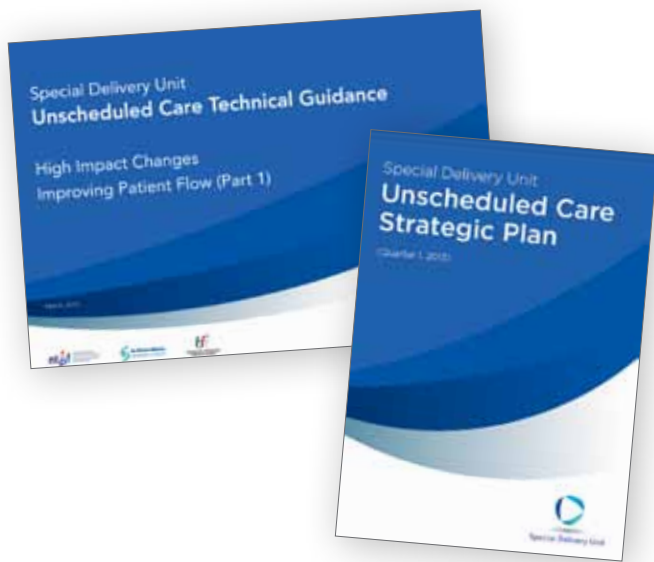
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Introduction

The guidance draws on published literature (including grey literature on best practice examples) as well as international health care improvement guidance. It should be read as part of a suite of guidance, specifically SDU Technical Guidance on Patient Flow (Part 1, 2013) and SDU Strategic Plan for Unscheduled Care (2013).



Higginson et al (2010) highlight that insufficient attention has been paid to demand and capacity planning and propose that a detailed understanding of demand is required in order to plan effectively. Litvak (2011) reaffirms this by stating “that the number of patients who must be treated in any given time period is a key condition under which a health care system must operate. Yet surprisingly, many hospitals ignore this key dimension in their improvement efforts”

Understanding demand and capacity is critical to safe operational management across the local health economy (Allder 2010, NHS 2010, Walley, 2006, Walley 2011). Inadequate understanding, poor planning and consequent delays in the patient journey puts patients at risk, leading to poor service experience at best and poorer outcomes at worst.

Demand and capacity planning, efficient patient flow and meaningful escalation planning are intrinsically linked. One cannot be effectively done without the other. Therefore, hospital and community agencies need to understand what is critical to quality in terms of understanding demand and planning realistic capacity. This includes understanding the data on patient intake (demand), throughput (capacity and patient flow) and egress. Understanding demand and planning capacity across the entire health economy will consequently strengthen operational grip on unscheduled care, facilitate elective capacity and support meaningful service planning.

This technical guidance introduces some key concepts associated with demand and capacity planning and is intended for use by key clinical leaders and operational managers who have responsibility for scheduled and unscheduled care improvement.

How to use this guidance

Whilst the concept of demand and capacity is familiar, its routine application in Irish healthcare operational delivery is less evident. This guidance is intended to be brief and accessible. The principles contained in the document are not solely focused on unscheduled care and have equal relevance to scheduled care. The fundamental intention is to ensure appropriate planning for both scheduled and unscheduled care pathways thus improving patient experience. One cannot be addressed without the other and therefore as indicated in the introduction, this guidance seeks to achieve two things;

- Firstly, it seeks to introduce key concepts associated with demand and capacity planning.
- Secondly, it seeks to signpost essential resources that facilitate an enhanced understanding of demand and capacity planning, resulting in the application of this understanding at an operational level.

As stated, the technical guidance is merely intended to ensure that some rudimentary concepts around demand and capacity are defined and the emerging ideas associated with capacity are introduced. It has been developed in the context of the Special Delivery Unit Unscheduled Care Strategic Plan (2013), the National Clinical Care Programmes and HSE Service Plan (2013). Whilst, the guidance is of particular relevance to operations managers, it is of equal relevance to all staff who contribute to patient care, whether in hospital or in the community, as their contribution to the process will be critical to its success.

In the interests of maximizing relevant resources the guidance contains links to:

1. Essential reading reflecting seminal papers by experts in the area of demand and capacity planning
2. YouTube clips or Powerpoint presentations

Leadership and Governance

Leadership

We know from experience in other jurisdictions that positive leadership is instrumental in addressing seemingly intractable challenges (The Health Foundation 2013). Therefore, leadership engagement, commitment and ownership is a pre-requisite to meaningful implementation of this guidance and ultimately to addressing scheduled and unscheduled care improvement.

If leaders understanding demand and capacity they will;

- Plan service access more successfully
- Increase throughput (by addressing variations in capacity and demand)
- Focus improvement effort as the organizational norm
- Improve operational management to effectively manage demand and match with capacity

Corporate and Clinical Governance

Governance is the provision of transparent and accountable leadership within an organization. Clinical governance is dependent on four components:

1. its use to promote quality and safety;
2. the creation of clinical governance structures to improve safety and quality
3. the effective use of data and evidence
4. the sponsoring of a patient centred approach.

(Braithwaite and Travaglia 2008)

In the context of demand and capacity planning, 'governance' means **everyone** involved in the patients journey understands their contribution to ensuring that unnecessary waits are avoided (see appendix).

Clinical governance is:

- The system through which healthcare teams are accountable for the quality, safety and satisfaction of patients in the care they have delivered.

For health care staff this means:

- Specifying the clinical standards you are going to deliver and showing everyone the measurements you have made to demonstrate that you have done what you set out to do.

Objective of Clinical Governance Development is that:

- Every clinical and social care action is aligned within a clinical governance system

Effective governance arrangements recognise the inter-dependencies between corporate, financial and clinical governance across the service and integrate them to deliver high quality, safe and reliable healthcare. What this means is that quality and safety is a priority and considered in all decision making. The CEO or equivalent of the health care facility is accountable and responsible for both corporate and clinical governance.

Formalised governance arrangements ensure that everyone working in the health service are aware of their responsibilities, accountability and authority in this respect and work towards achieving this. Having governance structures at institutional and departmental level allows for a formalization of accountability, clarity of purpose, and visibility of progress. This allows for a culture that challenges professional practices or redundant processes which contribute to delays.

A significant suite of practical resources, developed by the HSE Quality and Safety Directorate are available on [www.hse.ie/go/clinical governance](http://www.hse.ie/go/clinical%20governance).

These include,

- Quality and Patient Safety Clinical Governance Information Leaflet (2012)
- Quality and Patient Safety Clinical Governance Development Assurance Check for Health Service Providers (2012)
- Quality and Safety Prompts for Multidisciplinary Teams (2012)
- Quality and Safety Walk-rounds: toolkit (2013)
- Quality and Safety Committee(s): guidance and sample terms of reference (2013)
- The Safety Pause: Information Sheet (2013)

Essential reading:

1. (HIQA, 2012) *Theme 5 of the National Standards for Safer Better Health Care*
2. (HSE, 2013) *Leadership Governance and Management (Workbook 5) of the Quality Assessment and Improvement (QA+I)* see link <http://www.hse.ie/eng/about/Who/qualityandpatientsafety/Standards/qaandImprovement/qaadndocuments/QAandIWORKBOOK5.pdf>
3. (HSE, 2013) http://www.hse.ie/eng/about/Who/qualityandpatientsafety/resourcesintelligence/Quality_and_Patient_Safety_Documents/clingov.html

Process Improvement

What does process improvement look like?

A process is simply the method by which a patient journey (or stage in that journey) is managed. Process mapping is a technique to identify inefficiencies or help eliminate redundant steps in clinical workflow. It also identifies bottlenecks or blockage points where time or resources are wasted. Opportunities to address process improvement in patient flow are illustrated in Chart 1 (page 7).

An example of redefining process, cited by Rechel (2010), is the separation of patients in an Australian Emergency Department into two streams on the basis of complexity rather than urgency. This created a fast-track patient stream for patients who can be treated and discharged more or less immediately, leading to significant improvements in several key performance indicators, including mean waiting and treatment time.

Simple steps to improve process improvement typically involves;

