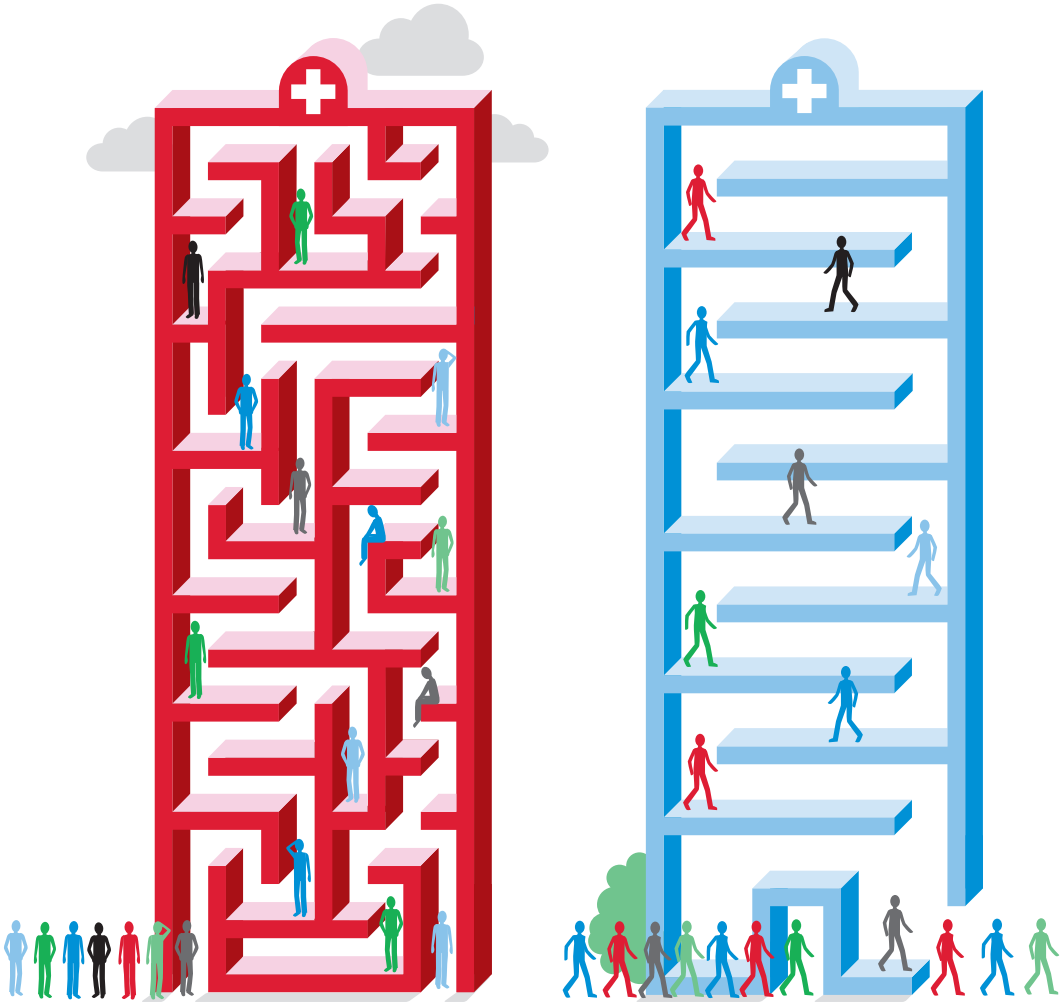
The Health Foundation
Inspiring Improvement

Improving patient flow

How two trusts focused on flow to improve the quality of care and use available capacity effectively



Learning report

April 2013

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Health Foundation commentary

Poor systems deliver poor results – for patients, NHS staff and taxpayers. A common assumption in the NHS has been that more cost is required to improve patient flow and healthcare quality. However it can be argued that increases in cost have not always resulted in proportionate improvements in access to or quality of care.

The Health Foundation created the Flow Cost Quality improvement programme to focus on the relationship between patient flow, costs and outcomes in two NHS hospital trusts: South Warwickshire NHS Foundation Trust and Sheffield Teaching Hospitals NHS Trust. The programme helped the trusts to examine patient flow through the emergency care pathway and develop ways in which capacity could be better matched with demand, preventing queues and poor outcomes for patients.

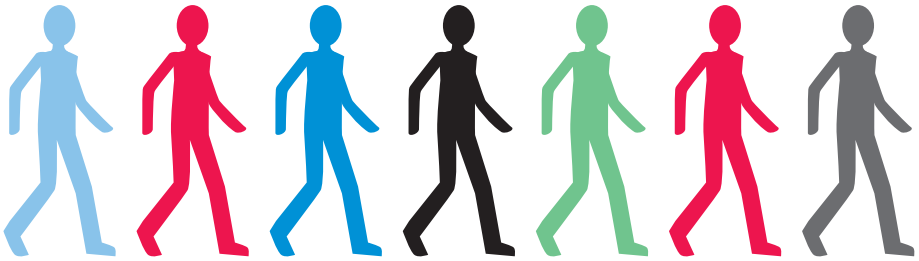
Both trusts report early indications of apparent reductions in mortality, maintained performance during difficult financial times and, in some instances, removal of considerable capacity while improving quality of care and reducing length of stay. The robust analysis of patient flow conducted by the trusts has given them greater confidence that the results they are starting to see are based on a sound foundation. It has also provided them with the insight they need to quickly understand where to intervene when they face further performance challenges.

This report describes the experiences of the two trusts, explains some of the key principles that led them to ask questions about their services, and provides some practical tools and stories that describe how they went about making changes. We hope that it will prompt other organisations to ask themselves questions and think about the benefits of working on flow.

The two trusts that participated in Flow Cost Quality are by no means unique in applying the techniques described here. However, it remains relatively rare in the NHS for these techniques to be used systematically and consistently across whole organisations or populations, to the extent that they start to change the core service model, culture and approach of the organisation.

What characterises these trusts, and the support provided by Dr Kate Silvester as part of the programme, is the determination to take some powerful principles and pursue them to their logical conclusion. The key concepts underpinning the programme, and the work and analysis done by the teams, prompt some profound questions and specific challenges about the design of services.

- Why do patients typically see the most junior members of an emergency team before they access senior decision makers in emergency care?
- In the debate about improving care out of hours, are we doing enough to understand demand and reduce delays within working hours?
- Are assessment units, as currently organised, really providing rapid access to senior decision making and ensuring patients quickly get on the right pathway? Or are they, in many instances, operating as 'holding bays' in a bid to ease pressure on emergency care, while potentially adding confusion and delay at a point which appears critical to the overall outcome of a patient's care?



- Why do we stick to the historic pattern of separating outpatient and emergency care when, for some specialties, much of what patients need is the same and it's hard to confidently identify those who need care more urgently? Might there in fact be efficiency as well as quality gains in bringing together these flows for some patient groups?
- Why do we keep people in hospital for their discharge assessment, when they are medically fit and the assessment might be more meaningful in their own home?

One of the key findings from the Flow Cost Quality programme is that technical insights into service design alone are not sufficient to achieve sustainable change. If you hope to realise the more radical benefits offered by prioritising flow, how you approach change and the organisational context in which this happens is just as critical as finding the right service design. This also prompts some important challenges for organisations.

- Do the measures used, both at board and operational level, provide the information needed to really understand what's happening to service performance and the root causes of problems encountered? Would shifting to measuring mortality by date and time of admission rather than discharge be a more sensitive and useful indicator?
- In the quest to assure quality standards, might regulators and providers require checking processes that are actually making it harder to reliably deliver high quality care?
- How far do departmental structures, job roles, financial incentives and operational policies support the core task of safely getting patients through their pathway of care? Or do the priorities of individual functional departments inadvertently pull organisations (and patients) in different directions?
- Do cost improvement programmes overly rely on achieving economies of scale, without really understanding the impact on the ultimately more important 'economies of flow'?
- Does the use of multiple discrete projects, typically used to achieve change, give organisations the best chance of delivering their complex improvement objectives?

None of these are easy questions to answer, but this report demonstrates why these ideas are important and have the potential to deliver real benefits. For those who are already absorbed in this agenda, we hope the report offers inspiration to take your work further and encourage you to also share what you are learning.

Dr Jane Jones and Penny Pereira
Assistant Directors
The Health Foundation

1 Introduction

This report describes the work undertaken by two NHS trusts as part of the Health Foundation's Flow Cost Quality programme. It illustrates the problems created by poor flow that the programme was set up to address, and provides practical examples from the sites of how focusing on flow can improve quality, use available capacity effectively and save money. It summarises the key lessons learned by the sites and highlights important challenges that focusing on flow raises for designing services and approaching change.

Poor quality healthcare systems deliver poor results – for patients, staff and taxpayers. Much of the previously experienced growth in NHS funding was predicated on the assumption that more resource and capacity was required to improve the quality of, and access to, healthcare. However, many have observed that these increases did not deliver the proportionate improvements expected.

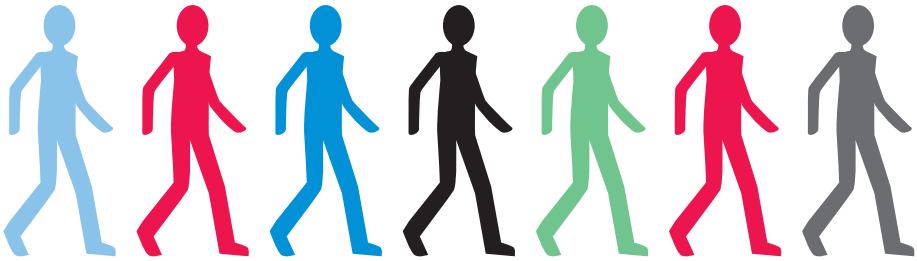
With the arrival of the £20 billion 'productivity challenge' and the Quality, Innovation, Productivity, Prevention (QIPP) agenda came new questions: Can access and patient outcomes continue to improve with less resource? If the timeliness and quality of care is improved, what happens to cost?

To explore these questions, the Health Foundation developed its Flow Cost Quality improvement programme. The aim of the programme was to explore the relationship between patient flow, costs and outcomes by examining flow through the emergency care pathway, and developing ways in which capacity can be better matched to demand.

The programme ran in two NHS hospital trusts: South Warwickshire NHS Foundation Trust and Sheffield Teaching Hospitals NHS Foundation Trust. South Warwickshire looked at the emergency flow for all adult patients, while Sheffield focused on one clinical subspecialty – geriatric medicine.

Each trust brought its own context, culture, challenges and opportunities to the programme. Together, their work and experience has provided rich learning about the relationships between flow, cost and quality, and about managing large-scale change within a complex system. More details about the work done in the sites can be found at www.health.org.uk/flowcostquality

The Flow Cost Quality programme builds on, and contributes to, a growing body of work on improving flow. Early examples include the work of hospitals in the UK and the USA in the early 2000s as part of the 'Pursuing Perfection' initiative, and the Institute for Healthcare Improvement's (IHI) IMPACT network; the Esther Project in Jönköping, Sweden; and the NHS Modernisation Agency's Emergency Services Collaborative, Action On programmes and Improvement Partnership for Hospitals. More recently, a number of NHS trusts have been involved in the Lean Enterprise Academy's 'Making Hospitals Flow' collaborative. Other international examples include the work of the Seattle Children's Hospital and Group Health in Seattle (USA), Intermountain Healthcare in Wyoming (USA), and Flinders Medical Centre in Adelaide (Australia). Sources of information and results from these initiatives can be found in the Appendix to this report.



1.1 Why work on flow?

The term 'flow' describes the progressive movement of people, equipment and information through a sequence of processes. In healthcare, the term generally denotes the flow of patients between staff, departments and organisations along a pathway of care.

Flow is not about the **what** of clinical care decisions, but about the **how, where, when and who** of care provision. How services are accessed, when and where assessment and treatment is available, and who it is provided by, can have as significant an impact on the quality of care as the actual clinical care received.

The concept of using flow to improve care has received increasing traction within healthcare, especially in relation to reductions in patient waiting times for emergency and elective care. Awareness has been growing of the ideas, first tested in other industries, and results that organisations have generated by applying flow thinking to their organisations.

As the national policy agenda focuses more strongly on integration between primary care, acute services and social care, the need to understand and improve how patients flow through systems is more important than ever. High profile cases of failures in the timeliness and quality of care serve as warnings as to the painful consequences of poor quality systems and processes.

In a pressurised financial environment, faced with ever greater challenges to meeting quality objectives, there is understandably an appetite for approaches that have been shown simultaneously to improve quality and reduce cost. Most of the concepts and specific changes described in this report have already been tried somewhere in the NHS. What these trusts – and this report – seek to do is understand what is possible when flow concepts are applied systematically across whole organisations and populations.

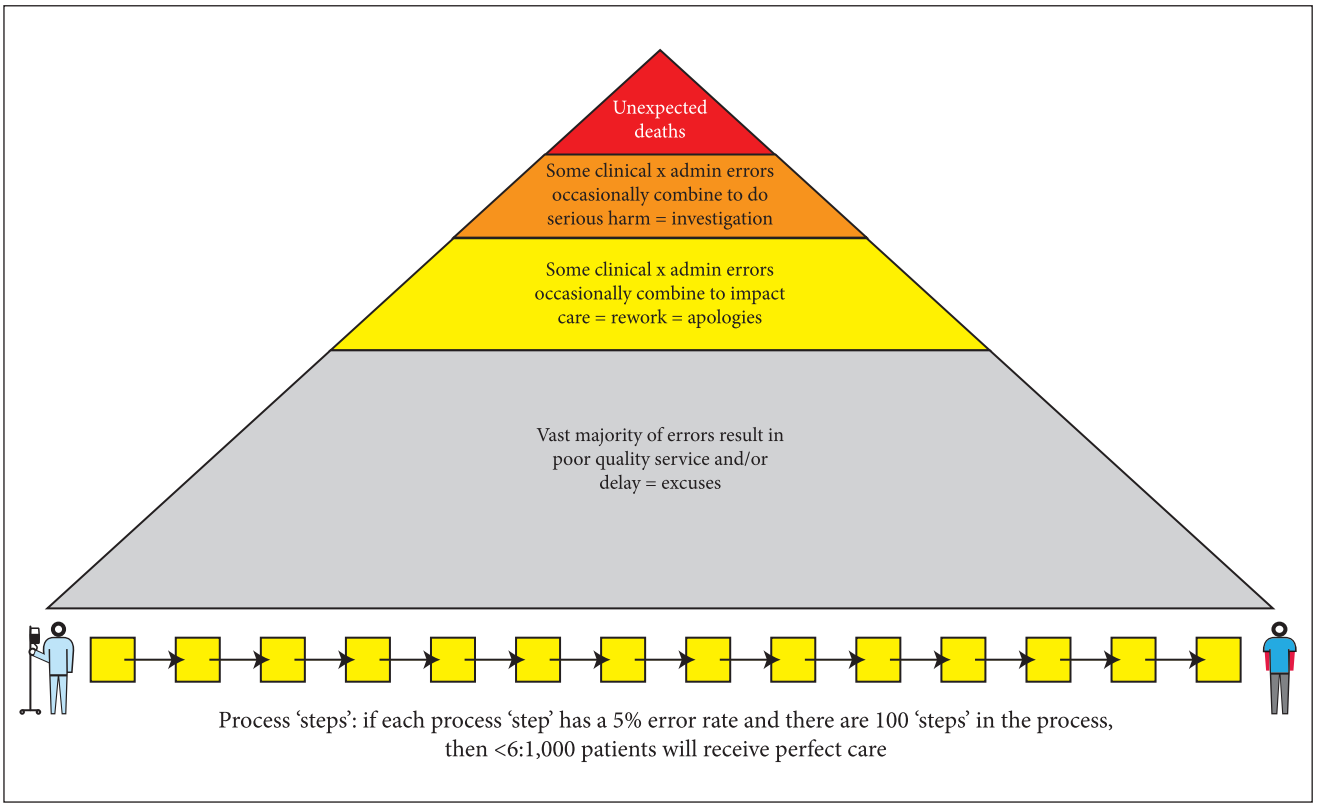
As well as piecing together specific process changes to start to have an impact on overall organisation performance measures, this work raises questions about the way in which we structure leadership and delivery of services. While improving quality, increasing efficiency and flow – and reducing costs – have traditionally been the responsibility of different functions (and executives) within healthcare organisations, it is increasingly understood that they are inextricably linked. Improving systems of care is a shared agenda – the full benefit is only realised if an end-to-end patient pathway approach is taken across departments.

While the trust teams aren't the first to acknowledge problems with flow in their organisations, they have joined a relatively small number of trusts who have made this a sustained focus and effort and are starting to report impressive results.

'It's about looking at it from the patient's perspective – how do we remove the barriers and for the patient make it seem integrated? Because that's where the quality and efficiency gains lie.' (Tom Downes, Clinical Director for Quality Improvement, Sheffield)

Box 1: The quality triangle

The model below – the 'quality triangle' – helps to illustrate the relationship between patient flow, quality and cost in a system of care.

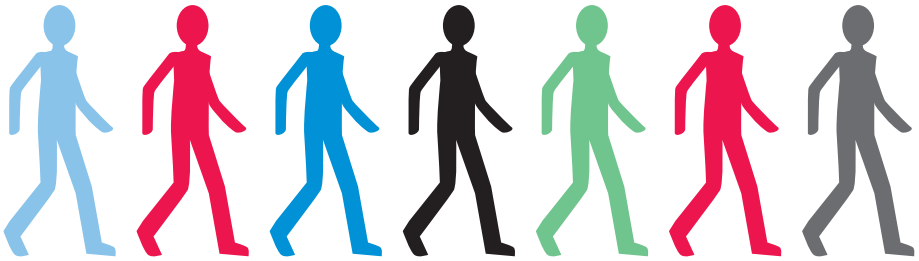


The process, or journey, that a patient experiences is depicted at the bottom of the triangle. Each yellow box represents a task. A patient journey may involve hundreds of clinical and administrative tasks and the same tasks can happen at different times and in different places.

The number of tasks in a process affects the quality of care. If we assume that every task in a 100-step process is performing to the quality standard accepted in clinical trials – ie a 95% probability of it being done correctly – this means that fewer than 6 in 1,000 patients going through that process will receive 'perfect' care (the right care, first time, on time, every time, in full).

The grey base of the quality triangle reflects the usual working environment, in which many errors are detected but lead to poor quality service and/or delays. Patients, relatives and staff become so used to this level of quality that it becomes accepted as normal. However, many of these constantly occurring errors are not spotted and corrected (represented by the yellow part of the triangle). These errors can combine to cause a problem which impacts on patient care, such as medication errors, delays or repeated investigations. The same errors can also result in serious harm (orange) and, more rarely, in an unexpected death (the red tip of the triangle). However, there is no way of predicting how and when errors will combine to cause harm.

Improving the quality of each task by 1% **and** removing 10% of tasks in a 100-step patient journey would result in 25 out of 1,000 patients receiving perfect care. This represents a five-fold increase in quality, or a five-fold decrease in risk at the base of the triangle. Ultimately this will impact the small number of serious incidents and unexpected deaths at the top of the triangle.



1.2 Key concepts for improving flow

The relationship between flow, quality and cost

Quality problems are often treated as if they are one-off events, rather than the inevitable consequence of random combinations of constantly occurring errors and delays in multi-task processes. A typical response therefore is to add more 'checking' tasks to spot and correct errors. However, as illustrated in Box 1, adding tasks or steps to the existing patient journey can actually make the inherent quality of the process worse – increasing the total number of tasks, each of which has the potential for errors – and can waste precious time and resource.

Instead of adding 'assurance' checks, the most reliable and sustainable way to improve both quality and cost is to systematically redesign processes of care. The basis for process improvement involves:

- improving the quality (value) of each task or step
- removing any unnecessary tasks (waste) from the process.

Improving the quality of a system also reduces costs. If quality is improved by removing wasteful tasks from a process, the cost of staff time performing the tasks and caring for patients while they wait for them to be performed is reduced.

As well as the human costs involved for patients, family and staff, errors and patient harm have a financial impact (through, for example, increased length of stay, re-admissions, additional investigations and procedures). If the error rate and harm within a care system can be reduced, the costs can too.

While there is a logical productivity case for improving quality, the relationship between quality and cost is not linear, often making it difficult to see or realise the full potential contribution of these approaches to overall financial objectives. 'Wasted' or non-value adding staff time that is removed from a process can only be released incrementally (usually in Whole Time Equivalents). Similarly, capital costs, such as beds, can often only be released as 'units', such as whole wards. Organisations therefore tend to find that financial benefits lag behind the implementation of quality improvement work and are sometimes not realised, as the additional step of taking out capacity is often itself far from straightforward.

Variations between demand and capacity

Even if a process is designed so that it only involves tasks that are valuable and necessary, flow will also be affected by variations in demand and capacity.

Most delays and inefficiencies in the healthcare system are not the result of excess demand or the shortage of resources. Instead, the key issue is a mismatch between when capacity is available and when demand presents to a service.

Box 2: The flaw of averages

If service capacity is planned to meet the average demand, patients will have to wait (queue) when demand is higher than average. But when the demand is lower than average, the unfilled capacity cannot be carried forward to the future and is effectively lost.

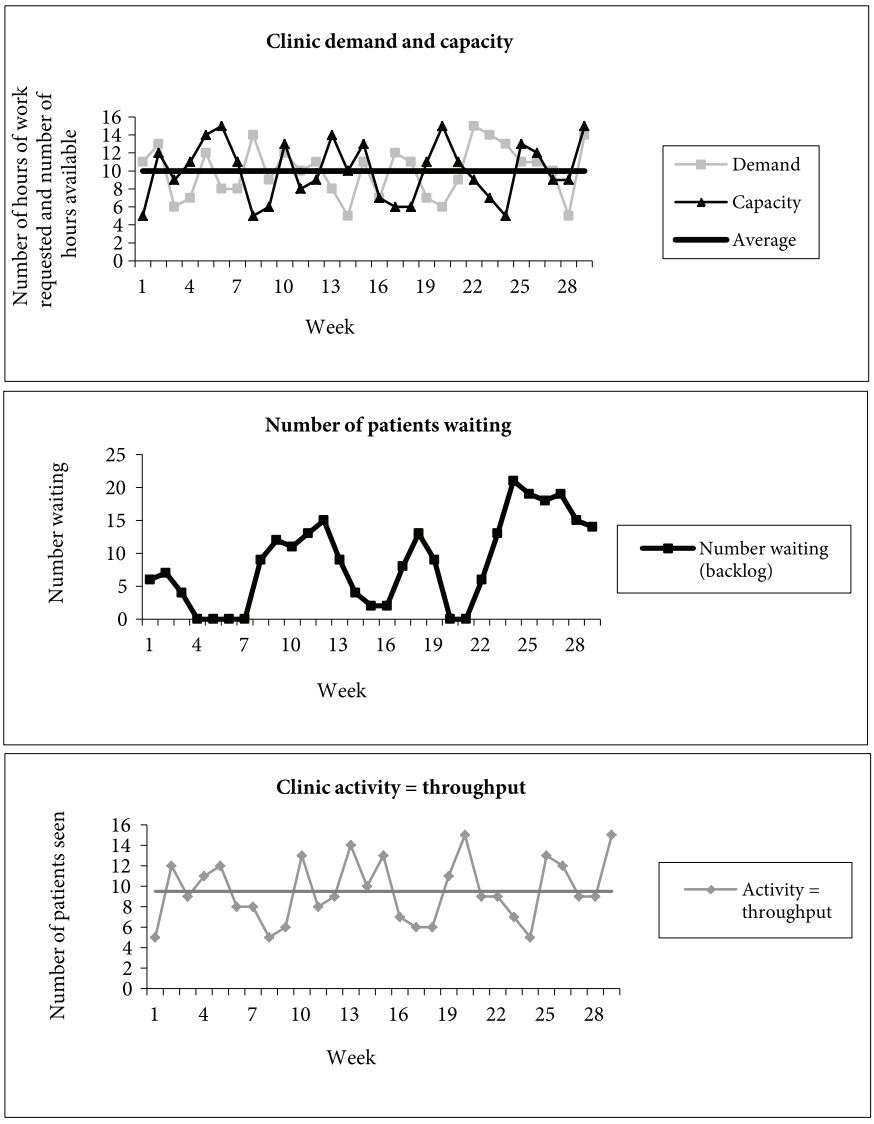
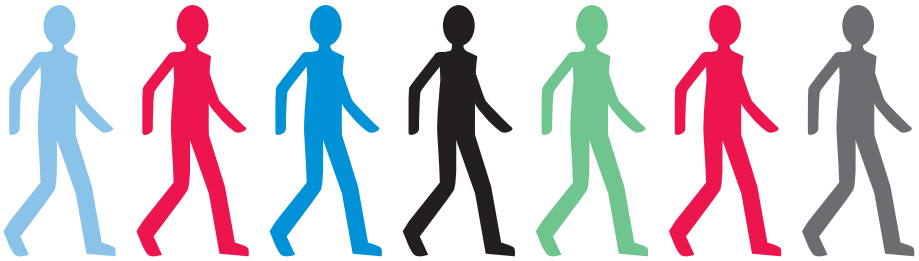


Chart 1: In this example clinic, an average of 10 hours of work per week is required to meet the patient demand (number of people and severity of their conditions). An average of 10 hours of capacity (staff time, equipment and clinic space) is provided to meet the demand. Note the mismatch between patterns of variation in demand and in capacity.

Chart 2: This illustrates the queues that form due to this variation mismatch, which is caused by planning clinic capacity to meet **average** demand.

Chart 3: As a consequence of 'lost' capacity when demand is lower than average, the **throughput** of the process (ie clinic activity) is equivalent to only 9.5 hours of work per week when the top chart illustrates that the average capacity is 10 hours per week. If only data on activity and waiting times are taken into account, the problem will be misdiagnosed as an overall shortage of capacity.



Services tend to be planned on the basis that, if average capacity is sufficient to meet average demand, there will be the right level of resources to provide care without delay. Box 2 illustrates why this doesn't work in practice.

Patients present to the healthcare system, generally very predictably, mostly between 9am and 8pm, seven days a week, 365 days a year. However, the number and skill level of staff needed to meet this demand is only available within 'normal working hours'. There is typically reduced capacity at night, weekends and on public holidays.

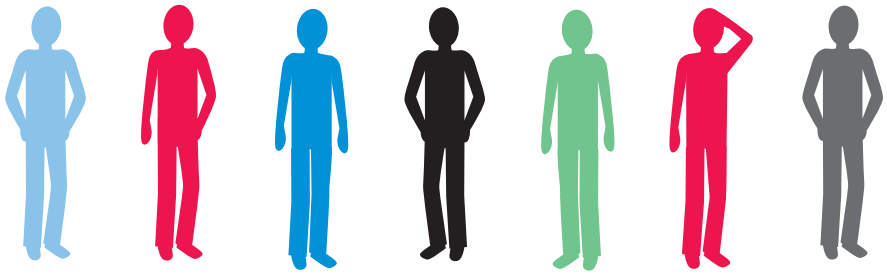
The mismatch between capacity and demand is a significant problem in healthcare for a number of reasons.

- There is typically a mismatch at every step in pathways that often have many stages. This mismatch creates an amplification effect (also known as the Forrester effect) which means that problems with variation get worse as patients travel down a multi-stage pathway.
- Queues caused by this mismatch have consequences. Seriously ill patients have to be 'prioritised' within a queue and resources have to be reserved for these urgent cases. This limits the remaining capacity available for less seriously ill patients, who are consequently delayed for longer.
- Staff working amid a constant backlog can feel 'overwhelmed by demand' (or at least the fear that they may be overwhelmed again at any time). The pressure associated with this constant backlog is understandably associated with errors. Staff trying to meet patient needs in this context may also act in ways that inadvertently make the problem worse. They might react to the pressures they face by adding check processes and diverting patients to emergency care so that they are seen quicker, using up further capacity and making services more chaotic.
- When organisations put in place extra short-term bursts of activity to deal with queues (for example with waiting list initiatives or extra activity to respond to winter pressures) this can send surges of work to the next step in the process, increasing the impact and problems associated with the amplification effect.

Managing variation

If the section above describes why variation and the mismatch between capacity and demand accumulates to be such a problem for healthcare services, it also serves to illustrate the potential for reducing delays, wasted resources and clinical risk if the root causes of variation can be better understood. Much can be achieved but it needs the right approach.

In a resource-constrained environment, responsible managers and clinicians work to make services as efficient as possible. However, 'efficiency' is commonly misinterpreted as 100% utilisation of all resources – human and equipment. The 'flaw of averages' shows that if planning is based on average demand, staff may be fully utilised, but will no longer be fully productive. Valuable time is wasted triaging, prioritising and 'managing' waiting patients, rather than adding value by diagnosing and treating them. Some of the costs of this 'unseen' waiting have become embedded in hospital structures: physical resources such as waiting rooms, assessment units and discharge lounges.



If variations in demand are taken into account in capacity plans, this ensures that there is surplus capacity or 'slack' in the system to adjust for hourly, daily and seasonal changes in demand. This surplus can be misinterpreted as waste. However, a small investment in 'slack' prevents amplification and the distortions in demand that require far larger investments in capacity further downstream. Slack also allows for changes in staff capacity due to sickness, training and holidays. It gives staff time to monitor and improve services, and to manage any sustained changes to average demand until long-term capacity can be planned to meet it.

Rather than maximising the utilisation of individual units in organisations, the focus needs to be on optimising the flow of patients through the system. Flow can be improved by reducing the variation in capacity and ensuring that the capacity, at points where there is a constraint in the process, meets the variations in demand.

2 The Flow Cost Quality improvement programme

The Heath Foundation worked with the two NHS hospital trusts during the Flow Cost Quality programme to support them to:

- understand the emergency care pathway and how it relates to the wider healthcare system
- understand the pattern of demand on their services from all sources (emergency, planned, outpatient and follow-up care)
- develop capacity plans to meet the variations in demand and prevent queues
- test the impact of changes to capacity by reducing the capacity variations, improving productivity and reallocating resources.

Kate Silvester, a dedicated clinical systems improvement expert, supported the teams in both organisations. Kate originally trained and practised as an ophthalmic surgeon, before retraining as a manufacturing engineer. She has expertise in the design and management of organisational systems to deal with variability in demand and capacity.

> *'On rejoining the health service I learned that all those tools and techniques that I'd been taught absolutely work in healthcare. And they are very similar to the way of thinking that we have... [when] learning about a very complex human system.'* (Kate Silvester)

The Flow Cost Quality programme employed principles and tools drawn from the growing body of practical knowledge on 'clinical systems improvement'. It also drew on concepts and principles from two key methodologies from manufacturing – 'lean' and the 'theory of constraints' – which have been adapted for service industries, including healthcare. See Box 3 for details.

2.1 The improvement approach

The results achieved by South Warwickshire and Sheffield are not just a result of what they did and the different service models they designed given their new theoretical insights into variation; success relied just as much on how they approached improvement. In a complex organisation involving hundreds of people, a systematic approach capable of securing and sustaining engagement of multiple diverse perspectives is essential for changes to work.

Underpinned by the principles of lean, the theory of constraints and clinical systems improvement, the programme developed an overall improvement approach. This began to be used at every level of the system, including board, clinicians and support services.