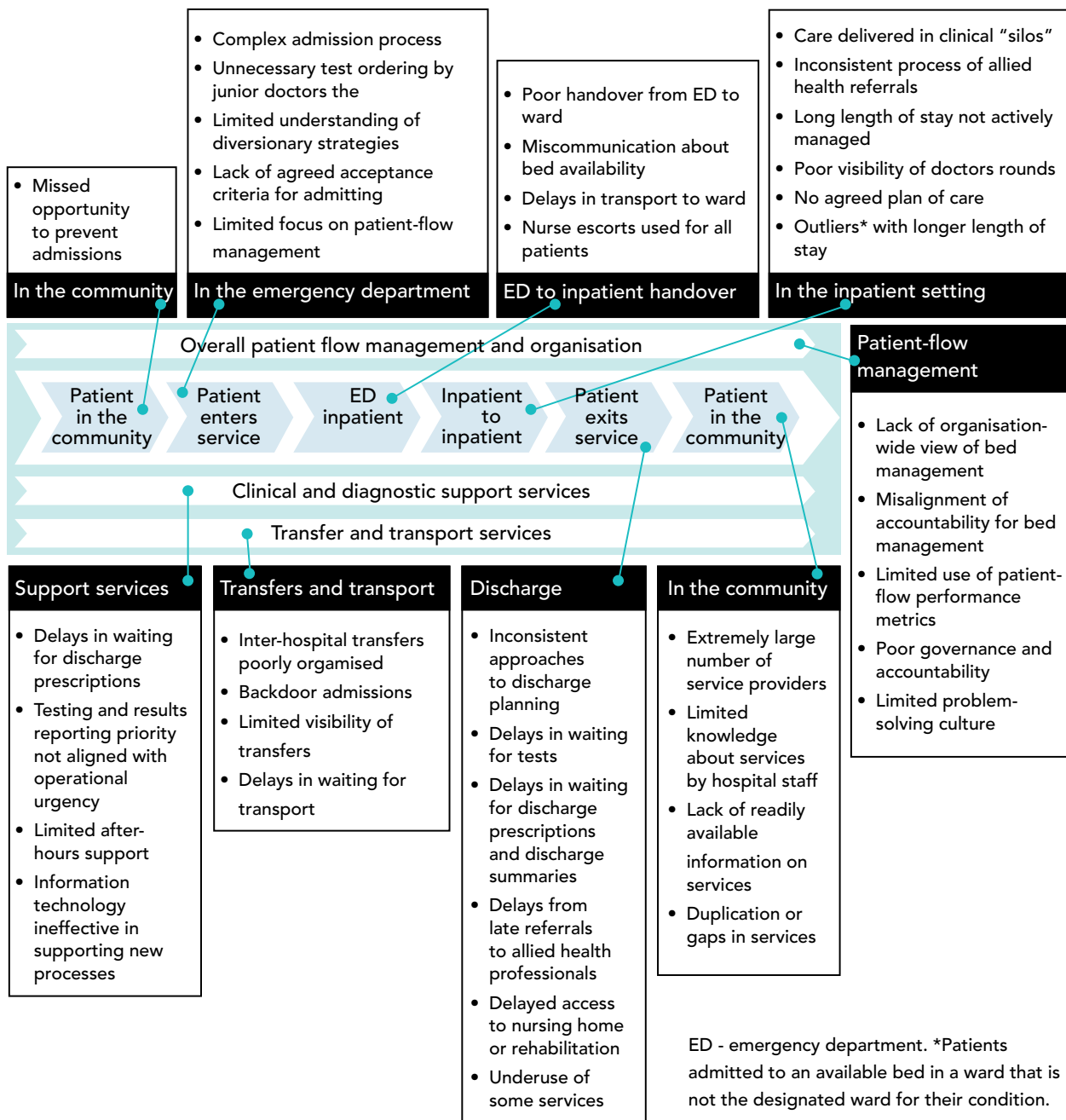
- Tracking a patient(s) journey, either tracked in real time by staff member (or researcher) or a care journey diary by a patient.
- Patient flow audits

An example of process improvement methodology, Lean process re-engineering, is widely used in healthcare (De Souza, 2009 and Young and McLean, 2009). Whatever methodology is utilized, the key is to accept these techniques as an improvement journey, that seeks to standardise the processes and take 'waste' (represented by duplication and delays) out of the system.

When applied to demand and capacity planning, process improvement generally seeks to address three things;

- 1. Improve the patients journey through the use of bespoke pathways**
- 2. Enhance operational grip**
- 3. Maximize the use of resources**

Chart 1. An example of process improvement opportunities across a patient journey



Essential reading:

4. Mould et al (2010), *The evolution of the pathway and its role in improving patient care*, *BMJ, Qual/Saf Health Care*, 19:1-6
5. NHS (2004) *Waiting for assessment, Emergency Care Checklist*
6. NHS(2013) *Quality and Service Improvement Tool*, *NHS Institute for Innovation and Improvement 2006-2013*.

Enhancing Operational Grip

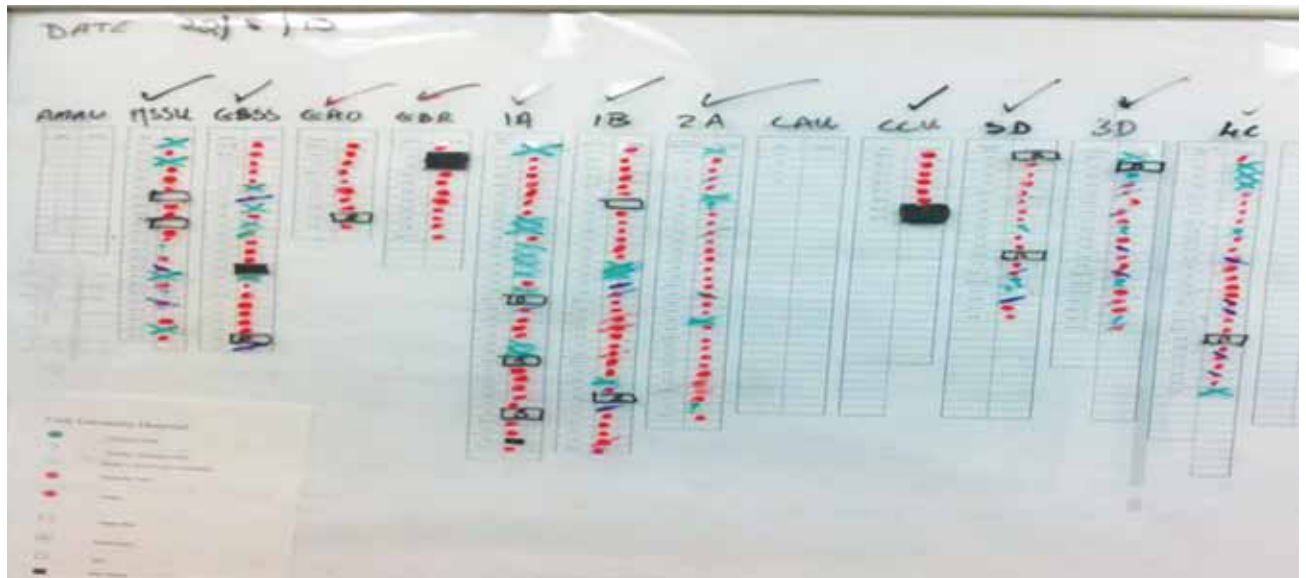
Hospitals, and their constituent departments, tend to operate as inter-related ecosystems rather than interdependent, co-operating parts. As already indicated, demand is predictable and capacity is measurable. Therefore, operational grip (the extent to which there is clarity of purpose, predictability and accountability) will be enhanced by understanding demand at hospital and departmental level and consequently being able to match this with capacity. This usually requires process change. However, current operational processes are usually largely invisible. A lot goes on 'behind the scenes' that is not systematized or over dependant on individual effort. Consequently there is a high potential for single points of failure (e.g. if a key staff member is on leave the system slows down). There is a need therefore to enhance the status and visibility of operational management.

An operational management strategy being increasingly deployed is the implementation of the Visual Hospital concept. Whilst a hospital's operational status is typically seen via the Patient Administrations System (PAS) or equivalent, the development of a Navigational Hub or Operations (Ops) Room will significantly enhance operational grip. The functioning of this 'hub' is enabled by a suite of data, usually paper based (or on whiteboard) and can make a significant contribution to process change, (electronic versions of a visual hospital system typically emerge from the first paper/whiteboard based generation).

Making the status of the hospital visible enhances organizational intelligence thus allowing process bottlenecks to be identified, surfaces undesirable practice and signals variation in demand and capacity. This enhances organizational grip which allows for safer, more objective decision making and improves governance (both clinical and executive governance). In addition, it increases organizational buy in to process changes as people can see where their efforts have positively contributed to improvement or repeated failure to address poor practice are highlighted. From a demand and capacity perspective it informs predictive planning and by extension escalation management.

Examples of critical to quality information in Navigational Hub/Ops Room are:

- Anticipated demand (attendances and requests for admission) and predicted capacity (discharges and turn around time per patient)
- Historic demand for the equivalent period last year
- Diagnostic and theatre capacity requirement (nature and mix)
- Conversion rate (admissions divided by attendances = conversion rate)
- DOSA rate



Whilst the function of the Navigational Hub/Ops room has historically provided visibility in terms of patient flow, it can be developed into a broader Command and Control function.

The SDU recommends the development of the concept of a visual hospital (see graphic) in order to enhance this operational grip. This provides the necessary overview that facilitates operationalizing demand and capacity planning.

Recommended resource:

1. YouTube, Lean summit, 2011. Tania King, Redesigning Complex Processes <http://www.youtube.com/watch?v=E6FueHtzTNk>

Maximising available resources

A common practice has been to deliver capacity or develop resource strategies around historic departmental processes rather than data informed arrival patterns. Yet we know that capacity and demand theory suggests that the presence of a queue is not necessarily an indicator of a shortage of capacity in the system (Allder 2010). It is more likely that it reflects a lack of alignment between demand and capacity or an unintended delay in the process. This in turn leads to further queues (backlog) which can be very hard to clear.

Capacity planning must therefore be based on meeting variation in demand for all services (eg. majors, minors, paediatric, surgical, medical, elective, OPD etc) matched with available resources rather than planning to meet 'average demand' for all services.

We therefore need to ensure we address the following:

Smoothing demand

Most studies indicate that ***unscheduled admissions*** (medical and surgical) to hospital are far less variable than elective admissions. Clinical scheduling distorts the natural pattern of demand. Daily fluctuations in capacity must be adjusted over a seven day week where possible.

In particular the system for discharging patients at weekends should be the same as for weekdays (SDU High Impact Changes, 2013).

Matching available resources (capacity) to demand by more flexible working

Delivering services over 7 days is a key modernisation agenda (Future Health 2012-2015). Equally, avoiding competing schedules across the hospital ecosystem is a fundamental requirement that ensures a safe, timely patient experience (NHS, 2009). This includes departmental analysis of demand (see diagnostics, page 15) and ensuring this is mapped against capacity. In seeking to resource this, there is a recognition that challenging traditional working patterns and adopting more flexible, 7 day work schedules, aligned with demand, results in better patient outcomes (Bell et al, 2013, RCPI, 2013).

Assertively managing patient length of stay?

Ensuring the patient journey pathway runs smoothly across the full care continuum is a challenging but critical requirement. This means meaningful use of Predicted Date of Discharge (PDD), more regular and planned discharge ward rounds (RCPI 2012), improved in hospital access to support services, timely senior clinical decision making, use of assessment units, short stay and specialty wards and finally timely access to step down and community services.

Patient pathways conceptualized as a true measure of capacity

In common with all well established institutions, hospitals were designed around medical specialties and departments rather than around the needs of patients. The exponential trend towards day cases and shortening lengths of hospital stay now ‘invalidates beds as a measure of capacity’ (Rechel, 2010).

A new paradigm of demand and capacity is therefore required.

Traditional practices, where a hospital's activity is centred on Monday to Friday schedules, means that patients often spend most of their time ‘waiting’. It may be argued that patients ‘waiting’ are being ‘cared for’ but international evidence indicates that a patient admitted on a Friday night will have a length of stay that is 25% longer than a patient admitted on a Tuesday (Government of Scotland 2007, O’Keefe 2013). Notwithstanding the issues it raises around resource utilization, the research indicates that patients admitted at weekends have worse outcomes (Bell, D. Redelmeier, D. (2001), Aujesky et al (2009), Crowley et al (2009).

Therefore, to quote Rechel (2010) ‘rather than seeing hospital as “warehouses” through the “bed number” approaches to planning, we need to see hospitals as immensely complicated processing plants, with thousands of parallel, often complex and interlocking, processes’. Walley (in press 2013) recognizes the complexity of addressing these patient pathways as part of an improvement agenda and advocates “dyadic” relationships whereby teams investigate their own internal flow issues and develop an appreciation of their neighbouring departments demand and capacity.

Whilst no doubt there are challenges involved in re-conceptualising the use of patient pathways as a more accurate reflection of ‘capacity’, the influence of the National Clinical Care Programmes, coupled with key Health Policy Funding reforms (money follows the patient) and Future Health 2012-15 provides the clinical and policy architecture by which a reconceptualization is possible.

Essential reading:

7. Higginson, I. Whyatt, J. and Silvester, K. (2010) *Demand and Capacity Planning in the Emergency Department: how to do it*, *Emerg Med J.* 2011 Feb; 28(2):128-35
8. Bell, D. et al (2013) *Consultant Input in Acute Medical Admissions and patient outcomes in hospitals in England. A multivariate analysis*, www.plosone.org.uk
9. Davidson, S.J., Koenig, K.L. & Cone, D.C., (2006) *Daily patient flow is not surge "management is prediction"* *Academic Emergency Medicine* 13 (11), 1095-1096.
10. Rechel, B (2010), *Hospital Capacity planning, from measuring stocks to modelling flows*, *Bull World Health Organ.* 2010 August 1; 88(8): 632-636

Data and Information

What does 'demand' look like and is demand predictable over the year?

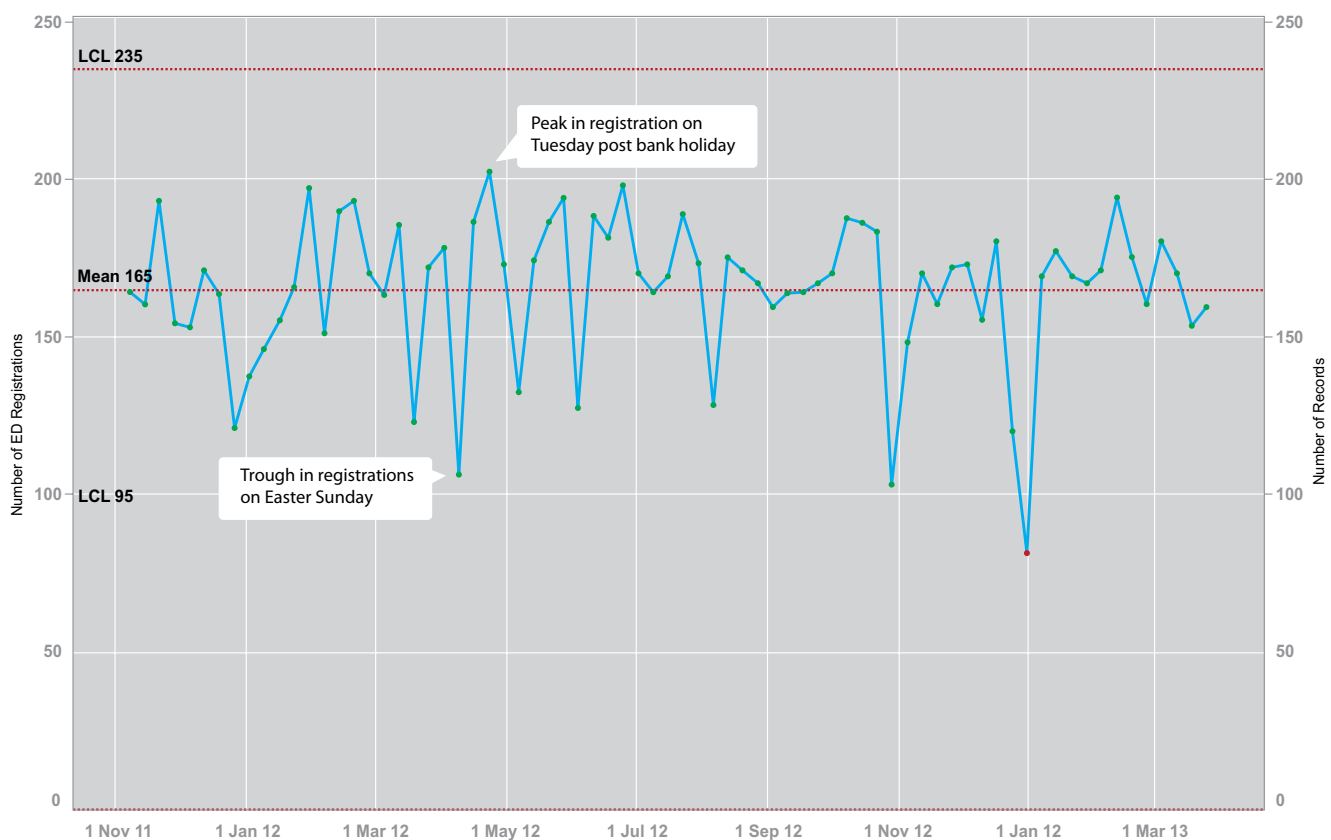
According to the Institute for Innovation and Improvement (NHS 2010) demand is comprised of all the requests/referrals coming in from all sources and how much resource is needed (equipment, staff time, beds, diagnostics) to meet this demand.

Whilst Alvarez et al (2009) suggests the main objective of understanding demand is to efficiently use the resources of a hospital in order to provide excellent care to patients, the SDU holds the view that effective demand and capacity planning

is an important proxy for patient experience. This in turn means good multidisciplinary teamwork, patient pathways that are based on National Clinical Care Programme guidelines, diagnostics capacity aligned with patient flow and innovative and effective use of all resources including inpatient beds.

The following chart show the profile of attendances on **Monday in a level 4 hospital over a 15 month period.**

Chart 2. ED registrations (Monday)



It allows us to understand that despite attendance being **variable**, it is nonetheless **predictable** with a narrow range. As a result of understanding this, clinical and managerial leaders can be confident that attendances on **Monday** will fall with a narrow range. They will be clustered around the mean (165) giving managers a high degree of confidence (95%+) that allow for capacity planning within this narrow range. The operational implications of the outlier evident need to be factored into capacity planning either in terms of surge (e.g. post bank holiday) or periods with substantially less attendances (e.g. Easter Sunday).

The operational implications of the outlier evident need to be factored into capacity planning either in terms of surge (e.g. post bank holiday) or periods with substantially less attendances (e.g. Easter Sunday).