The improvement approach fell into three key phases, which reflected the Plan, Do, Study, Adjust (PDSA) cycle of lean.

- Understanding the system (*Study and Adjust thinking*).
- Testing different solutions and implementing new processes (*Planning and Doing*).
- Measuring for improvement (*Study and Adjust thinking again*).

Box 3: Methodologies underpinning the programme

Clinical systems improvement

The discipline of clinical systems improvement focuses on processes within organisations, viewed from a patient perspective. It emphasises engagement of all stakeholders in understanding and improving an end-to-end process, and uses time-series data to diagnose and measure the impact of improvements. Changes are tested using Deming's quality improvement cycle of Plan, Do, Study (or Check) and Adjust (PDSA). This was the key improvement approach taken by the Flow Cost Quality programme.

Lean

Lean methodology – the basis of the world famous Toyota production model – aims to provide what the customer wants, quickly, efficiently and with as little 'waste' as possible. Its application to healthcare lies in streamlining and improving the quality of processes by minimising or eliminating waste (including unnecessary delays, re-work, inappropriate procedures and errors) and maximising what adds value to patients.

Theory of constraints

The theory of constraints came from a simple concept similar to the idea that a chain is only as strong as its weakest link. It recognises that movement along a process, or chain of tasks, will only flow at the rate of the task that has the least capacity. The approach involves two key principles.

- Identifying the constraint (or bottleneck) in the process and getting the most out of that constraint. Since this rate-limiting step determines the system's throughput, the entire value of the system is represented by what flows through this bottleneck.
- Recognising the impact of mismatches between the variations in demand and variations in capacity at the process constraint.

Further reading can be found in the Appendix to this report.

Understanding the system

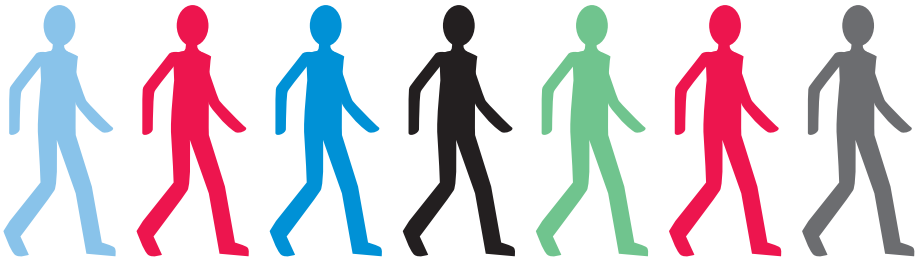
Process mapping pathways of care was essential to enabling the teams to understand their individual systems in detail. It drew together the perspectives of a range of stakeholders, including patients, and helped to clearly set out what was actually happening, rather than what people thought was happening. It also allowed the teams to identify where in the system the real constraints lay and to understand that these were not always where the 'symptoms' – the obvious problems – were occurring.

Testing different solutions and implementing new processes

The teams tried small tests of change using PDSA cycles to trial the ideas they identified as potential solutions for key problems within the system. These, supported by rigorous measurement, were a core component of the improvement approach. Data were regularly gathered and plotted in time series on run charts for every test of change. Only when the teams were happy that the change had significantly improved their process was the new process implemented.

Measuring impact

Since understanding variation in the system was a key principle underpinning the work, the teams needed to interrogate their data to understand the patterns of process variation over time. They also needed to be able to distinguish when the pattern had changed significantly (statistically) and whether significant changes were expected or unexpected.



To understand the variation of processes over time they embedded the discipline of statistical process control (SPC). Developed within manufacturing, SPC is becoming increasingly used in healthcare environments. It has gained traction in part because clinicians are familiar with recognising patterns of variation in the charts at the end of every patient's bed. Several measures of the performance of the patient's 'system' are plotted over time (eg temperature, pulse, blood pressure, respiration and fluid balance) and the relationship between them is monitored. This is an essential part of making a diagnosis and monitoring the impact of treatment.

Identifying high-level measures, and regularly reviewing them, was crucial for the teams to understand their system's performance and whether (and how) any of the changes they implemented actually made a difference at the system (hospital) level. From the frontline teams to the board, this required an important shift in how key information was presented, moving away from comparative data to time-series data that demonstrate performance over time.

> *'We're looking, very specifically, at the relationship between the emergency flow (from the point at which the patient declares themselves ill to the point at which they are well again), the death rate and the cost, and we're tracking those three things as if they were the pulse, the blood pressure and the temperature on the patient's chart at the end of their bed.'* (Kate Silvester)

2.2 Implementing the approach

The teams used two key tools to help them implement the approach: the A3 process and the Oobeya (big room) process (see Boxes 4 and 5).

Unsurprisingly, the different contexts and organisational cultures of South Warwickshire and Sheffield led to the two sites taking different approaches to how they managed their work.

Initially starting with the A3 process introduced by the programme, the core team at South Warwickshire decided to put a programme management structure around it as the project grew. This included a programme board, with executive and wider stakeholder membership, and a number of project streams focusing on different elements of the work as the programme progressed. The teams in each project stream used the A3 process to structure their work. The size and organisational culture of South Warwickshire facilitated strong executive involvement, with clear and active leadership support from the chief executive.

In Sheffield, a much larger trust, the leadership and drive for change came mainly from within the improvement team and from clinical leaders involved in the project. The team took a more emergent approach to the work and were highly successful in adapting a method – the Oobeya process – for multi-stakeholder participation, including GPs and wider stakeholders.

Box 4: A3 – more than just a paper size

Both organisations used the A3 problem solving process as a key methodology for their system analysis and tests of change.

What is it?

The A3 problem solving process is a systematic, iterative and participatory approach to analysing a problem and developing solutions. It is based on discussion and collaboration among a group of stakeholders and encourages them to work together to 'see' and understand a problem, and track changes made to solve it. The A3 is a process, not a plan, and can't be written by one person. The A3 name comes from the paper size used to capture all the information concisely – and with visual clarity – on a single sheet.

The process has its foundations in Deming's original PDSA cycle for quality improvement. It starts at 'Study' and focuses on really understanding the problem before jumping into ideas for solutions, and has a strong emphasis on facts, data and measurement. It evolved from Toyota's world-famous approach to improving its manufacturing process.

How to use it

As a working document, the A3 record is handwritten in pencil to enable the continual updating required at each iteration. There are many different versions, but most are based on the common features shown in the format below.

Title of problem: Owner and date

<table>
<tr>
<td>Box 1 Issue or problem</td>
<td>Box 4 Current state map (current condition)
What is happening currently?</td>
<td>Box 7 Improvements required
(countermeasures to reach the future state)
What changes are required?</td>
</tr>
<tr>
<td>Box 2 Background
How has this problem come to light?
How important is it to:
Business?
Customers?
Suppliers?</td>
<td>Box 5 Analysis: DATA
Why are these problems happening?</td>
<td>Box 8 Weekly review meetings
What change By who By when State of completeness</td>
</tr>
<tr>
<td>Box 3 Stakeholders
Who is affected by this problem?
Who is involved in the process?</td>
<td>Box 6 Future state map (target condition)
What would the process look like if all the waste was eliminated?</td>
<td>Box 9 Measures for improvement
Time
Cost
Quality
Target condition achieved by:
Date
Cost/benefit
Signed off by</td>
</tr>
</table>

Steps in the A3 process

- Capture the issue or problem, how it came to light and its impact on patients and staff (boxes 1 and 2). This will help define the measures for improvement (box 9).
- Identify key stakeholders (box 3) – the people who carry out or who are impacted by the process – and bring together a team to map and understand the current process (box 4) and analyse data (box 5) to identify the root cause(s) of the problem. When working on flow, this analysis needs to include:
  - identifying the activities that do not add value to the patient or customer (waste)
  - measuring the demand for the process and the capacity of each task in order to reveal the constraint (or bottleneck) in the process.
- Agree what the future state should look like (box 6). This includes:
  - how the process will work once the wasted activities have been eliminated
  - how the capacity of the rate-limiting task in the process can be adjusted to meet the demand, or how 'wasted' resources can be redirected to relieve the bottleneck.
- Discuss and agree the changes needed (sometimes called 'countermeasures') to eliminate the waste from the process and maximise value to the patient (box 7).
- Document the changes planned (what, by who, when?) (box 8). Test them rapidly and on a small scale, and review and adjust as needed, before implementing them in full.
- Keep track of how the changes impact your measures for improvement (box 9).

Once the issue has been solved, ie the required improvement has been achieved and sustained, the A3 team can be disbanded. The final version of the A3 document forms the record of the new process or standardised work.

Key lessons from the Flow Cost Quality programme on using the A3 process

- The A3 problem solving process is more than an iterative technical tool for understanding the root cause of a problem and testing solutions; used properly it can be a powerful method for changing the beliefs and behaviours of those involved.
- The process builds certainty and momentum for the changes required. It brings together the stakeholders affected by the problem, who are often separated by geography or organisational silos. Together they can build a shared understanding of the problem and generate solutions to its root cause.
- Stakeholders need encouragement to spend more time in meetings based around the A3 problem-solving process. The result is a shorter timeframe required to solve the problem and eliminate waste. The initial costs of such meetings are far outweighed by the costs of poor problem solving (workarounds) and firefighting persistent problems.

The A3 process can be used effectively within a more traditional programme and project management framework (South Warwickshire), and as a key visual tool within the Oobeya approach (see Box 5 overleaf).

Box 5: The Oobeya (big room) process

What is it?

The Oobeya (Japanese for 'big room') process is a regular standardised meeting of the project team through the lifetime of the project. It takes place within a dedicated project room in which all the project information is displayed. Participants use the visual information to monitor data and progress, discuss issues, share experiences and agree next steps in the project.

The Oobeya process offers an environment for real-time decision making that engages all relevant stakeholders. It can be used to help identify improvements to individual healthcare processes, with reference to their wider system impact, and then implement them successfully.

It was developed by Toyota and is used by other manufacturing companies (including NASA, Boeing and Unipart) for managing new product development in highly complex, worldwide supply chains.

How to use it

The Oobeya process can be tailored to suit the project and pace of change required. It was used by Sheffield as a weekly, one-hour standing meeting with a standard agenda; all relevant information was updated on wall charts in a dedicated project room. The key elements of the approach are as follows.

1. Begin with a patient story

A stakeholder describes a patient's experience (often from the previous week's test of change) in order to remind all stakeholders of what they need to achieve.

2. Study the last test of change

Review updated measurement (time series) charts to see impact of the changes. Discuss what was learned from the test, including:

- **nuggets**: what went well and needs keeping
- **niggles**: what didn't go so well and needs changing
- **nice-ifs**: what needs to be included in the next test of change
- **no-nos**: things that could happen, didn't happen and must not happen as a result of changes (eg re-admission on the same day as a consequence of a failed discharge).

3. Plan the next test of change

Use the Study phase of the previous PDSA cycle to plan the next test of change. Discuss and capture issues (niggles) and identify those that can be resolved. Use a visual system (eg sticky notes) to support the management of the test process.

4. Briefly discuss any other pertinent issues

Include feedback from other relevant meetings attended by stakeholders.

Between meetings, anyone familiar with the big room can visit or guide other stakeholders through the overall process and the status of tests of change at any time. One of the major benefits of this approach is that all the relevant information is visible, easy to understand and available to all.

The Sheffield team had used the A3 process to good effect, but found that the number of separate test (PDSA) cycles they were undertaking was leading to problems with the overall management of the change process. The team needed something which would bring together a broader group of stakeholders to understand and address delays to patient flow and sources of error in the wider health and social care system. They therefore adapted the Oobeya process.

Key lessons from the Flow Cost Quality programme on using the Oobeya process

Benefits of the approach include:

- A standard process that allows staff, including senior managers, to see and understand the complexity of the whole system, their 'place' within it and their impact on it.
- Frequent meetings with timely decisions made in response to real-time data.
- Encouraging frequent tests of change to the processes of care, and reducing intervals between successful tests (which impacts the cost of change).
- Dialogue between stakeholders from across the system.
- Managers recognising the impact of other parallel initiatives.
- Reducing the cost and improving the value of meetings.

'The big room provides a space where the team can come on a weekly basis and take part in the discussion in real time. It's equal. Everyone has a say, there isn't a hierarchy when you walk through the door of that big room.' (Suzie Bailey, Service Improvement Director)

'At times it's uncomfortable. With some of the tests we fail, with others we succeed, but we learn from both.' (Tom Downes)

'It's quick, everybody's opinions are valued and at each meeting I feel that we move ahead with the plans.' (Helen Miller, Clinical Specialist Occupational Therapist)

3 Towards a service model designed to optimise flow

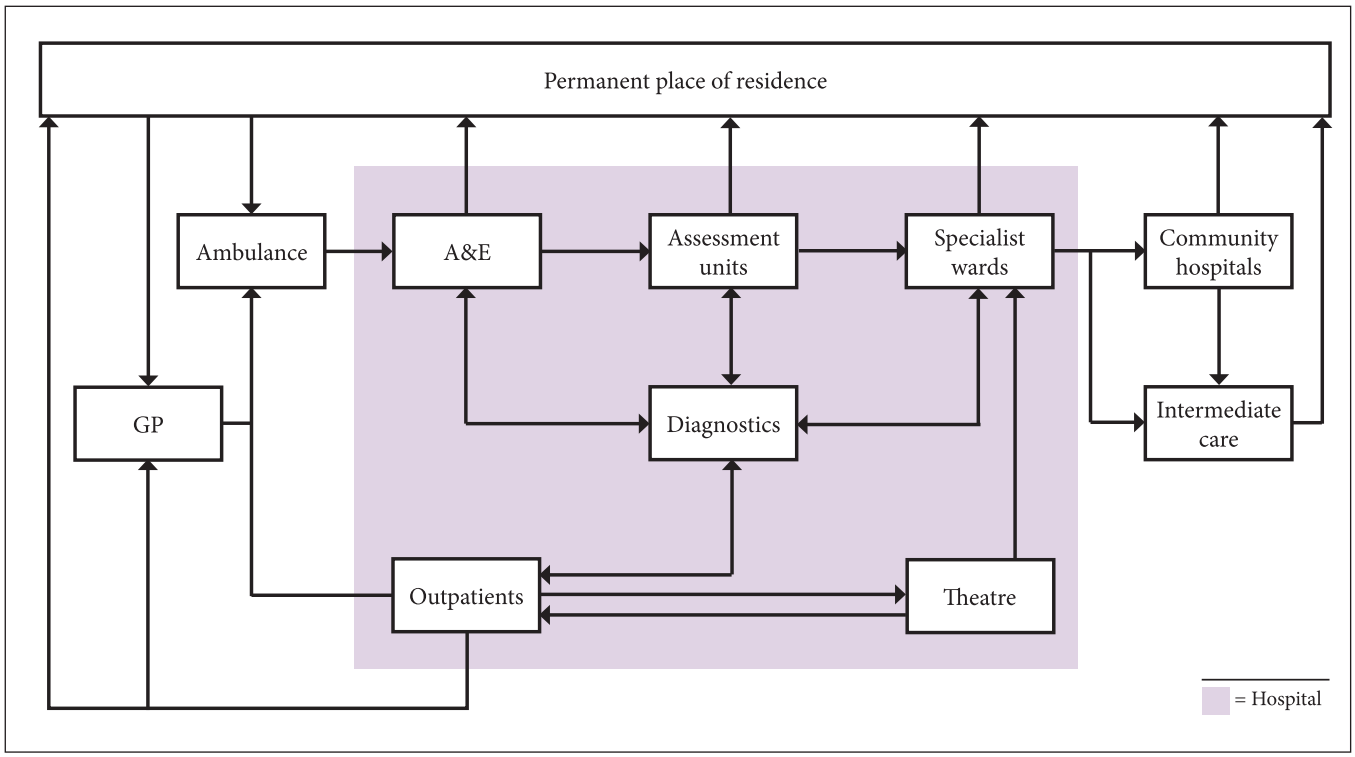
This section describes the insights the two trusts gained into specific parts of their system, the changes they made and the impact these are having. The impact on quality and cost builds on the combination of these changes and is summarised in chapter 4.

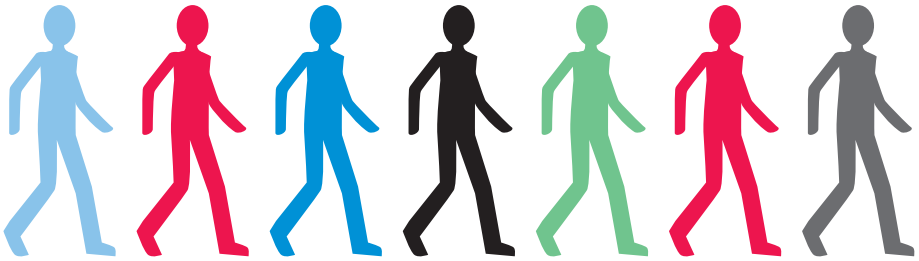
The trusts between them made changes across the patient pathway. These included changes to:

- meet demand in real time at the front door and improve care through a single multidisciplinary assessment process (Boxes 6 and 7)
- speed up patient flow by:
  - improving the turnaround time of core processes (Box 8)
  - improving the flow into post-discharge care (Box 9).

This report provides a selection of the work done and the changes made by each trust. More detail about the work done by the sites is available at www.health.org.uk/flowcostquality

Figure 1: A visual representation of the patient pathway





3.1 Meeting demand in real time at the front door

See Boxes 6 and 7.

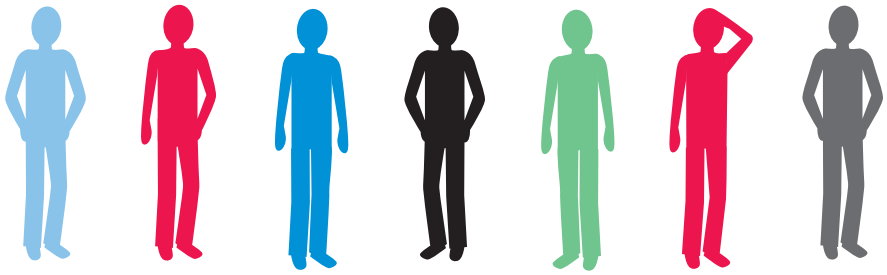
The problems

The analysis that both trusts did showed the following pattern underpinning the problems they were facing at the front door of their hospitals.

- Demand from people getting ill was predictable and largely occurred during the day, although delays in GP assessment and transport meant that many patients did not arrive at the hospital until the afternoon.
- Delays meant that, although two-thirds of patients arrived during working hours, when senior decision-making staff are available, they are not in the 'right' place by the time senior staff leave the hospital at 6pm.
- A larger queue built up over the weekend, which used capacity of staff the following week to clear, absorbing staff time that could be used to see patients presenting that day.
- Especially when patients had to wait for senior assessment overnight or over the weekend, there was an increased risk of them being put on a pathway that notes review suggested was inappropriate and led to a much longer than necessary length of stay.
- The Sheffield team observed that many of the patients who arrived through the planned outpatient pathway went through similar steps as they would have done in A&E and the assessment unit, but this took multiple visits over several months. The patients referred to outpatient care were often as ill as those presenting to A&E.
- The delays described above were a root cause of not just harm and inconvenience to patients but significant wasted resources and unnecessary stress for staff. South Warwickshire identified a potential association between periods of poor flow (indicated by a rise in emergency access target breaches) and mortality.

The solutions

- Both trusts changed consultant working patterns to bring capacity more in line with when specialist input was needed.
- Sheffield tested the pooling of junior doctor capacity to reduce duplicated assessment and make it easier to absorb variations in demand.
- South Warwickshire implemented a system in which specialist consultants 'pull' their patients from the medical assessment unit (MAU), reducing delay and ensuring patients get on the right pathway as soon as possible.
- Sheffield set up an integrated frailty unit that saw people on the day they presented, serving those who were previously seen separately via outpatient and emergency care.



3.2 Speeding up patient flow

See Boxes 8 and 9.

The problems

- Analysis of length of stay data at Sheffield showed that the majority were discharged within a week and the mode (most frequently occurring) length of stay was 24 hours after admission. However, the data also showed that a few patients could spend months in hospital (see Figure B9.1 in Box 9). This suggested that while the discharge of many patients was within the control of the patient and hospital team, improving the length of stay of those in hospital also relied on post-discharge care.
- Analysis over time at South Warwickshire and Sheffield gave both trusts new insights into the interdependency of their local healthcare system. After a long period of flat demand in South Warwickshire, the closure of capacity in the community (eg community hospital) was associated with an increase in demand and variation on hospital services. The Sheffield team were likewise able to quickly identify and start to address problems in post-discharge services when changes in community capacity caused challenges for the reduced hospital bed base introduced through the project.

The solutions

- Both teams acknowledge that they have so far been able to make less progress with improving flow at the 'back door' of the hospital and into other services. However, they have made some changes and have established a platform of data analysis and stronger stakeholder communication.
- South Warwickshire improved the processes that governed the pace of patients travelling through their services. They reduced turnaround times for blood tests, introduced an electronic work management system, started daily ward and board rounds and improved the take home medicines process.
- Sheffield moved to a model of 'discharge to assess', whereby patients who need post-discharge care are discharged as soon as they are medically fit, with assessment and care packages put in place with the patient at home.
- Process mapping, patient stories and a review of patients' notes highlighted multiple points of delays and examples of patients 'getting stuck' and missing the opportunity for discharge, especially after a move between wards or teams. Especially for older people, this could be associated with deterioration and further unnecessary days or weeks in hospital.

Box 6: South Warwickshire 'front door': diagnosis and solution design

The problems

Although confident they had created an efficient pathway for elective patients, senior leaders within the trust knew they had some real problems in the emergency pathway:

> *'It was obvious that patients were having a poor experience. We weren't able to achieve the four hour target in A&E, our length of stay was increasing, mortality was increasing, patients were undergoing multiple bed moves… there was 'gridlock' in the hospital'.* (Jyothi Nippani, Associate Medical Director for Emergency Care)

As in many hospitals, most emergency patients faced delays waiting for an initial assessment by a junior doctor. Once assessed, they then had to wait for input from a senior medic. There was also a lot of duplication (and therefore waste) in the current system. Patients coming through A&E would be seen by a junior doctor first, then by a registrar and sometimes by an A&E consultant. This would often trigger a referral to a specialist team:

> *'Then patients would again be seen by the most junior doctor in the specialist team… and the process would start again. So it took a long time to take an actual clinical decision. And patients had to answer the same questions so many times'.* (Jyothi Nippani)

An in-depth analysis of data revealed that the peak influx of patients from A&E to the Medical Assessment Unit (MAU) occurred in the evening, and there was no change over the weekend. The overall demand for emergency care was not the problem – the problem was the availability of staff at the right times to meet the demand (Figures B6.1 and B6.2).

Figure B6.1: The daily mismatch between emergency demand and capacity

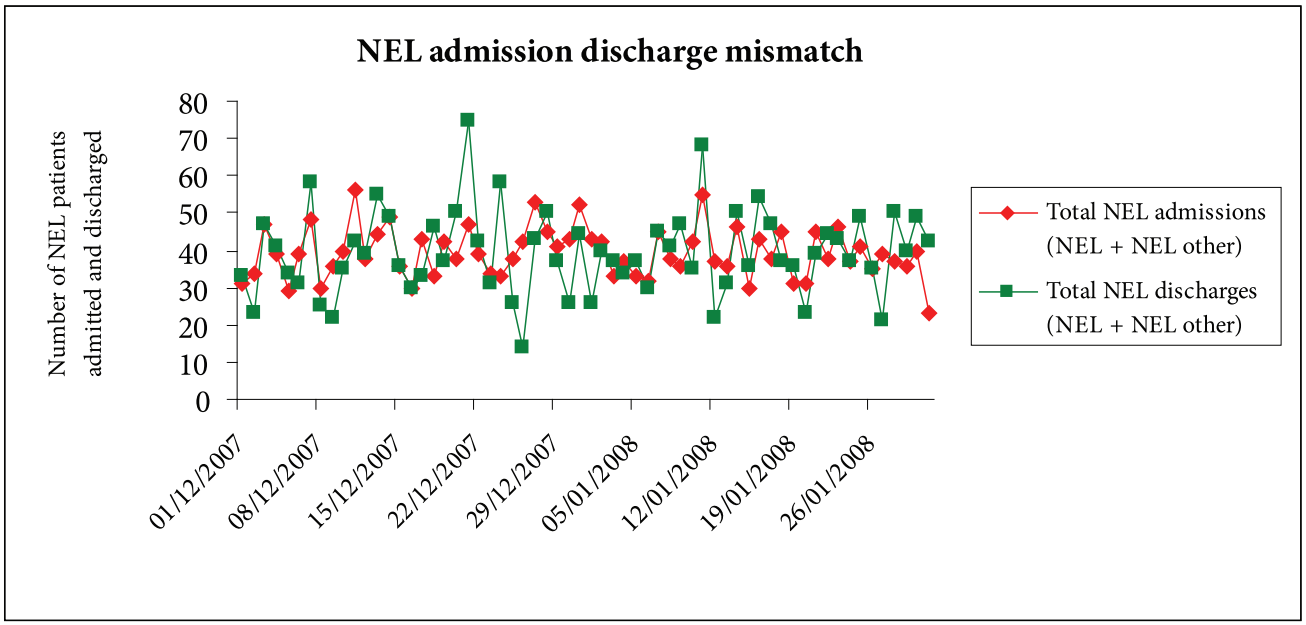
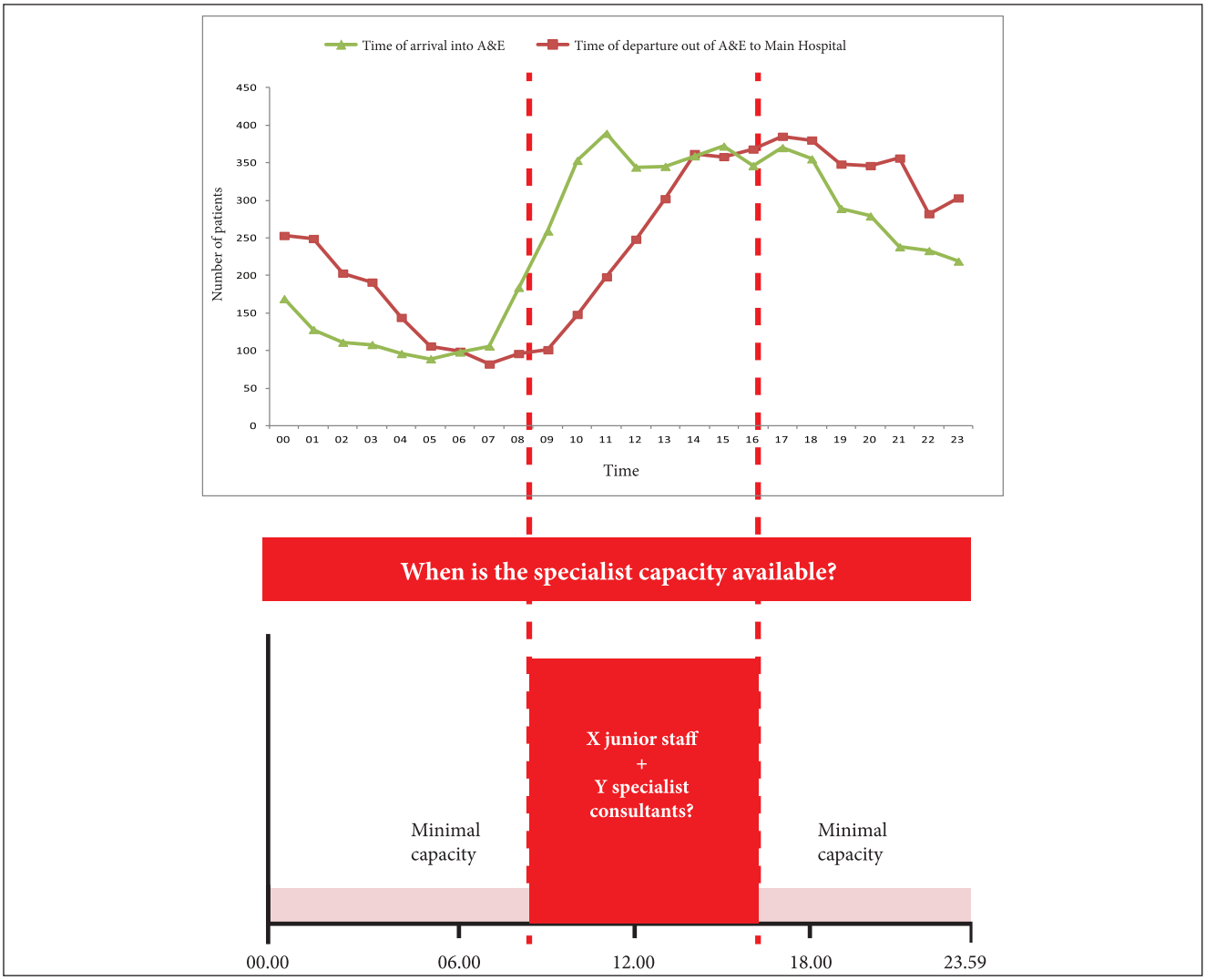


Figure B6.1 shows data gathered prior to the Flow Cost Quality programme. It shows that the variation in daily discharges is far greater than that of the emergency admissions (which are predictable within limits). The variation in discharge is due to the Forrester (amplification) effect within the hospital and is governed by variations in capacity, particularly the availability of senior decision-making staff. There is a peak in discharges on Christmas Eve (24 December) and on 2 January.

Figure B6.2: Mismatch between timing of patient demand and availability of specialist medical input during the day



The top chart in Figure B6.2 shows the time emergency patients (who go on to be admitted) arrive at A&E (green line) and when they arrive on the assessment units and wards (red line). There is a four-hour time delay between the two. The consequence is that although two-thirds of patients arrive during working hours (when senior decision-making staff are available), they are not in the 'right' place by the time the senior staff leave the hospital at 6.00pm.

> *'What we had was a "stop-start" system, with patients still coming at night when we'd gone. Friday afternoons produced a much longer queue, which we then had to pick up on Monday. This wasn't good for the flow of patients – there was a lot of waiting in the system. It was very clear that we couldn't change when patients were coming into the system, so we had to change our working patterns.'* (Jyothi Nippani)

The mismatch between the daily variations in admissions and lengths of stay for patients requiring subspecialty care and the variation in subspecialty bed availability meant that many patients were not placed on the particular specialist ward they needed. As a consequence there were further delays for those patients requiring specialist opinion and confusion as to who was responsible for each patient's care.