Essential reading:

11. *Alvarez et al (2009) A simulation study to analyze the impact of different emergency physician shift patterns in an Emergency Department, Conference on Operational Research Applied to Health Services (ORAHS), July 12-17, 2009*
12. *NHS (2004), Managing Predictable Events*

Using data to understand demand by day of the week

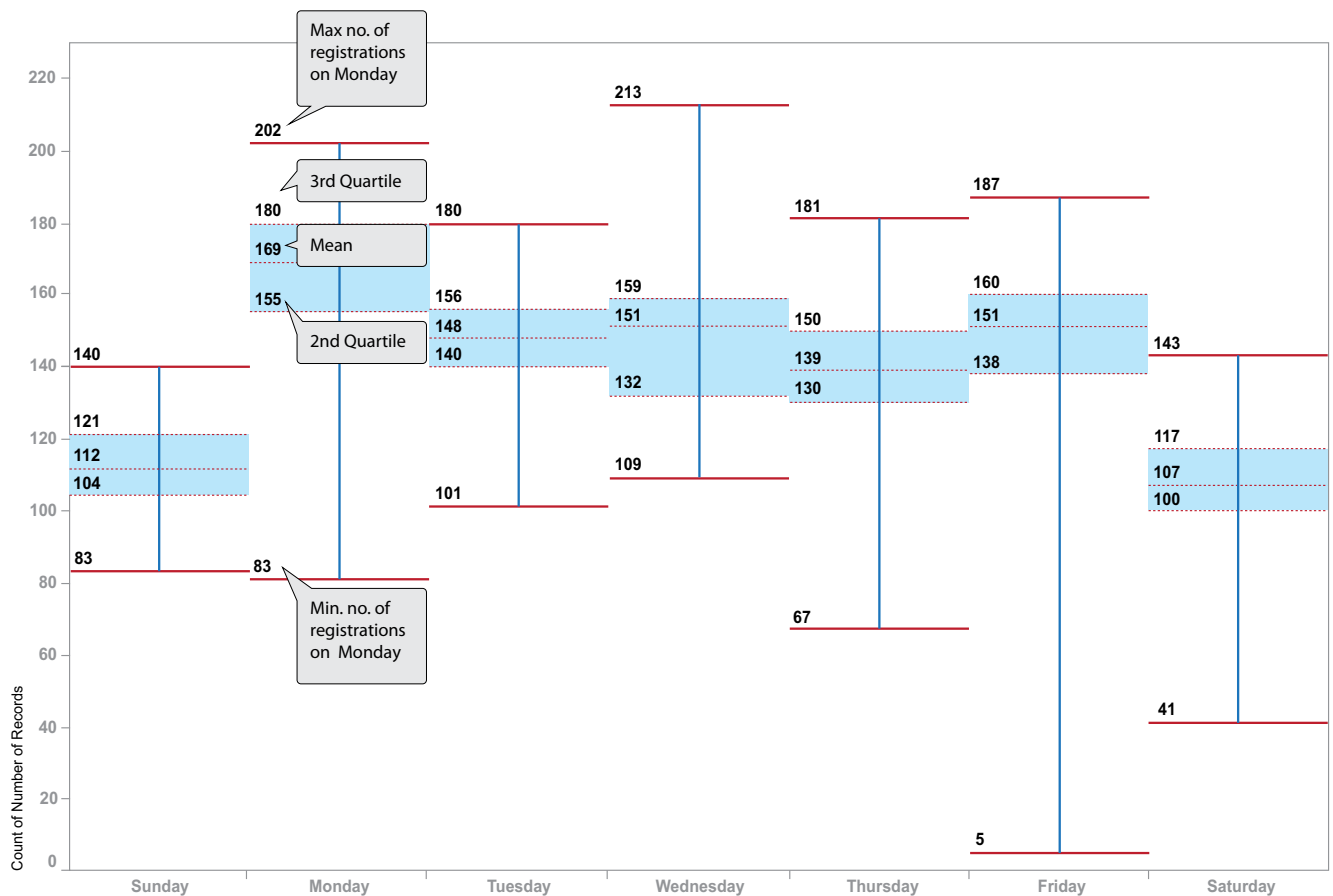
If we take ED registrations by day of the week over 15 months (Chart 3 page 15) we see the need to plan the capacity required to meet the predictable demand. This demand is relatively stable but varies. If we look at the chart, a typical Monday will have around 169 ED registrations. If an average conversion factor of 25% was applied we would expect to see 42 unscheduled admissions on Monday. Capacity planning for a 'typical Monday' in this hospital should therefore be concerned with making sure there is a balance between the demand placed on the service on Monday and its ability to meet that demand. If a service underestimates the demand (for example doesn't factor in elective admissions) it will have insufficient capacity, staff will be stretched and patient experience will be poorer.

Clinical and operational leaders will appreciate that capacity planning is not always straightforward due to the range of variables that influence the process (equipment, expertise, staff numbers, roster patterns etc). Informed capacity planning will depend on the exact mix of activities undertaken requiring adjustment to the planning process.

Again taking Chart 3 (page 15) showing day of the week registrations, clinicians and managers will need to understand the planning implication of this pattern. This includes:

- Process (Predicted Date of Discharge, Weekend Discharge, Home by 11, diagnostic capacity alignment together with patient centered processes such as age and condition attuned pathways)
- Availability (senior decision making presence in ED/ AMU, on call rotas for radiology etc)
- Behaviours (clinical leadership, organizational bias for learning and action)

Chart 3. ED registrations over 15 months by day of the week



Essential reading:

13. Bell et al (2013) *Consultant Input in Acute Medical Admissions and Patient outcomes in Hospitals in England, A multivariate Analysis.*, 8, 4, www.plosone.org

Getting beneath the demand conundrum

As indicated earlier in the guidance healthcare demand, especially emergency demand, is relatively stable. 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 ED is self-inflicted.

Chart 4a. Distribution through the week. Patients admitted as an emergency or elective admission and patients arriving at the ED who will be admitted – percentage each day of the week

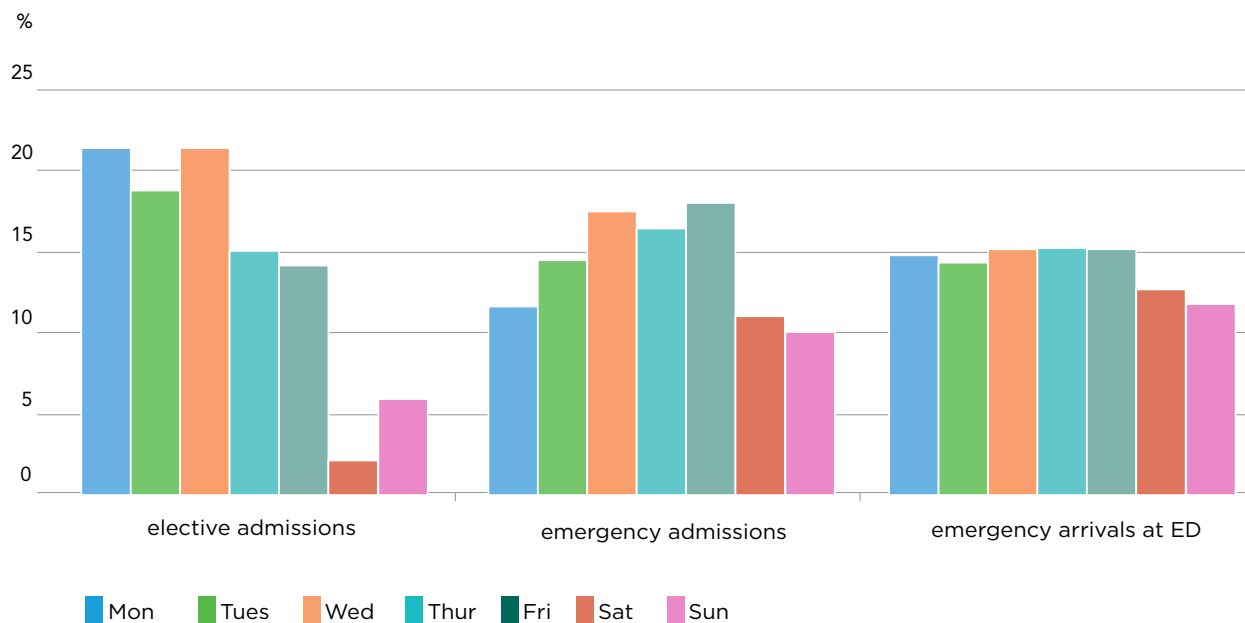
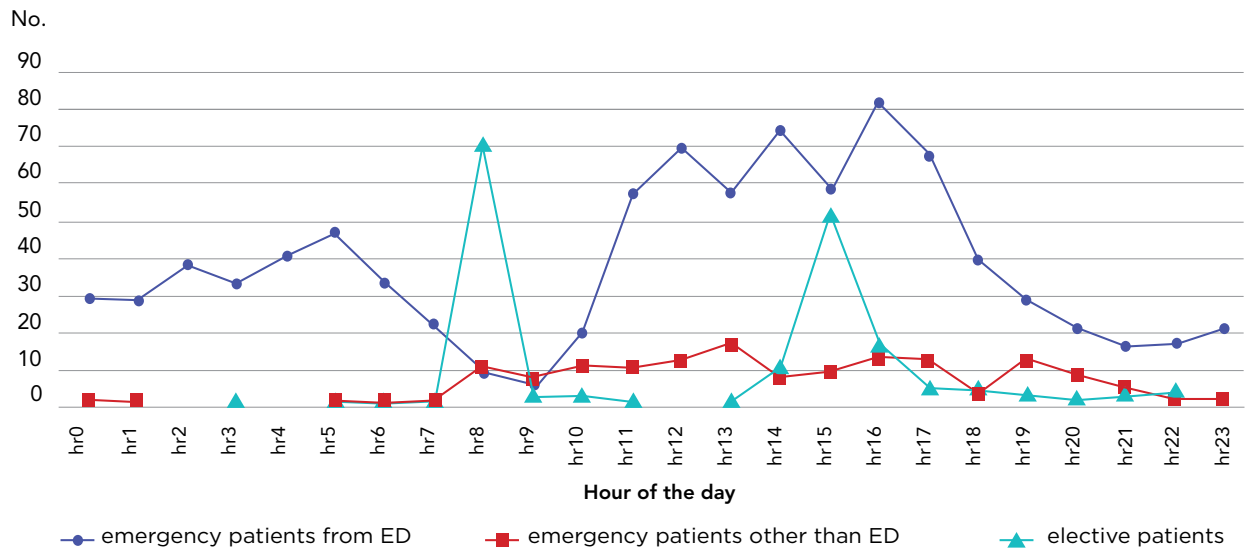
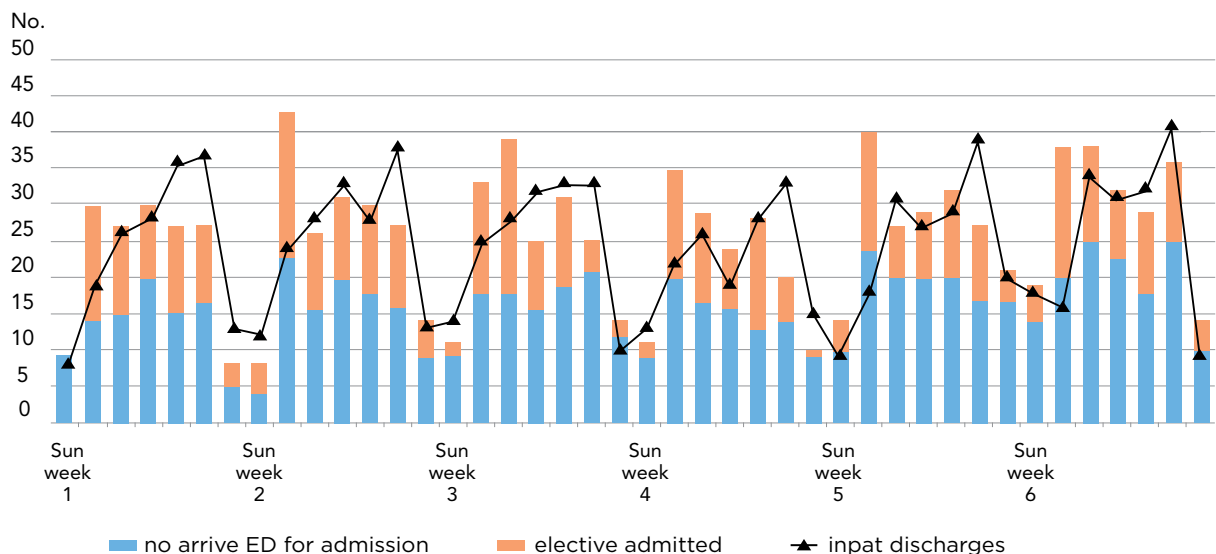