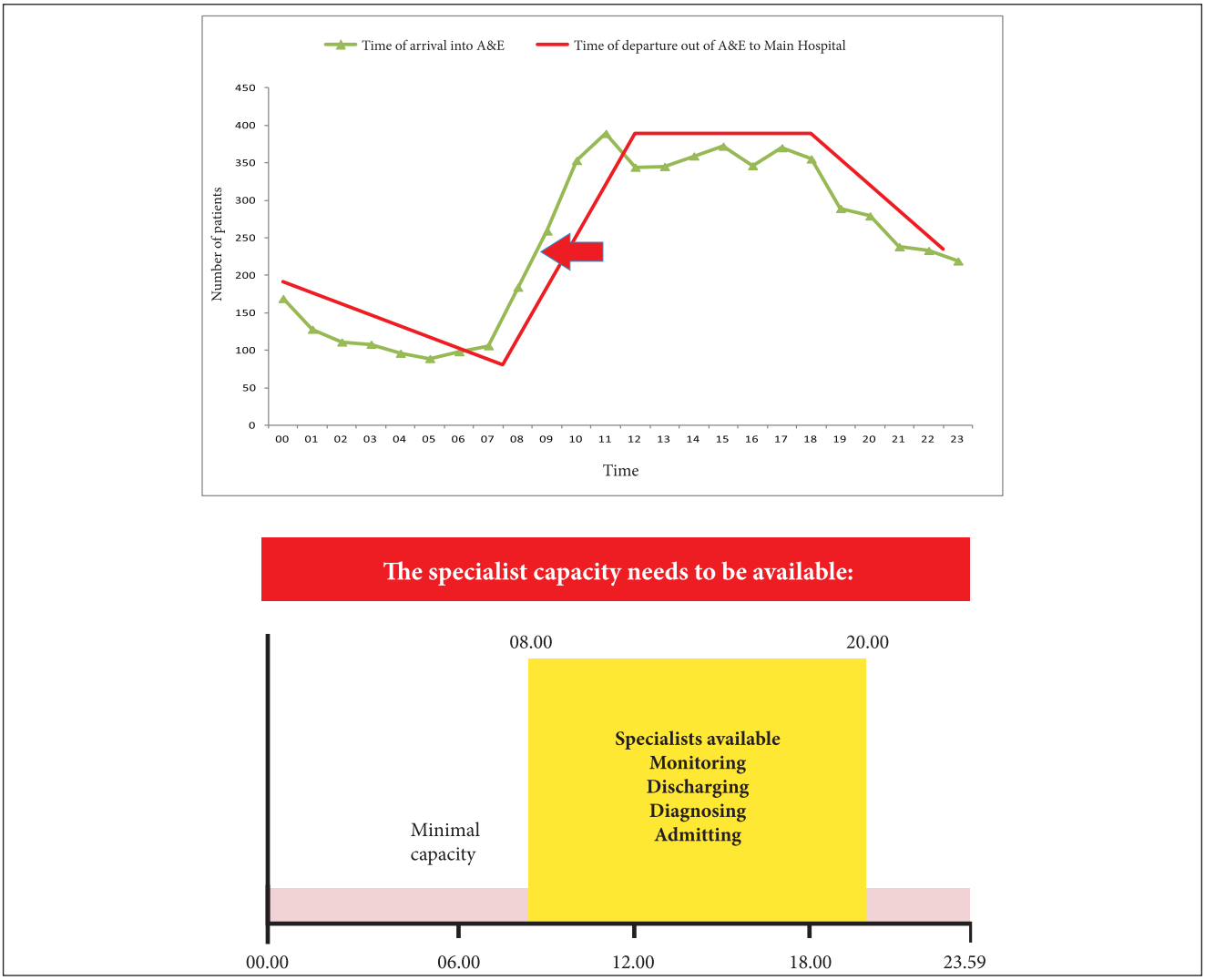
> *'If patients end up on the wrong ward, they get a raw deal. There are delays and they don't always get the right treatment. We wanted to make sure patients got seen by the right specialist at the right time.'* (Jyothi Nippani)

The solutions

Bring senior clinical assessment to the 'front door' and 'pull' patients through the system

Figure B6.3 demonstrates the required change to eliminate the time delay and distortion of demand. The patients had to be seen and referred by A&E staff more quickly and then assessed by senior clinicians on the day they attended.

Figure B6.3: Shifting specialty medical input to match timing of patient demand



The flow team hypothesised that if they placed senior clinical decision makers in the MAU, when patients presented, they could improve the system dramatically. Having senior medical staff available to assess patients earlier would get patients onto their right care plan more quickly and efficiently. They could then refer patients to subspecialty colleagues electronically so that they too could see the patients on the day of admission.

– The specialists also recognised that if they visited the assessment units after their morning ward rounds (at which time they would have discharged patients), they could 'pull' patients from the MAUs to their specialist wards while beds were available. The cardiologists were keen to try out the change and so began a month-long test of 'specialty pull' – a daily visit to the MAU to identify patients needing cardiology input or admission.

  'It fitted with what they wanted – only cardiology patients on the cardiology ward. It gave them greater ownership and empowered them to discharge patients who didn't need to be there and pull in cardiology patients from MAU. That had a big impact on flow.' (Jayne Blacklay, Director of Development)

– The success of these tests in cardiology convinced other specialists to change their working patterns. Now, each morning, a range of senior clinicians (including cardiologists, geriatric medicine specialists, gastroenterologists and chest physicians) visit MAU, seeing patients needing their specialist input and making immediate care management decisions. Those that can be discharged may be given a follow-up outpatient appointment while patients requiring admission can be transferred to a specialist ward for further treatment and care.

Due to the timing of demand in the MAU, the changes that were needed meant introducing extended and weekend working for consultants (Figure B6.3). Senior medical availability from 8.00am to 8.00pm ensured that patients were being assessed and put on the right care management plan on the day they presented. It took major delays out of the process and, crucially, avoided the need to 'store' patients overnight on the MAU. It also reduced the duplication and waste inherent in the previous system of multiple assessments. The presence of senior clinicians provided greater leadership and guidance to the junior team.

> *'We had consultants who had been working here for 20 years and had never been rostered to work beyond 5pm so to ask them to work late into the evening every day including the weekend was a lot to ask. But they engaged with it and felt that this was the way forward. Once convinced, the consultants did the rotas themselves and just got on with it.'* (Jyothi Nippani)

The impact

The changes put in place brought a range of benefits including speedier senior assessment of patients, with quicker access to specialist input or admission, lower bed occupancy on the MAU and a higher percentage of patients on the 'right' wards for their needs.

> *'The surprising thing was that although the symptoms were in A&E, we didn't have to do anything in A&E at all. What we did was try to sort out the system from the back end – and the flow started improving.'* (Jyothi Nippani)

Box 7: Sheffield 'front door': diagnosis and solution design

The problems

Through their analysis of the whole emergency pathway for older people, the Sheffield team were able to understand the key constraints in the emergency process. The main patterns of flow through the process were:

- 90% of the emergency patients who were referred to geriatric medicine by their GPs or A&E staff, first presented to the healthcare system between 8:00am and 6:00pm
- those who contacted their GP first were not seen and referred on to the hospital until after midday
- the first of these emergency patients arrived at the hospital in the early afternoon (those using private transport arrived more quickly than those arriving by ambulance)
- patients arriving at A&E directly did not get referred on to geriatric medicine, or move onto one of the four medical assessment units (MAUs) for at least four hours.

As a consequence of these patterns, two-thirds of the frail older patients 'arrived' on the MAU after 6.00pm. At this time only junior medical staff were available to assess them. Patients waited until the following morning for a consultant ward round review, often seen first by an acute physician before being seen by a geriatric medicine consultant. The traditional model of 'post-take' ward rounds resulted in the 'batching' of patients, with the geriatric medicine consultant waiting until their post-take ward round to review up to 20 patients at a time on the MAU.

The delays in getting specialist geriatric medicine assessment meant that many frail older people had to stay in hospital overnight unnecessarily. In addition, during the initial tests of change, a limited audit of ward rounds showed that 20% of these patients had their diagnosis or care fundamentally changed by a geriatric medicine specialist if they were seen at an early stage compared to 20 hours after admission.

Furthermore, patients referred by their GP for an outpatient assessment faced significant delays. For some, this could lead to deterioration in their clinical condition and an emergency admission.

The team recognised that the key problem in their emergency system for older people was the time taken from patients presenting to being assessed and given a care plan by a geriatric medicine consultant. From October 2011, improving the assessment process for frail older people became the key focus for the Sheffield team's Oobeya approach (see Box 5).

The solutions

1. Change consultant working patterns, from 'post-take' to 'on-take'

The timely availability of skilled specialist staff is a key factor in the delivery of high quality efficient care. As in South Warwickshire, the Sheffield improvement team recognised that they needed to change the timetable of consultant activities and increase senior medical staff availability to meet patient demand as it occurred. This would prevent the delays and potential safety issues inherent in 'storing' patients in the MAU overnight. It would also address the distortion in demand, passed on to departments and organisations downstream in the patient pathway, caused by the 'batching' of patients for the post-take consultant ward round.

- The involvement of consultants in the various tests persuaded them that the current job plans were hindering the provision of care. This involvement was the main enabling factor in them agreeing that the job plans needed to be altered to extend the on-call service to 8pm and to increase weekend cover from 8am to 5pm. This was achieved through the job planning process, releasing time by using clinic capacity more efficiently and timetabling periods of time back in lieu. The change increased the number of older people who could be assessed on the day they presented at hospital and prevented the build-up of patients over the weekends.

– All 16 geriatric medicine consultants changed their on-call duty rotas on 1 April 2012. Although a significant change, this was a natural step from a series of tests (each with a single consultant) that had shown a range of benefits and built staff confidence.

  'Different consultants learned different things. For example, one consultant with an educational interest began seeing patients alongside the junior doctor clerking them. He was able to give feedback immediately, supporting competency based learning in real time.' (Tom Downes)

Despite the new rotas creating a few difficulties, such as some consultants finding it difficult to take back time elsewhere, the reactions of the geriatric medicine specialists have been positive. Many were unhappy with the service they had been providing and can see clear benefits in the new system, for example:

– seeing patients as they present helps pace work throughout the day and provide consistent quality of care
– earlier specialist assessment increases the chances of early supported discharge with the associated reduction in risk of healthcare-associated adverse events
– reduced inequality of service for people admitted at weekends
– improved job satisfaction and enjoyment from seeing a better service for patients.

In the new system, consultants (geriatric medicine specialists) are available 'at the front door' to assess patients as soon as investigations have been done and enough clinical information is available. This is 10 to 20 hours sooner than in the previous system of the post-take daily ward rounds. Faster turnaround for diagnostic tests and a clear plan of care by consultants has increased the number of patients who can be discharged on the day of admission.

2. Pool junior doctors

Reducing the time from admission to senior medical assessment may be facilitated not just through changing consultant rotas but also by changing working patterns for junior doctors.

The first delay encountered by most emergency patients is in waiting for an initial assessment by a junior doctor. However, in analysing demand, the improvement team found that there was, in fact, sufficient overall junior doctor capacity to review all presenting emergency patients within an hour of their arrival at hospital.

Pooling the capacity of junior doctors from A&E, the MAUs and the medical and surgical specialties could enable the trust to meet the peaks in emergency patient demand and eliminate 'wasteful' repeated assessments that were not adding value.

3. Establish an MAU focused on frail older people

From their initial work on securing earlier specialist assessment of frail older patients, the team turned to reducing unnecessary overnight stays for people who were able to return home with support. One of the hospital's three MAUs has now become a unit focusing on the medical admissions of frail older people. The Frailty Unit opened in May 2012. Its key benefit is the co-location of all the specialist, medical, nursing and therapist staff who deal with frail older people, thus improving communication and team working. Relatives of patients admitted both before and after the change have commented that the Frailty Unit is more calm and more patient focused than a normal MAU.

4. Merge inpatient and outpatient care

Analysis of the patient pathway had highlighted significant delays for patients referred by GPs for an outpatient appointment. As part of the process, patients often had to be referred elsewhere for investigations, such as scans or physiotherapy assessment, stretching the overall wait for weeks, sometimes months. Some were reaching crisis point before their medical outpatient appointment and the delays meant that GPs sometimes had no option but to send frail older patients as emergency cases to the hospital.

The improvement team set themselves a challenge: to reduce the outpatient process time from around three months to less than eight hours. They tried a small test with their next two referral letters, telephoning the patients to ask them to come in the next morning. For those two patients, all the issues identified by the GP were dealt with that day. They had all the necessary investigations, were reviewed by the geriatric medicine specialist and seen by other team members, such as therapists or a social worker, if needed.

> *'We were able to deliver all the value of that three-month process for those two patients in less than four hours. That morning was one of the proudest mornings of my 18 years being a doctor.'* (Tom Downes)

An unexpected finding from this test was that there was often no clinical difference in the severity of conditions for older patients who presented (or were referred by their GPs) as an emergency case or those who were referred to an outpatient clinic. There was also no difference in the process of care they required.

This led to a larger test of change: combining outpatients and emergency patients into a single system of care.

> *'We realised that the divide of outpatients and emergencies is artificial because most patients being referred by GPs require a secondary care consultation and in geriatric medicine that's usually sooner rather than later.'* (Paul Harriman, Assistant Director, Service Improvement)

Adopting a common process for urgent and routine patients (merging inpatient and outpatient flows) aimed to achieve a manageable demand that is smoothed through the day, and to reduce both waiting and 'process' times for routine patients. Initial tests show that it has reduced the need for follow-up outpatient capacity and suggest that the outpatient service will ultimately become an integral part of the Frailty Unit.

5. Put in place a multidisciplinary assessment team

The trust had already put in place a dedicated 'Front Door Response Team' (FDRT). This multidisciplinary team of occupational therapists and physiotherapists, a social worker and general and mental health nurses works alongside the medical staff, providing input to clinical assessments and focusing on what needs doing to get patients back home as soon as clinically possible. However, the dispersed nature of the admission units often led to delays in accessing the service once a patient had been identified for discharge. A test was undertaken with a dedicated group working in the Frailty Unit. This showed that it made teamwork there much more cohesive and further benefiting patients.

> *'If we can pick patients up sooner, do the assessment in a more real time, at the right time, then we can actually work with the services outside in the community to get these patients home quicker.'* (Elaine Atkin, Operational Manager, FDRT)

Box 8: South Warwickshire delays: diagnosis and solution design

One of the specific areas the South Warwickshire team looked at was blood tests. Diagnostic services – particularly blood sciences and imaging – are key to timely diagnosis and monitoring of treatment. Blood tests are critical to clinical decision making and therefore to both patient flow and safety.

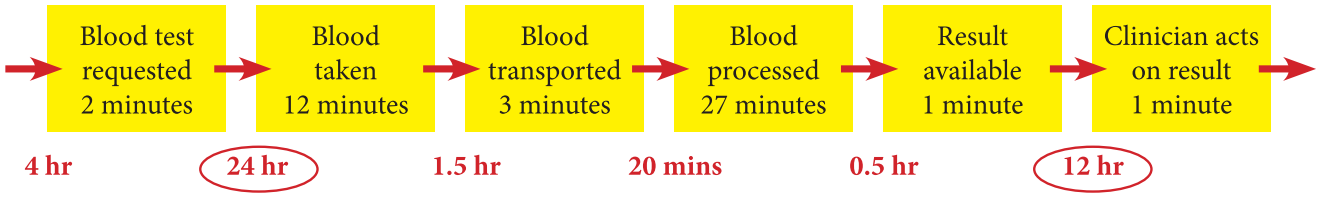
The problems

In South Warwickshire, the flow team looked in detail at seven ward rounds and discovered that all the blood results on which the doctors were making clinical decisions were at least 24 hours out of date. Clearly, this was a major safety issue.

Analysis of the current system

A multidisciplinary team, comprising a consultant, junior doctor, ward sister, phlebotomist, portering manager, laboratory receptionist and laboratory technicians, came together to map and understand the main delays in the inpatient blood test process. The team discovered that blood tests requested on the ward round on day one were drawn by the phlebotomists after 8am on day two, while that day's ward round was taking place. The inpatient blood samples were delivered to the laboratory after the ward round had ended – just as blood samples from outpatient clinics and GP practices were arriving. This peak in demand for testing meant that results were not available until the late afternoon when doctors were no longer on the wards. As a consequence, blood results were not reviewed until the following day's ward round (day three).