Chart 4b. Distribution of patients throughout the day. Emergency patients admitted from ED and emergency patients admitted through non ED routes and elective patients admitted



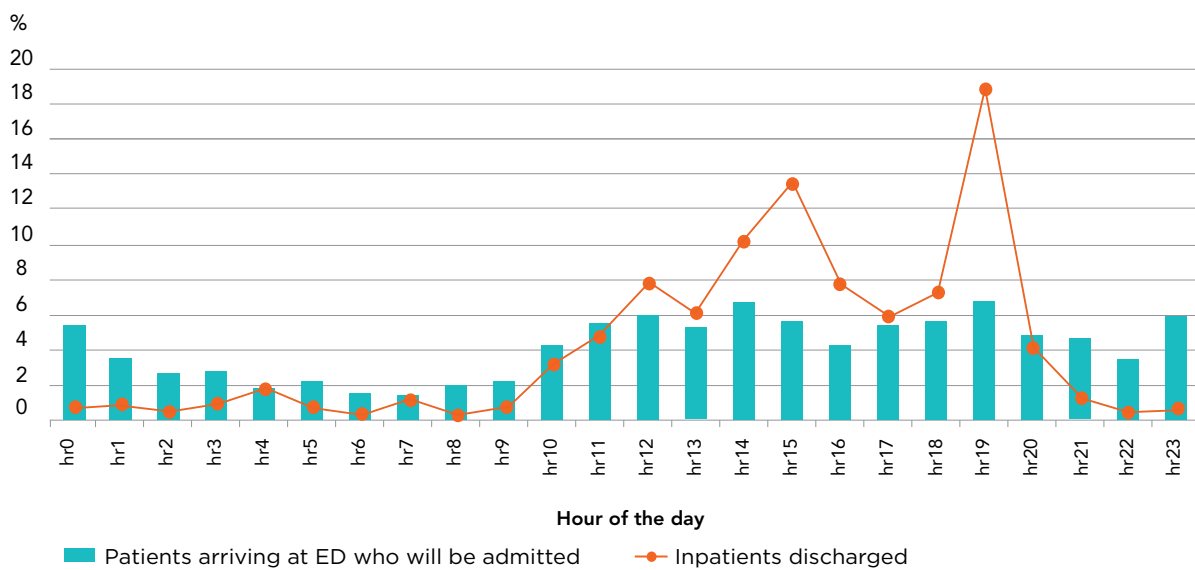
As batching happens at every step along the clinical pathway, admissions and discharges become unsynchronised on daily and weekly periodic cycles.

Chart 4c. Number of patients arriving at ED that are admitted, elective patients admitted and inpatients that are discharged each day



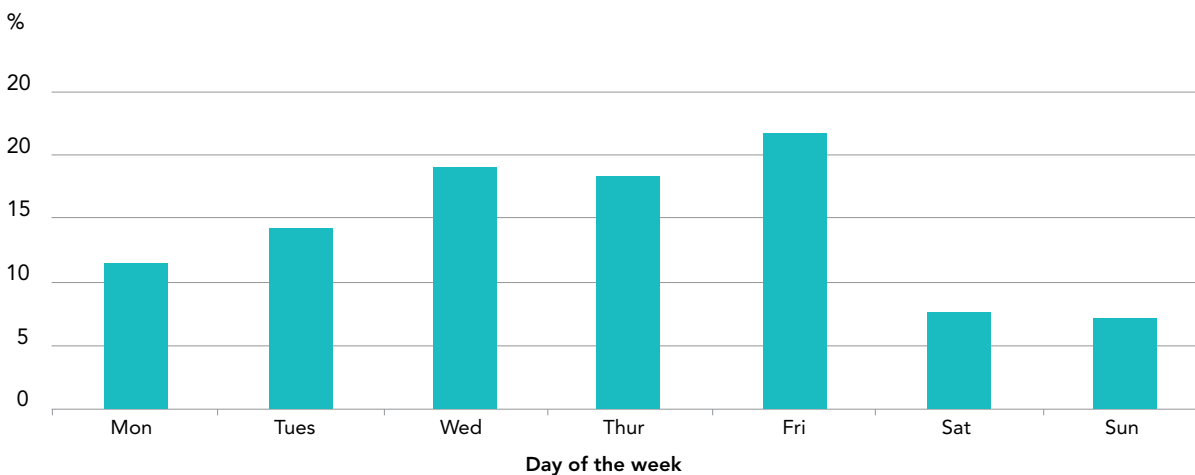
On a daily basis, arrivals happen from mid-morning to late evening. Discharges on the other hand, compressed into a relatively narrow time span in the late afternoon and early evening. This is why the daily beds crisis often melts away by 6pm.

Chart 4d. Distribution of patients throughout the day. Patients who arrive at ED and will be admitted and patients discharged from an inpatient bed percentage each hour of the day



On a weekly basis, Fridays are almost always the busiest day for discharges, especially Fridays before holidays. However, weekend discharges tend to be less numerous, thus opportunities to smooth demand and match with capacity are lost (chart below illustrates departures by hour of the day in a level 4 hospital).

Chart 4e. Distribution on through the week. Patients discharged from an inpatient bed - percentage each day of the week



Using data to understand demand and plan capacity by day of the week

As we have seen, Unscheduled Care demand (at the point of intake) is predictable but can vary (in this instance by day of the week) and requires further consideration. **Chart 5 (on page 20)** shows the number of ED registrations per day of the week, again over a 15 month period. It shows the Minimum and Maximum number of registrations per Day of Week.