Figure B8.1: Summary of the blood test process for an inpatient



The necessary and value adding steps are shown in the yellow boxes. The delays due to waste (transport, inventory, motion, waiting, overprocesssing, overproduction and defects) are shown in red.

Staff had previously assumed the delays in getting blood results were the responsibility of the laboratory. However, the analysis showed that the primary problem lay outside the laboratory. In practice, there were two key issues: a) the phlebotomists' work practices and the doctors' ward rounds were out of sync; b) the batching of blood samples resulted in large variations and peaks in demand on laboratory resources.

The solutions

1. Make small alterations to working practices

The phlebotomist agreed to start her day half an hour earlier at 7.30am, at the end of the nursing handover. Changes to the portering routine enabled two porters to 'shuttle' between the phlebotomist and the laboratory, delivering small quantities of blood samples in real time. One laboratory technician changed their working day to start at 8.00am and finish earlier in the afternoon. These changes would allow laboratory staff to process blood samples as they came in, instead of waiting for a large batch in the afternoon. In addition, the laboratory team redesigned their workflow for analysing samples, resulting in a more efficient process that takes less staff time.

2. Test the changes

Having measured the numbers of samples arriving in the lab before 9.30am and the number of blood results coming out by 10.30am for two 'control' days, the team then tested the new system over three days to demonstrate that it worked. Inpatient blood samples were in the lab by 9.30am and results were available before the doctors left the wards.

3. Make the system reliable

The team wanted to ensure that clinical decisions were being made on 'today's' blood results. They monitored the number of inpatient blood tests requested each morning, the number of samples delivered to the lab by 9.30am and the number of results available by 10.30am, aiming to achieve 100% of results available for the ward rounds. They recognised that there would be occasions when the result was abnormal and would require further testing. Making the system reliable meant that if the result was not on the wards by 10.30am, the doctors would know that there was something wrong with the result and follow it up at the end of the round.

Further changes included recruiting phlebotomists and training laboratory staff to take blood, enabling the trust to provide a consistent and standardised service, seven days a week, 365 days a year.

The impact

The changes made have increased the number of same-day blood test results available on the ward rounds from less than 15% to more than 80%. Up-to-date results mean that consultants are able to make quicker and safer clinical decisions for patients.

The laboratory staff recognised the benefits of getting the inpatient samples processed earlier in the day. Domiciliary phlebotomists now pick up blood samples from the main GP practices on their way back to the hospital, thereby bringing the bulk of the laboratory's work forward into the day. As a consequence, these GPs received their morning results before their afternoon surgery. GPs visiting the laboratory during National Laboratory Week commented on the superb service they receive.

> *'The knock-on effect of getting blood results back to the ward on the same day has been really good for patients. Personally, I've really enjoyed it. Before I used to come to work every day and it could feel like a bit of a factory. It's made us realise that this sample has come from someone on a ward who really wants to get home so it's helped to bring that more to the forefront.'* (Tracey Clayton, Biomedical Scientist)

The relationships between the members of the multidisciplinary team have changed as understanding and respect for each role has grown. The laboratory staff, phlebotomists and porters can now see the impact they all have on patient care while the doctors are more respectful of the service they receive.

> *'It's led to a rapid improvement both in process time and in decision making for the consultants. It's a really powerful scheme and it didn't cost us a penny. We just re-engineered it and everyone is really proud of what they've achieved.'* (Glen Burley, Chief Executive)

In March 2011, the project team received a National Patient Safety award (highly commended) for addressing this nationally recognised problem.

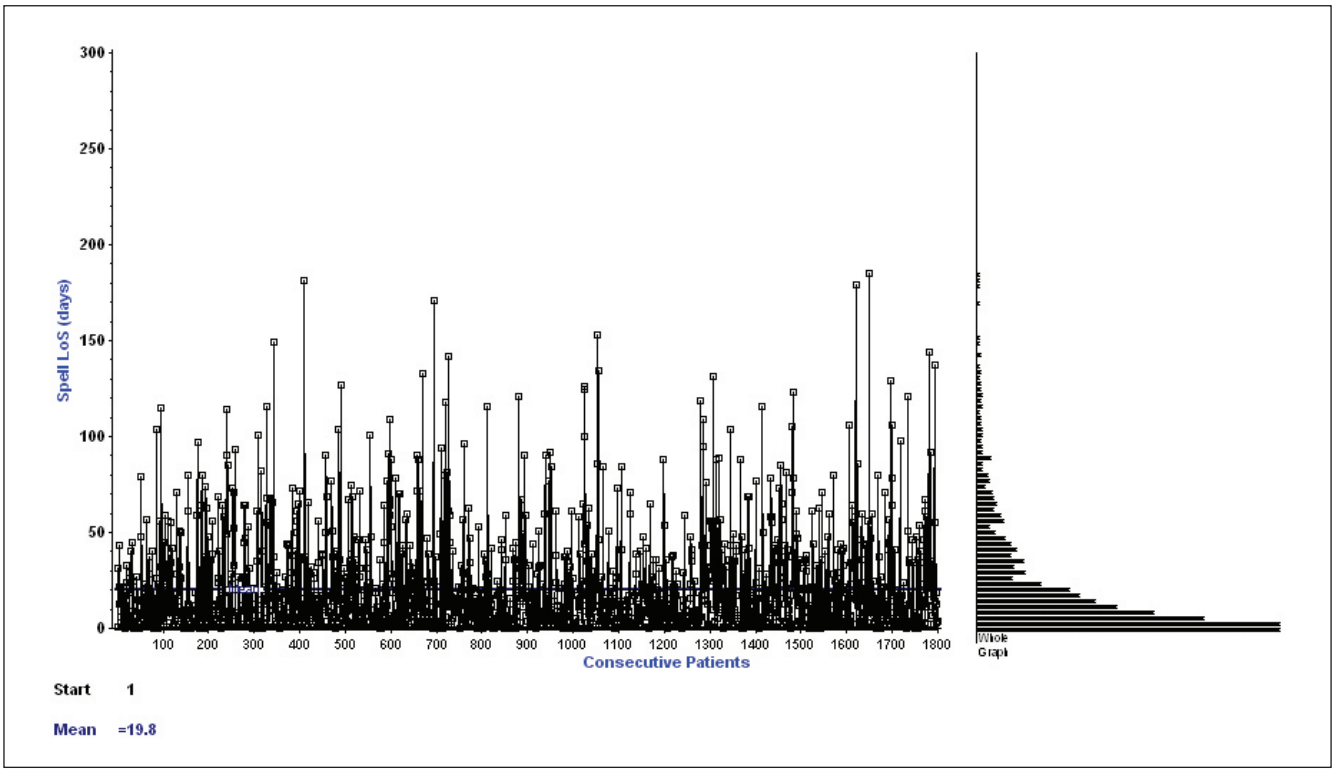
Box 9: Sheffield 'back door': diagnosis and solution design

The problems

The Sheffield team's analysis data for frail older patients admitted to hospital showed that the majority were discharged within a week, and the mode (most frequently occurring) length of stay was 24 hours after admission. However, the data also showed that a few patients could spend months in hospital (see Figure B9.1).

Figure B9.1

(provided by Sheffield Teaching Hospitals NHS Trust)



The control chart for 1,800 consecutive geriatric medicine patients discharged between October and December 2010 and its accompanying frequency distribution chart (right) shows the wide range of variation in the length of stay.

A geriatric medicine consultant analysed the notes of 23 of the 100 patients with the longest lengths of stay. This review highlighted the difference between 'possible' length of stay (based on the first definitive note by a geriatric medicine specialist that the patient was medically fit to be discharged) and 'actual' length of stay. The notes revealed multiple points when the patients could have been discharged. Opportunities were missed partly because the services involved in discharge were unable to respond quickly enough, as a consequence of a mismatch between capacity and varying demand.

As a consequence of delayed discharge, some frail patients deteriorated while others were transferred to other parts of the hospital. These transfers sometimes resulted in vital information being lost, resulting in further deterioration, rework and delay. On average, patients spent four times longer in hospital than was initially estimated by geriatric medicine consultants involved in their care. At a nominal value of £270 a night for a hospital bed, these 23 patients received approximately £470,000 of hospital care that potentially could have been spent on more appropriate care in their own homes or in residential or nursing care.

There was clearly real potential to improve patient flow and the quality of care and to reduce costs or make better use of precious resources.

> *'If we can get the efficiency of older people's healthcare better then I believe that so many of the other dimensions of quality – safety, timeliness, patient-centredness, equity and effectiveness – will drop out. There is enormous opportunity there.'* (Tom Downes)

The solutions

Switching to a model of 'discharge to assess'

The team recognised that getting patients home more quickly required not just earlier assessment and care planning but also work on the discharge process within and beyond the Frailty Unit. This required inter-agency working with the local authority and primary care.

In an early meeting, the team worked with wider stakeholders to map out in detail exactly what happened along the patient pathway. Staff now understood the reasons for delays and lengthy hospital stays.

> *'What we're brilliant at in Sheffield is assessing. The discharge process involved multiple assessments of patients – current and past abilities and forecasts of future abilities. In the Sheffield system, we always kept people in hospital. We sorted out medical care. Then the physios sorted what they needed to, then OT [occupational therapy], then social services… It was a drawn out process – a conveyor belt.'* (Peter Lawson, Clinical Director, Geriatric Medicine)

Changes included segmenting patients. Some were straightforward discharges: once the patient could get up and walk, they were able to go home, helped by their carers. For others, there were concerns that they might not be able to manage at home once their medical treatment was over and they were clinically well.

In the past, the latter group would have been kept in hospital for assessment of intermediate and social care needs, before going home with the appropriate package of care or discharged and then brought back to hospital for assessment. In the new system, patients are discharged once they are medically fit and have an assessment – with the appropriate members of the social care and community intermediate care teams – in their own home. This enables them to access the right level of home care and support much more quickly.

The change has truncated a discharge process of up to two weeks to care packages being put in place directly with the patient at home, enabling the Frailty Unit to reduce length of stay and therefore shortening the overall patient pathway. The 'discharge to assess' process is now being spread to other units within the hospital. While there have been some challenges with the capacity of post-discharge services to deal with the demand from this process, there is consensus that it provides a better model of care and work is ongoing to address this next bottleneck in the system.

4 The impact of the changes so far

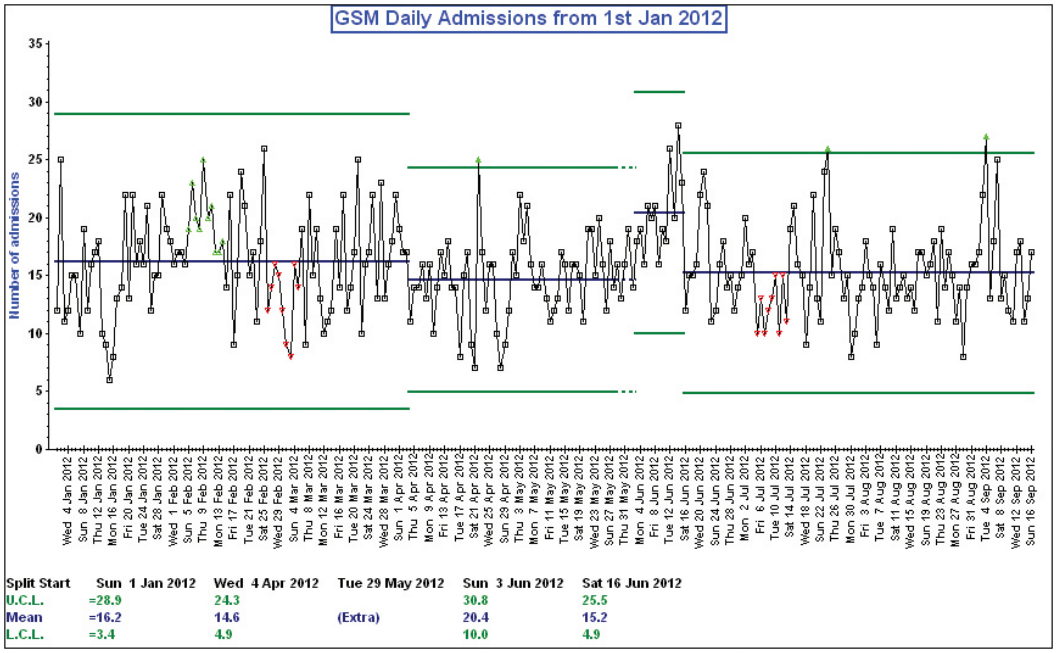
As with any large-scale change in a complex environment where lots of other things also went on during the period of the work, it is impossible to know for sure that the results the organisations have seen were directly caused by the changes made. However, the increased understanding of how their systems operate, combined with robust measurement, has given the teams reasonable confidence that their work has significantly contributed to improvements in quality of care and service efficiency. Even after setbacks in terms of overall results (as has been the case at both sites), the teams have a stronger platform for engaging people in finding the right service response.

Sheffield

The suite of changes implemented in Sheffield's geriatric medicine emergency pathway has resulted in measurable improvements in a triangulated set of key high level measures. The biggest impact has been on the timeliness of assessment and treatment. The earlier in the day that a patient is assessed by the medical team, the more quickly they can get the care they need and be moved towards discharge.

While demand has stayed the same (Figure 2), the changes have enabled the team to achieve a 37% increase in patients who can be discharged on their day of admission or the following day (Figure 3).

Figure 2: Number of daily emergency admissions to geriatric medicine
(provided by Sheffield Teaching Hospitals NHS Trust)



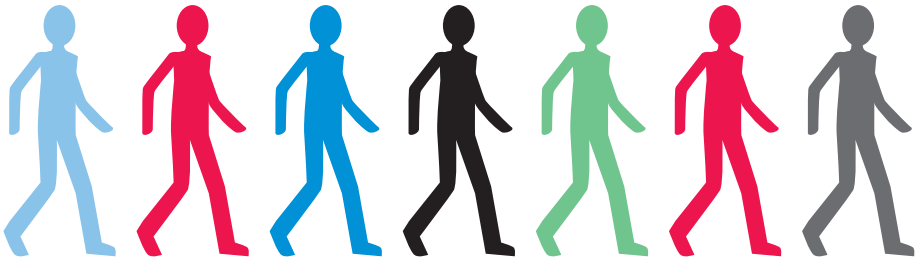
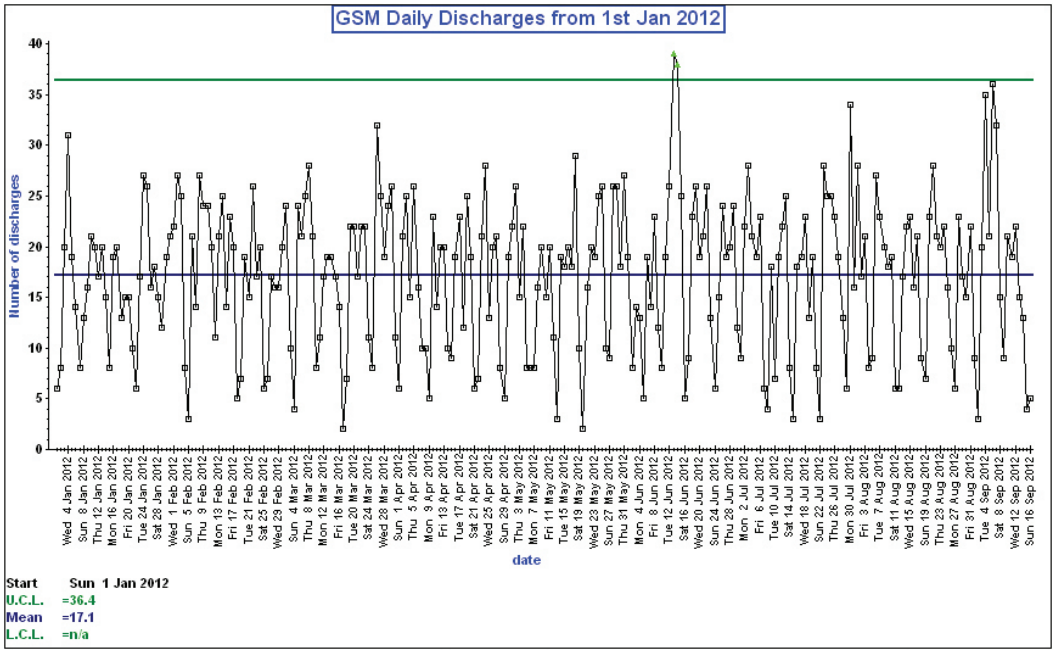
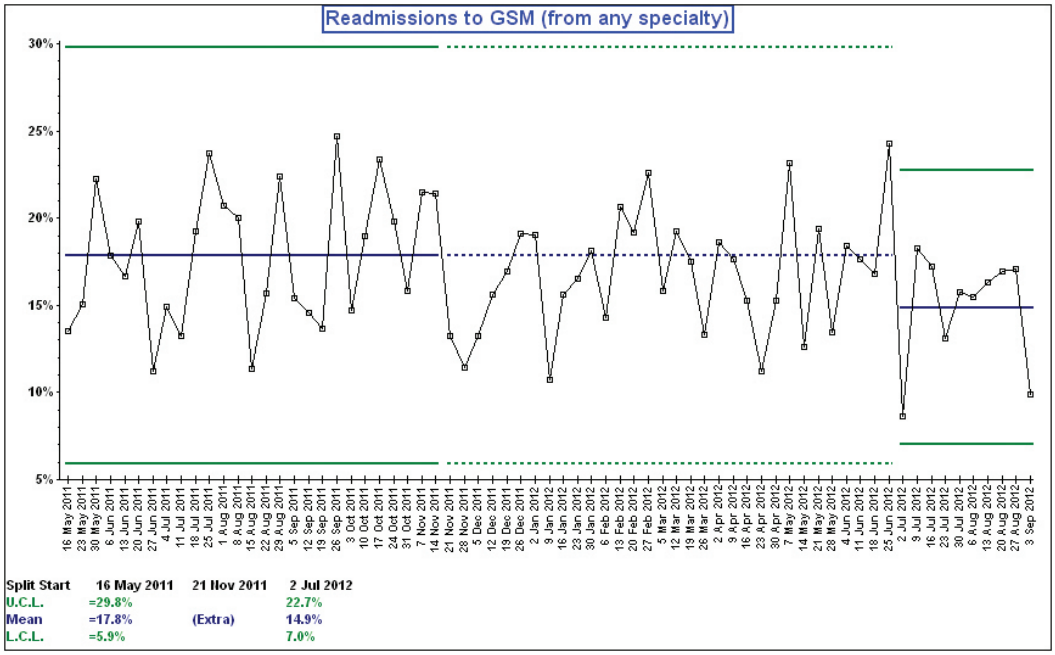


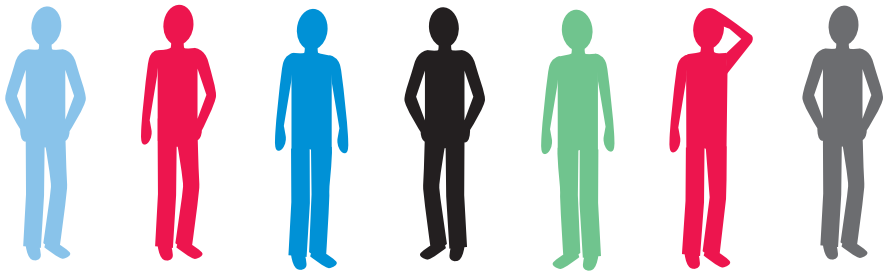
Figure 3: Percentage of patients discharged from the Frailty Unit on day 0 or 1
(provided by Sheffield Teaching Hospitals NHS Trust)



This equates to two additional patient discharges each day. Importantly, there has been no increase in the re-admission rate – an important balancing measure to check that patient outcomes are not adversely affected by speedier throughput (Figure 4).

Figure 4: Percentage of re-admissions
(provided by Sheffield Teaching Hospitals NHS Trust)

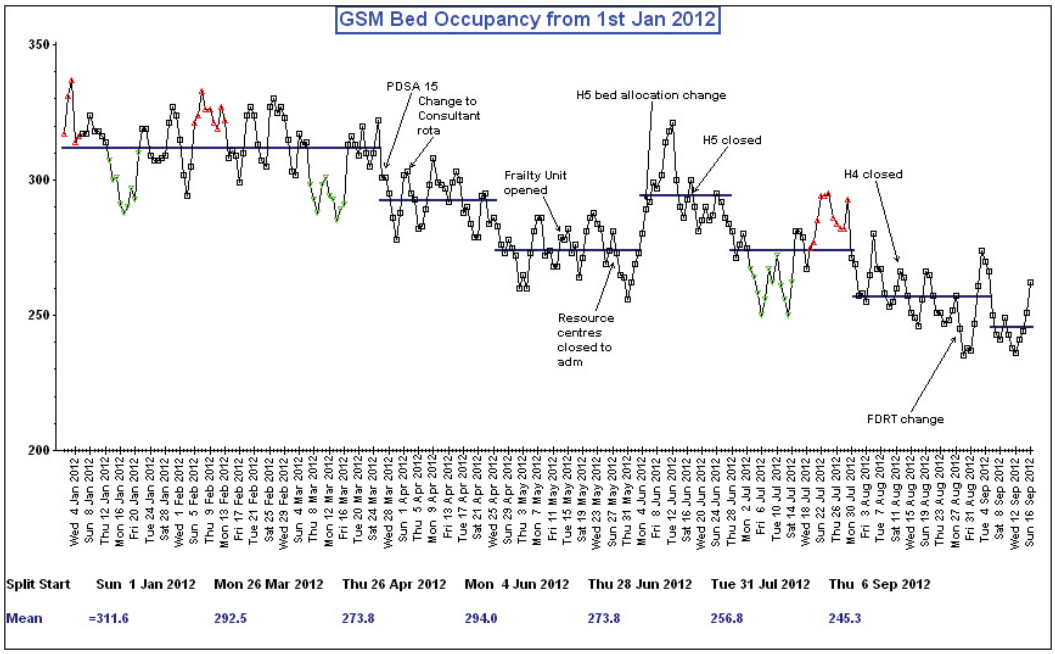




The changes have produced significant results in terms of bed occupancy (the product of the number of admissions, discharges and length of stay (Figure 5)). This has reduced from a mean in January 2012 of 312 (max 337) to a mean in early September of 246 (lowest point 235). During this period the trust was able to close two wards, totalling 68 beds. Without the changes in geriatric medicine, these would have remained open. In addition, one geriatric medicine consultant retired and was not replaced. The cost associated with running a ward is typically quoted at around £1.5m and the full year effect of the financial cost saving/avoidance is therefore estimated to be in the region of £3.2m.

'During the period from June to mid-September, geriatric medicine lived within its allocated bed complement for the first time that we can recall.' (Paul Harriman)

Figure 5: Geriatric medicine bed occupancy rate and associated tests of change
(provided by Sheffield Teaching Hospitals NHS Trust)



'What we've seen here is that we can have a slicker service that is not going to be as expensive to deliver and in fact will give better outcomes for the patients.' (Peter Lawson)

The Sheffield team report that deaths among this patient group (measured in the trust by raw mortality rates) appear to have fallen since April 2012 from a relative constant of 11% (over the past two to three years) to 9.5% (Figure 6). This suggests a relationship between improving patient flow and improving patient safety.

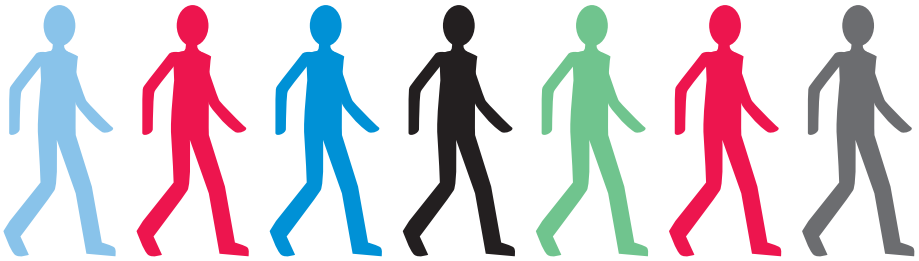
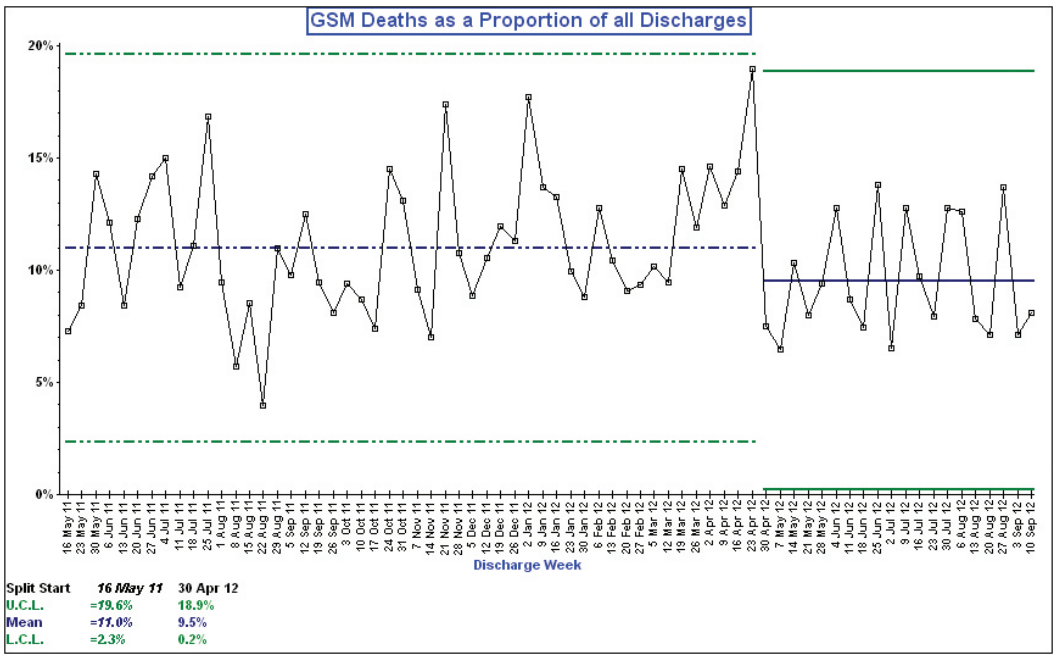


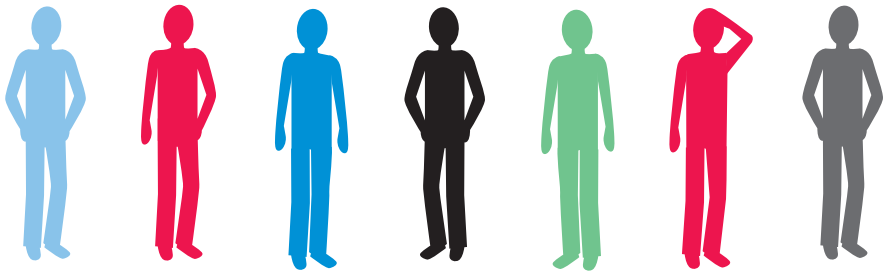
Figure 6: Deaths (emergency geriatric medicine) as a proportion of all discharges
(provided by Sheffield Teaching Hospitals NHS Trust)



During late September the wider health community in Sheffield experienced major problems with patient flow. Patients were unable to access care support in a timely manner and this resulted in increasing delays to discharge, as well as an increase in patients whose admission was for purely social care reasons. This, in turn, had an immediate impact on A&E attendances and their ability to meet the four-hour target.

The hospital never fully recovered from this before the onset of flu, black ice, norovirus and other issues associated with winter, meaning that the bed count returned to previous levels. However, they hypothesise that without the improvements in the earlier part of the year, they would have been in a worse position today.

> *'The Flow Cost Quality work has had a beneficial effect in that we better understand what has caused the system to malfunction and that the teams are now enabled to address the issue across the whole city. We have started to see some of that solution coming on stream.'* (Paul Harriman)

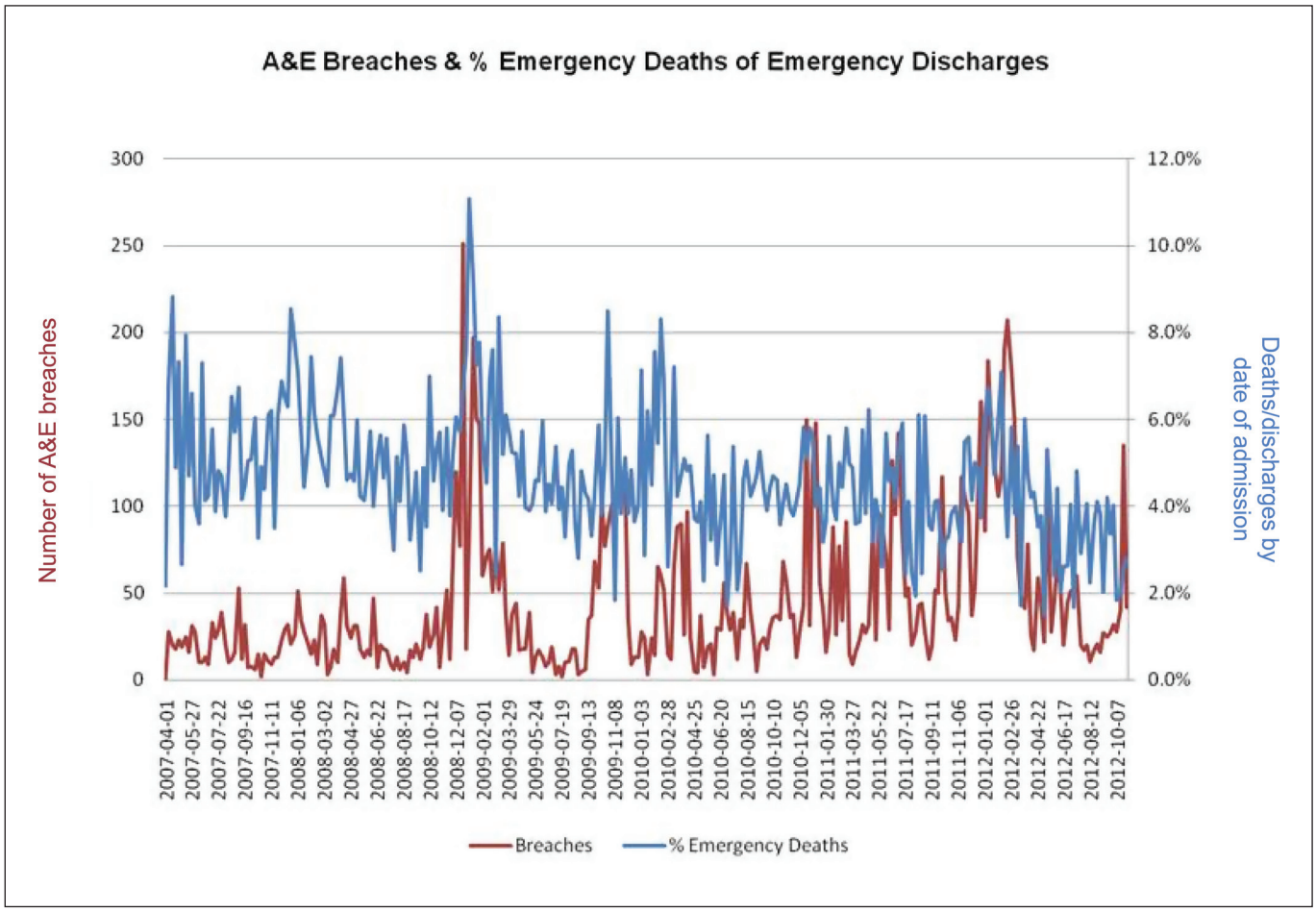


South Warwickshire

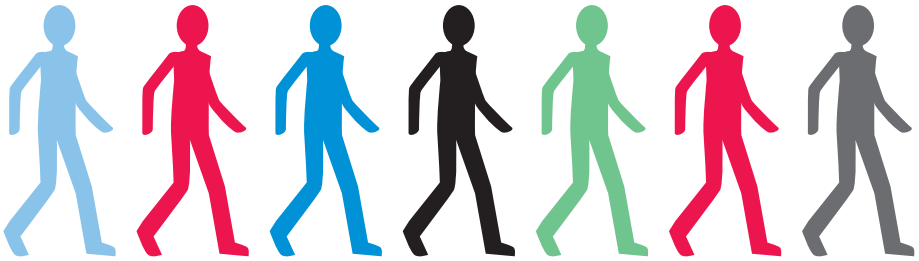
Since the team have been implementing the key changes tested within the project they are beginning to see results at a system level. Despite dealing with an 11.5% growth in emergency admissions over the past year, the trust has managed to maintain A&E performance, and reduce average length of stay and bed occupancy. An apparent 10- to 15-point improvement in raw mortality (as measured by the trust) and high levels of patient satisfaction point to this being a result of improved flow – a more efficient, higher quality system rather than one just pushed to work harder.