If we take a closer look at Monday, the **mean number of registrations in ED on Monday over a 15 month period is 169.**

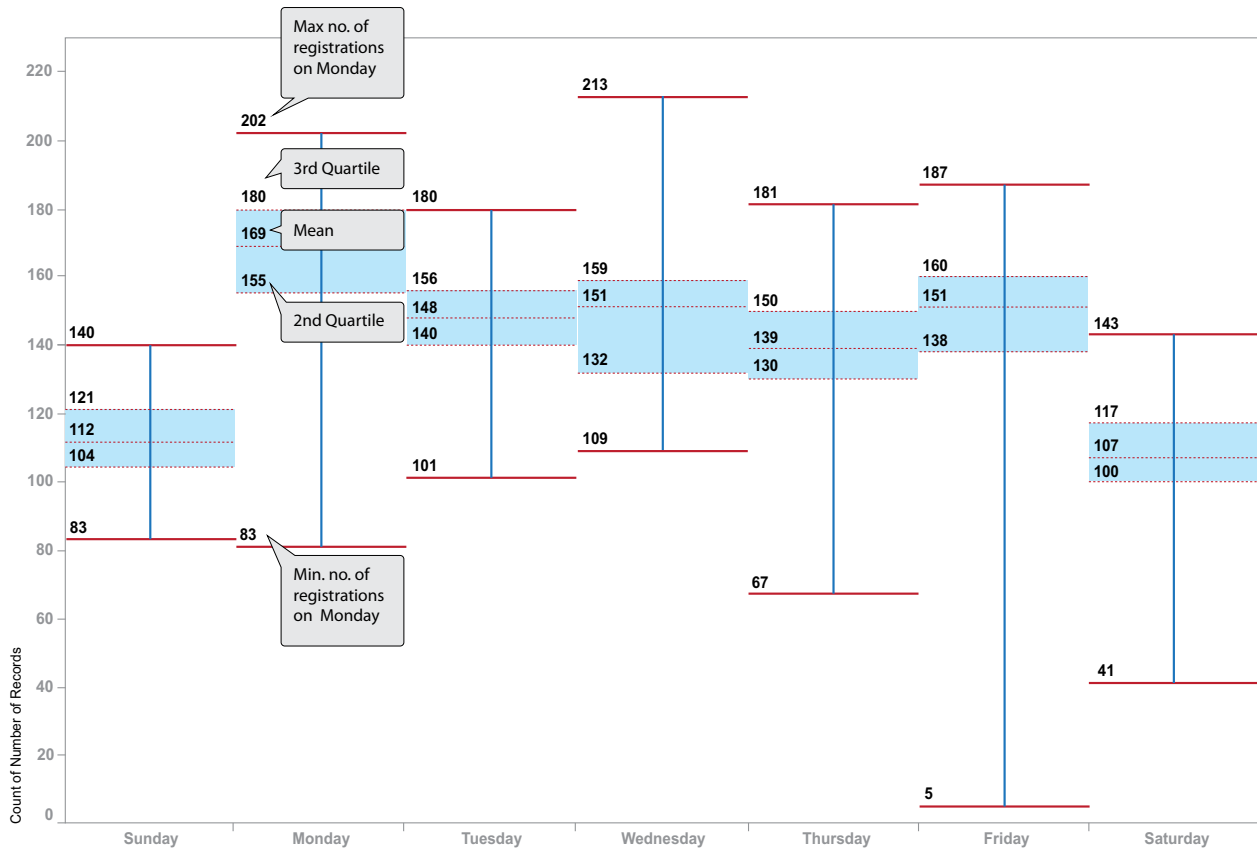
It is noteworthy that while the range between the Min (83) and Max (202) numbers can be quite large – the range between the 2nd (155) and 3rd (180) Quartiles is quite narrow. Therefore, capacity planning on the basis of the Mean and 2nd (155) and 3rd (180) Quartiles is more feasible.

Once again, taking “Monday”, and assuming a 25% conversion rate of attendances to admission, Chart 5 suggests that this hospital should plan on having an average of min of **42 discharges every Monday to meet unscheduled care demand.** This does not meet the additional planned elective demand. If the hospital achieves more than 42 discharges and generates capacity to meet elective demand on any particular Monday, it can be reasonably confident that it will be “in a good place” regardless of what might happen on Tuesday.

With reference to the maximum recorded Monday Registrations (202), the hospital knows that numbers approaching 202, although rare, have happened in the past and can happen in the future. When they do the hospital needs to have escalation plans in place to deal with that situation.

In terms of ED capacity, it points to the need to match capacity with variation in demand rather than basing decisions on ‘average’ attendances. (For further reading on the flaw of averages see PPT in Glossary of further reading). Consequently, operational managers can plan capacity to meet mean weekly demand or weekly demand based on 2nd and 3rd quartile. This will allow planning with confidence within a narrow but predictable variance based on upper control limit and lower control limit of anticipated registrations per day.

Chart 5. ED registration by day of the week over 15 months



Recommended resources:

2. *Statistical Process Control Video*
3. *PPT (flaw of averages)*

Capacity Planning for demand by hour of the day

The charts below show the hourly profile of attendances over a **24 hour period** comparing **‘summer’** and **‘winter’**. They illustrate that the hourly profile of ED Attendances for this particular hospital does not vary a great deal between ‘Summertime’ and ‘Wintertime’. **This challenges the concept of seasonal variation, particularly around the concept of the ‘winter crisis’,** and requires

that capacity planning is required for changes in the nature and not the volume of demand. This might include service balance in terms of elective and emergency care, staff skill mix and availability, shift patterns, availability of key senior decision makers, pathway design, turn around time for diagnostic, etc.

Chart 6. ED registrations by hour of the day (summer)

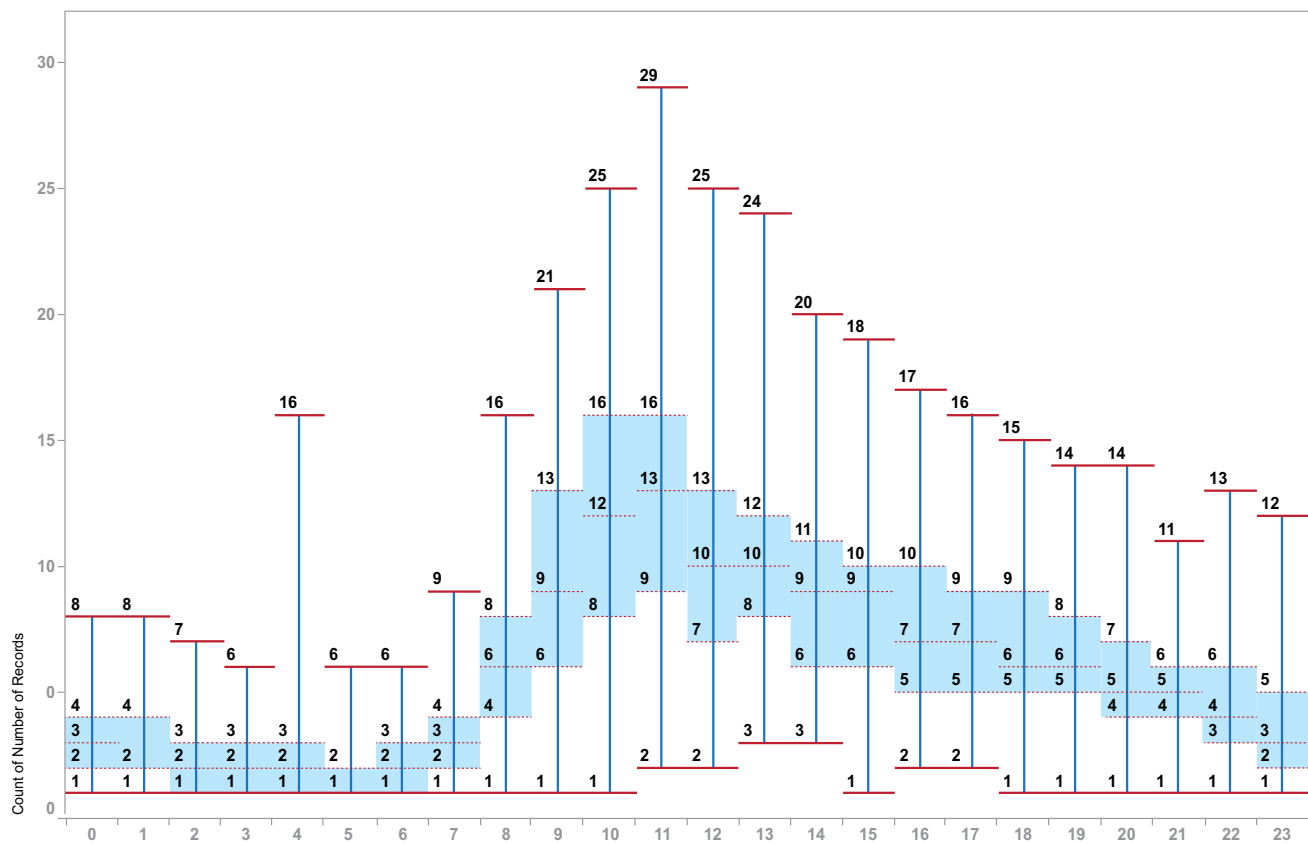
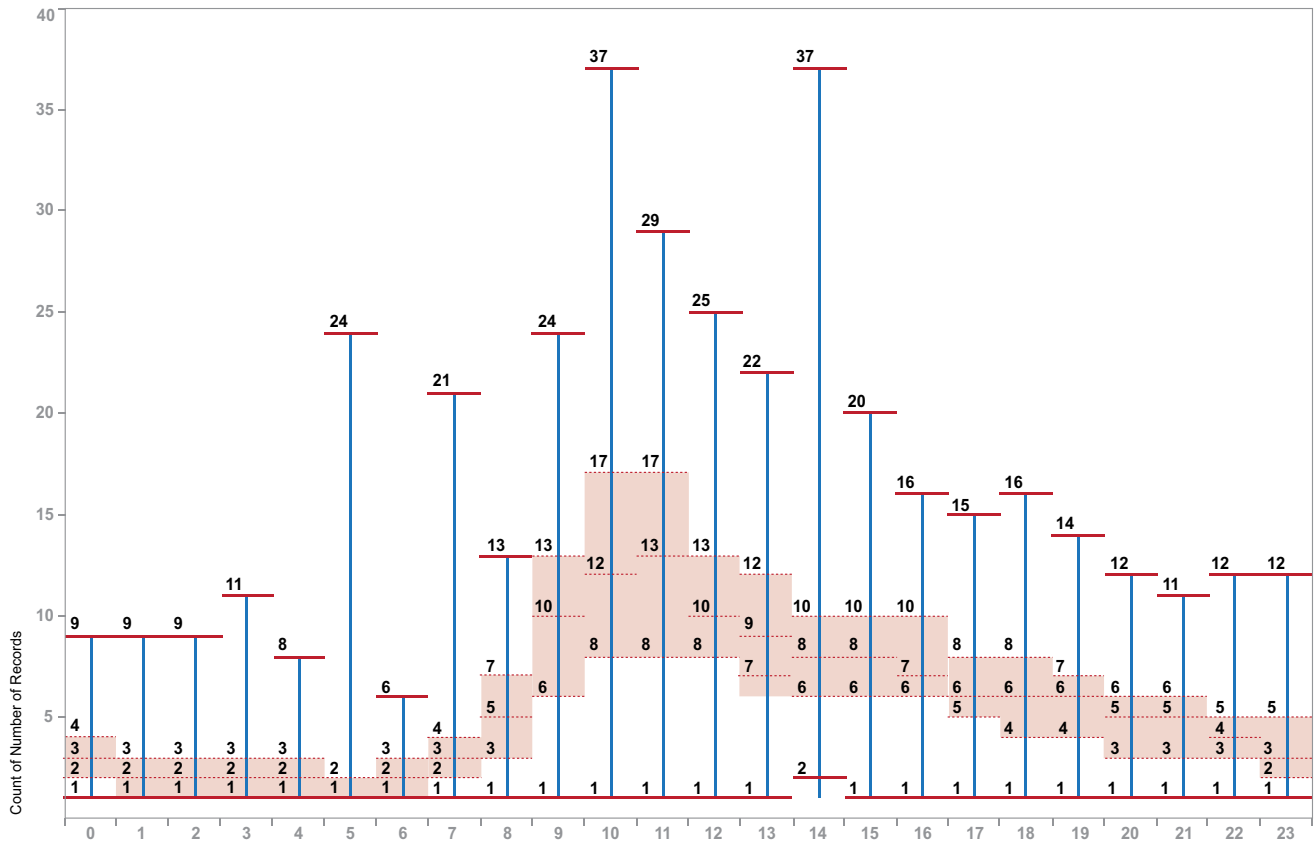


Chart 7. ED registrations by hour of the day (winter)



Planning

Diagnostics as key partners and not just providers

The availability and timely provision of diagnostics is a key facilitator of demand. Diagnostic capacity and Turn Around Time (TAT) has a direct impact on service performance and can impact positively or negatively on ED Patient Experience Time (PET) and inpatient Length of Stay (LoS).

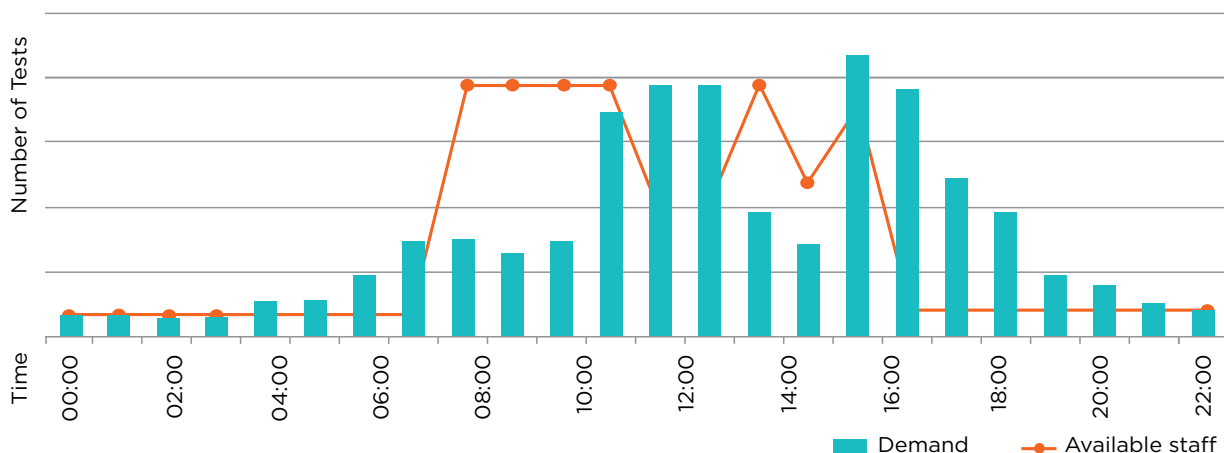
Understanding diagnostic demand in key high volume areas (Pathology, Radiology, Cardiology and Endoscopy) are of critical importance to aligning diagnostic demand and capacity (see chart 8) and is a key component in effective length of stay, improved patient safety and greater efficiency.

Chart 8.

Time available in laboratory X staff and skills X equipment = X mins

How does the available capacity match the demand on the service? Work with many services has found that the following pattern often exists.

Hourly demand versus available capacity of the pathology service



The following are key internal steps in aligning diagnostic capacity planning with demand.

1. Understanding and mapping the diagnostic service processes, (both patient and patient sample journeys) is a key first step in improving TAT
2. Being clear about the actual demand and understanding reasons for existing backlogs or delays.
3. Ensuring that there is sufficient planning to meet the known daily demand 'from the front door'
4. Ensuring that no inpatient has their 'diagnostic time' prolonged more than necessary.
5. Measuring capacity accurately (equipment, people and skill) and ensuring diagnostic service is process driven
6. Eliminating waste (including duplication, eliminate batching, unnecessary testing).

Integrated demand and capacity planning

Integrated care is a key strategy in reforming health systems internationally (Kodner 2009, Kings Fund, 2013) and increasingly seen as a response to healthcare sustainability arising from concerns with fragmented services resulting in disjointed care, sub optimal quality, system inefficiencies and escalating costs (Ham, 2013). This is especially relevant in the context of the emergence of chronic disease and the growth in complex care provision required by older people.

According to Kodner (2009), integration efforts can focus on (1) entire communities or enrolled/rostered populations irrespective of health status, (2) vulnerable client sub-groups (e.g., the frail elderly and persons with disabilities), or (3) patients with complex illnesses (e.g., chronic conditions, some cancers). If, however, there is commitment to fundamentally improving health systems to better meet the needs of the population within resource constraints, there is no question that the ways in which we deliver services have to change.

According to Murray (2009), the fundamental underlying dynamic in healthcare is relatively simple: *'every day, all day long, and one person or service at a time, we use our system capacity to meet customer demand'*. He suggests that healthcare is no different than any other 'flow system' whereby patient demand flows through a series of interrelated, interconnected process steps. Each step (primary care assessment and referral, ED or outpatient assessment, inpatient stay, diagnostic activity and discharge process)

has a demand, a capacity, an activity and a delay. Patient experience and system performance is assessed by measuring the delay either at each step or for the entire journey.

Again, according to Murray (2009) integration efforts identified four "key change strategies" as central to the process of better integrating services and achieving best practice:

1. Providing people-centred care (patient pathways)
2. Reducing clinical variance (standardised protocols)
3. Organizing the care continuum (process that are planned in an integrate way)
4. Process improvement (openness to change)

From a demand and capacity planning perspective if demand into any system exceeds the capacity of that system, the system will fail. If this is not understood and embedded in a wider integrated care context, driven by key principles (see appendix), improvement efforts focused on isolated components of a larger system, leads to sub-optimization. In that regard there is a need to pursue deliberate, evidence based strategies that integrate demand and capacity planning. This has been achieved most successfully in Canada where hospital and community services recognize their mutual interdependent relationship in maximizing resources for the benefit of the population, (Walley 2013).

Key points in measuring, planning and operationalizing demand and capacity data

The RCPI (2013) Ten priorities for action to improve the care of acutely ill patients is timely and of particular relevance to addressing the challenges posed by seeking to balance demand and capacity. It seeks to ensure that demand and capacity are aligned across the full seven day working week. This takes the form of new models of service delivery, process improvement and ensuring senior clinical personnel are at the forefront of decision making. Critically it advocates a renewed set of organizational values driven by an engaged leadership who based, transparent decisions.

Therefore Aligning (service) capacity with (patient) demand is vital if services are genuinely committed to providing a quality patient experience at every stage of the patient journey. When demand exceeds capacity, a backlog will form resulting in poorer patient outcomes. Once demand and capacity have been measured, the data and patterns that emerge can be used to anticipate demand and plan capacity.

An initial assessment of demand and capacity needs to consider the following key points.

Key Points:

- All demand needs to be measured. This includes hidden demand (not included in formal data capture) such as OPD, emerging pathways, out of area transfers and ad hoc requests for admission. Demand, capacity, activity and backlog need to be measured in the same units for the same period of time, i.e. hourly, over a 24 hour period, weekly or monthly. It is not possible to compare two or more items unless they are measured in the same unit of time.
- Consideration needs to be given to capacity changes over differing hours, days, weeks and months and to identify how capacity is provided over different time periods in order to deploy it evenly against predicted demand. (e.g. Staff leave, downtime for equipment maintenance).
- If there is a mismatch between demand and capacity there is a need to look for ways of gaining capacity within the system or look for ways of increasing the flexibility of the capacity.

Essential reading:

14. *Modernising Radiology Services (NHS, 2005)*
15. *Modernising pathology Services - a practical Guide to service Improvement (NHS, 2005)*
16. *Kodner, D.(2009) A Conceptual Exploration of Integrated Care, Healthcare Quarterly Vol.13 Special Issue, October.*

Recommended resources:

4. *Redesigning Support Activities in line with demand from the wards on <http://www.youtube.com/watch?v=9DSyiSoJXaY>*

- Once demand and capacity is understood, consideration needs to be given to process change. This includes rostering patterns or the interface between interdependent departments? In particular this might necessitate reviewing habitual arrangements whereby scheduled patient arrivals could be adjusted to align with discharges or streamed separately?
- Where the hospital Information Technology system provide key data it needs to be clear as to whose responsibility is it to engage with this data and where is it discussed? (e.g. Scheduled/Unscheduled Care or ED Governance Group).
- Consideration may be required in terms of other upstream processes (for example radiology scheduling) whereby adjustment is needed to ensure that patient streams are reflective of predictable demand (i.e. patient arrivals, scheduled clinics with high volumes such as orthopaedics).
- Understanding demand and capacity needs to be systematically evaluated and constantly reviewed.
- If we are to match demand and capacity on an hourly basis we need to 'pull' demand into real time response.
- Bespoke patient pathways are a more sensitive indicator of capacity planning than crude bed numbers.

Other strategies to address demand and capacity mismatch:
















Reduce demand

- Should we see all these patients? - implement protocols for upstream interception (telephone consult by senior decision maker) or diversion of demand.
- Provide alternatives pathways. Are they in the right place and who is appropriate to see them? Is there an equally safe ambulatory alternative?
- Provide bespoke pathways. Can the patient pathway (or the process at the bottleneck) be streamlined? Do we need to do all these steps? Can we agree on direct admissions?















Increase capacity

- Work differently - flexible hours, weekends, pre-plan and cover annual leave, extended roles, etc.
- Address internal bottlenecks (alignment between departments to meet demand).
- Bids for resources only when constraint is equipment or staff and working differently will not help.

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Appendix

Table 1. Ten key principles for integration

- I. Comprehensive services across the care continuum**
 - Cooperation between health and social care organizations
 - Access to care continuum with multiple points of access
 - Emphasis on wellness, health promotion and primary care
- II. Patient focus**
 - Patient-centred philosophy; focusing on patients' needs
 - Patient engagement and participation
 - Population-based needs assessment; focus on defined population
- III. Geographic coverage and rostering**
 - Maximize patient accessibility and minimize duplication of services
 - Roster: responsibility for identified population; right of patient to choose and exit
- IV. Standardized care delivery through interprofessional teams**
 - Interprofessional teams across the continuum of care
 - Provider-developed, evidence-based care guidelines and protocols to enforce one standard of care regardless of where patients are treated
- V. Performance management**
 - Committed to quality of services, evaluation and continuous care improvement
 - Diagnosis, treatment and care interventions linked to clinical outcomes
- VI. Information systems**
 - State of art information systems to collect, track and report activities
 - Efficient information systems that enhance communication and information flow across the continuum of care
- VII. Organizational culture and leadership**
 - Organizational support with demonstration of commitment
 - Leaders with vision who are able to instill a strong, cohesive culture
- VIII. Physician Integration**
 - Physicians are the gateway to integrated healthcare delivery systems
 - Pivotal in the creation and maintenance of the single-point-of-entry or universal electronic record
 - Engage physicians in leading role, participation on Board to promote buy-in
- IX. Governance structure**
 - Strong, focused, diverse governance represented by a comprehensive membership from all stakeholder groups
 - Organizational structure that promotes coordination across settings and levels of care
- X. Financial management**
 - Aligning services funding to ensure equitable funding distribution for different services or levels of services
 - Funding mechanisms must promote interprofessional teamwork and health promotion
 - Sufficient funding to ensure adequate resources for sustainable change

Principles for Quality and Safety

It is recommended that each decision (at every level) in relation to clinical governance development be tested against the principles described in Table 1.

Table 2: Guiding principles for quality and safety

Principle	Descriptor
Patient First	Based on a partnership of care between patients, families, carers and healthcare providers in achieving safe, easily accessible, timely and high quality service across the continuum of care.
Safety	Identification and control of risks to achieve effective efficient and positive outcomes for patients and staff.
Personal responsibility	Where individuals as members of healthcare teams, patients and members of the population take personal responsibility for their own and others health needs. Where each employee has a current job-description setting out the purpose, responsibilities, accountabilities and standards required in their role.
Defined authority	The scope given to staff at each level of the organisation to carry out their responsibilities. The individual's authority to act, the resources available and the boundaries of the role are confirmed by their direct line manger.
Clear accountability	A system whereby individuals, functions or committees agree accountability to a single individual.
Leadership	Motivating people towards a common goal and driving sustainable change to ensure safe high quality delivery of clinical and social care.
Multi-disciplinary working	Work processes that respect and support the unique contribution of each individual member of a team in the provision of clinical and social care. Inter-disciplinary working focuses on the interdependence between individuals and groups in delivering services. This requires proactive collaboration between all members.

Principle	Descriptor
Supporting performance	Managing performance in a supportive way, in a continuous process, taking account of clinical professionalism and autonomy in the organisational setting. Supporting a director/manager in managing the service and employees thereby contributing to the capability and the capacity of the individual and organisation. Measurement of the patients experience being central in performance measurement (as set out in the National Charter, 2010).
Open culture	A culture of trust, openness, respect and caring where achievements are recognised. Open discussion of adverse events are embedded in everyday practice and communicated openly to patients. Staff willingly report adverse events and errors, so there can be a focus on learning, research and improvement, and appropriate action taken where there have been failings in the delivery of care.
Continuous quality improvement	A learning environment and system that seeks to improve the provision of services with an emphasis on maintaining quality in the future not just controlling processes. Once specific expectations and the means to measure them have been established, implementation aims at preventing future failures and involves the setting of goals, education, and the measurement of results so that the improvement is ongoing.



Quality and Safety Clinical Governance Development Resources

Following feedback from stakeholders, consultation and review in services the following documents were launched and endorsed by the Minister for Health, Dr. James Reilly, TD at the second National Patient Safety Conference on the 9th February 2012 and third National Patient Safety Conference on the 24th May 2013.

1 A Quality and Patient Safety: Clinical Governance Information Leaflet:

- With the by-line: clinical governance we are all responsible...and together we are creating a safer healthcare system
 - Clinical governance descriptors
 - Clinical governance development principles
 - Clinical governance development matrix
 - The endorsement of the Colleges and stakeholders groups for the publication is demonstrated by the inclusion of their logos on the front cover.
-

2 A Quality and Patient Safety: Clinical Governance Development assurance check for health service providers

- With the by-line: we are all responsible...and how are we doing?
 - A series of practical statements are grouped into two parts i) clinical governance structures and ii) clinical governance processes. The completion of the assurance check will assist Hospital Boards/CEO/GMs or equivalent in determining what clinical governance arrangements are in place. It is designed as a development tool and is not intended as a reporting mechanism and it is not envisaged that responses will be returned centrally.
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3 National Clinical Programmes: Clinical Governance Checklist (National)

The output from the national clinical programmes – nationally agreed, evidence based, models of care/pathways for each of the programmes are central to clinical governance. A clinical programmes clinical governance checklist has been developed, tested and issued to 29 programme leads/programme managers. The document is intended as a guide for clinical governance development, across the continuum of care, in each of the national clinical programmes. The completion of the checklist is assisting clinical leads in determining their clinical governance arrangements when preparing the model of care/pathway documents.

4 Quality and safety prompts for multidisciplinary teams

The objective is to provide a practical, easily assessable guide, for local multidisciplinary teams to use in discussing quality and safety at regular team meetings (tested by 20 different teams in July and August 2012). The approach is based on the principles for good clinical governance and aligned with the themes of the *National Standards for Safer Better Healthcare (2012)*.

5 Quality and Safety Committee(s): Guidance and Terms of Reference

Health service providers have a central role in placing quality and safety of patient care at the top of every agenda and creating the leadership structures to support this. It will be crucial for all health providers to develop a senior Quality and Safety committee. This guidance document assists organisations in reviewing their arrangements and/or addressing current gaps.

The boards of Hospitals Group/Trusts and the leadership across our services have a critical role in communicating an inspiring vision for quality and safety and in translating that vision into clear priority objectives. Every clinical and social care action needs to be considered for its likely impact on the quality and safety of care that we provide.

The purpose of the document is to provide guidance and sample terms of reference for organisations to use and adapt in the establishment of both i) Quality and Safety Board Committees and ii) Quality and Safety Executive Committees. The guidance can be adapted to suit particular context and environments.

6 Quality and Safety Walk-rounds: Toolkit

In a systematic review leadership walk rounds and multi-faceted unit-based strategies are the two strategies with some stronger evidence to support a positive impact on patient safety culture in hospitals. The purpose of the Quality and Safety Walk-round Toolkit is to provide a structured process to bring senior managers and front line staff together to have conversations about quality and safety with the intention to prevent, detect and mitigate patient/staff harm. The walk-round can be focused on any location or service that may affect patient care and safety of the organisation.

7 The Safety Pause: Information Sheet

The purpose of the Safety Pause information sheet is to heighten safety awareness and to assist teams in being proactive about the challenges they face in providing safe high quality care for patients. It is based on a practical, why, who, when and how approach. It is based on one question 'what patient safety issues do we need to be aware of today' resulting in immediate actions.

The documents above can be located at www.hse.ie/go/clinicalgovernance



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