Figure 7 is a time-series chart showing A&E breaches (patients spending longer than four hours in A&E) and the death rate for the adult emergency admissions **by their date of admission** (blue line).

Figure 7: Correlation between A&E performance and mortality rate for adult emergency patients*



* These data were subjected to Statistical Process Control methods (Paper accepted by the *International Journal of Healthcare Quality and Assurance* in November 2012 and now in press: 'Does process flow make a difference to mortality and cost? An observational study').



The key points to be noted from the data include:

- There was a reduction in the mortality rate as measured by the trust for emergency patients admitted from June 2008. This corresponds with the implementation of the trust's healthcare-acquired infection control policy.
- There appears to be a non-linear relationship between emergency flow and the subsequent mortality of patients admitted during periods of poor emergency flow. There is an apparently marked relationship between poor flow and mortality in December 2008, September 2009 and December 2011.
- There was no change to the number of emergency patients attending the hospital during the first three years of the five years monitored for this programme.
- The poor flow in December 2008 and December 2011 can be explained by an increase in the proportion of emergency patients over 80 years old admitted in the preceding Novembers. In December there was a reduction in staff availability due to the Christmas holidays which, in 2008, was exacerbated by a flu epidemic that affected both patients and staff.
- Some staff thought that the deterioration in A&E performance and the spike in mortality in September 2009 was associated with the closure of a 40-bed community hospital. It was suggested that removing this 'storage capacity' from the health and social care system without first improving flow for these patients destabilised the entire emergency flow. However, following more detailed analysis of the change to flow, some stakeholders identified that other changes to the system were more likely causes of increased length of stay and the resultant poor flow. The introduction of the Continuing Healthcare Checklist† and the new assessment process was a lengthier process. There was also an increase in patients requesting assessment for Continuing Healthcare funding. This resulted in a growing backlog of patients for assessment and a subsequent increase in length of stay.
- Implementation of changes to improve flow, cost and quality began in April 2010. In May 2012, there was a statistically significant change (based on SPC analysis) in the pattern of the mortality rate. This was due to an increase in the proportion of younger patients (16 to 64 years) being admitted, which reflected an improvement in emergency flow and a fall in emergency bed occupancy. Freed-up beds allowed clinicians to reduce the clinical risk for younger patients (such as those presenting with potential deep vein thrombosis or pulmonary embolism) by admitting and keeping them on the MAU until diagnostic results were back.

In terms of efficiency and cost, these achievements have meant that the trust has been able to treat more patients without increasing the overall bed base. However, it was not possible to carry out plans to close winter capacity due to the growth in emergency admissions.

† https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/127200/NHS-CHC-Checklist-FINAL.pdf.pdf

5 Key lessons from the Flow Cost Quality programme

5.1 Improving flow

A number of lessons about how to improve flow have emerged from the Flow Cost Quality programme. These are important to both executive and clinical leaders within health and social care organisations.

Working on flow is crucial

The work undertaken as part of the Flow Cost Quality programme demonstrated that poor flow increases the likelihood of harm to patients. System-level measures at both sites showed an apparent correlation between poor flow and mortality, and the trusts are seeing a reduction in mortality as they improve flow. Focusing on patient flow in health and social care systems is crucial to reducing avoidable harm and deaths.

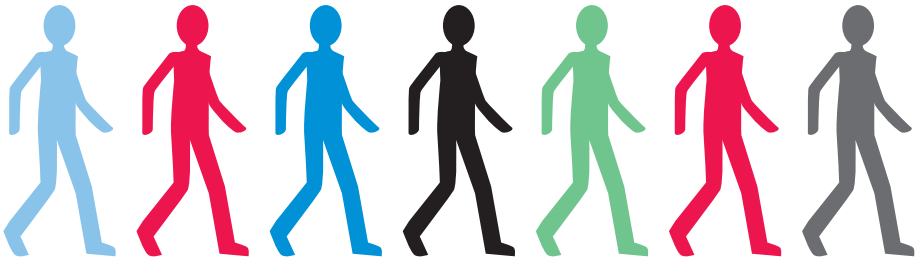
Poor flow also increases healthcare costs. The programme demonstrated a correlation between poor flow and higher costs. Many current systems and processes waste precious resources, including skilled staff time. Improving flow reduces delays and waste, which can reduce lengths of stay, bed occupancy and re-admissions, as well as improve patient and carer experience. Looking at problems and potential solutions within health and social care systems through the 'lens' of patient flow will help not only to improve the efficiency of care processes, but also the quality of the overall system.

Measurement and analysis is key

Data and measurement are key to making a 'diagnosis' of the system, but the pervasive method of using comparative data (year-to-year or organisation-to-organisation), particularly at board level, is not adequate for the task. The data needed to diagnose problems with patient flow may be available, but extracting it from established IT systems and interpreting it correctly can be problematic. There needs to be a shift from comparative data to presenting it in time series and using statistical methods in its analysis. This will enable the understanding of where the problems lie and the impact of interventions both internal and external to the organisation.

South Warwickshire in particular benefited from developing and using new system-level measures in this way. Plotting deaths by date of admission (rather than the traditional way by date of discharge) revealed a relationship between poor flow and clinical outcomes. When the emergency flow was poor (as indicated by breaches of the A&E target), the death rate increased. This enabled the team to monitor the impact (intended and unintended) of the changes they made to care processes on these crucial measures of system performance. They also found that what happened in A&E became a 'temperature check' for flow within their whole system.

The two sites also learned that being open and transparent with data increased staff engagement, while rigorous measurement and analysis enabled people to learn from both success and failure of tests and changes. However, this required the development of more sophisticated measurement skills for analysing data and using statistical methods.



Involve stakeholders 'up and down stream' to identify problems

Improving flow requires seeking out and addressing underlying system constraints rather than dealing with individual 'problem' departments (such as A&E) who are, in fact, experiencing the symptoms of poor flow within the wider system. This requires a real focus on understanding how the system operates as a whole.

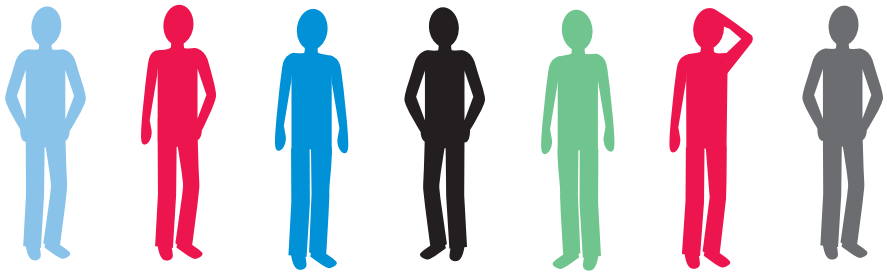
Improving flow will involve redesigning processes that cross professional, departmental and organisational boundaries, so the participation of many different stakeholders is needed. Each will bring different perspectives, motivations and expertise, and all have a limited view of the whole system, based on their particular role or function. At a basic level, any group which has an impact on, or which is impacted by, the process being worked on needs to be involved. Both trusts learned the value of engaging a wide range of stakeholders in their work, including those 'upstream' of the hospital process (primary care, ambulance service) and those 'downstream' (intermediate and social care). This facilitates an 'end-to-end' view of patient pathways and greater insight into the impact (intended and unintended) of changes made.

Good quality data and using recognised process change methodologies, such as those employed by the Flow Cost Quality programme, help to ensure a consistent, shared approach to understanding problems and working on potential solutions.

Use a combination of changes

The teams found that using a combination of changes was needed.

- Redesign of flows in and out of hospital, including consideration of:
  - GP referrals – emergency patients contacting their GPs in the morning may not be called or seen until midday. This adds delays to any onward health or social care required
  - transport – demand for emergency transport peaks from midday onwards. Patients requiring ambulance transport (as defined by their GP or carers) are delayed by the prioritisation process. They may not arrive at hospital until the late afternoon
  - social services.
- Patient assessment and care planning within the hospital should be in real time: this needs process redesign, pooling of consultant and junior doctor capacity, and services (including diagnostics and pharmacy) provided from 8am to 8pm, seven days a week.
- Merge flows where the process, skills and equipment required are the same (eg emergency attendance and outpatient referrals for geriatric medicine), rather than creating artificial pockets of capacity which are not linked to overall service flow. This should mean that patients go to the most appropriate service straight away, rather than finding ways to access emergency service capacity because of the waiting time for a 'routine' response from the same service.



- Improve the turnaround time and reliability of core, repeated processes that govern the overall rate of flow through inpatient and outpatient care including:
  - ward rounds
  - diagnostic tests
  - pharmacy
  - discharge.
- Create 'pull' systems for post-discharge services. Rather than 'pushing' patients into a queue to wait for the next step in their care, available resource should 'pull' the patients towards them. Examples from the programme include nursing and residential homes with free beds contacting hospital discharge teams for more patients and the 'discharge to assess' process.

Although the problems and changes outlined above come from the findings of the South Warwickshire and Sheffield hospital systems, similar patterns have been observed elsewhere (for example, in the hospitals taking part in the emergency services collaborative in the UK) and are well documented at Flinders Medical Centre in Adelaide, Australia. See the Appendix for details.

> *'Patient flow would be most improved by health and social care services being provided between 8am and 8pm, seven days a week, 365 days a year. There is minimal emergency demand after 6pm. The majority of the demand arriving at hospital after 6pm is a result of a 'distortion' in demand caused by prioritisation in primary care and ambulance service upstream of the hospital. It is quite possible for every emergency patient to be assessed, diagnosed and a plan for care established by a consultant within four hours of arrival at hospital. As a consequence, the vast majority of emergency patients could be safely moved to their next point of care, home or in hospital by 10pm.'*
> (Kate Silvester)

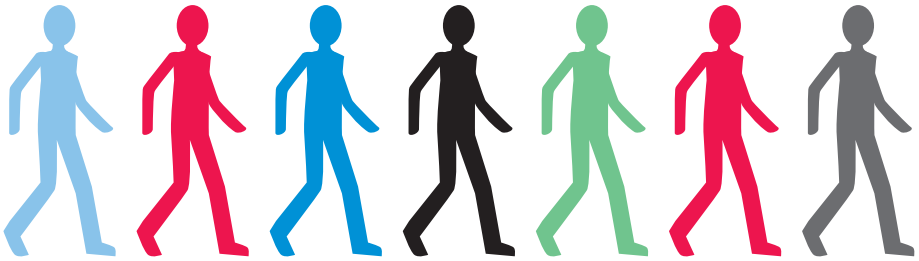
5.2 Wider implications of reorganising services to optimise flow

Change thinking about how organisations work

Both trusts learned that where the 'symptoms' of flow occur is not necessarily where the problem is, and that they needed to work up and down stream of organisational boundaries to optimise flow.

Organising healthcare systems into organisational and departmental silos contributes to poor flow. Rather than optimising the utilisation of individual units in the system, there needs to be a focus on optimising the flow of patients through the system. True capacity constraints (ie average capacity not meeting average demand) are rare. The key issue is the mismatch between variations in capacity and the largely predictable variations in demand. Using the principle of 'doing today's work today', we can understand and manage variations in demand, and match capacity to meet it.

> *'Sheffield Teaching Hospitals NHS Trust is a big organisation with 13,500 employees in over 70 professions. The system's engineering principle of breaking the organisation into smaller components, not by function*



(ie traditional organisation structure) but by identifying fractals of the "flow level" proved invaluable. This reflects learning from manufacturing, where factories and their supply chains are managed as value-streams that serve particular customers with particular needs. This principle of lean thinking has the advantage of bringing staff from different functions together to focus on the one thing that matters to them all: the patients in their care.' (Kate Silvester)

Understanding overall impact on cost

Most accounting systems encourage individual departments and functions to reduce their individual capacity and costs. This unwittingly creates constraints and additional costs to the system as a whole. The cost of managing any subsequent backlog or queue is borne by the departments or organisations upstream of the constraint, instead of by the department causing it. There needs to be a shift in focus from reducing unit costs to improving the productivity of end-to-end processes. Changing the paradigm from utilisation of resources to flow between resources also means changing the financial paradigm and how costs are accounted for within the system, from 'economies of scale' to the 'economies of flow'.

The programme highlighted the need to maximise the value of staff costs. Staff should be seen as assets rather than costs and there needs to be an understanding of the skill mix required to support high quality flow. Splitting tasks, so they can be undertaken by 'cheaper' staff, can make overall flow less efficient by increasing the number of process steps and therefore increasing risk and errors.

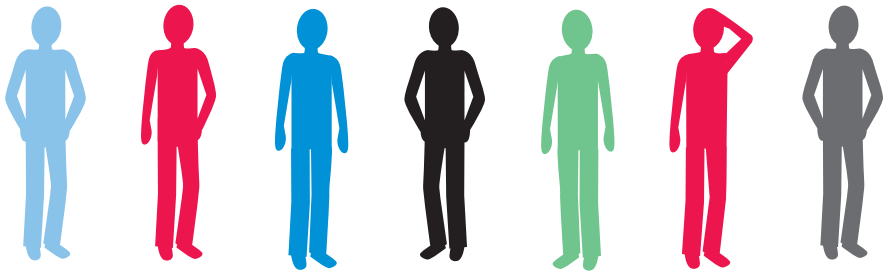
Around 22% of staff account for 50% of salary costs (an estimated £33bn per annum). This brings some challenges in ensuring that the value of senior medical, managerial and executive staff is maximised. The availability and productivity of senior clinical decision makers throughout the health and social care system needs to be improved, and there should be a focus on the productivity of managerial processes: on what adds most value to patients and taxpayers.

Apply the 'flow lens' to all aspects of an organisation

Many support systems do not facilitate the focus on flow. Policies governed by support functions, such as HR, finance, IT, estates and procurement, can inadvertently constrain the flow of patients, staff, information and supplies, causing variations in capacity and the mismatch between those variations and the predictable variations in demand. These factors need to be addressed in parallel with clinical care processes if change is to be sustainable and adopted organisation wide.

Managing complex change

Many of the key insights and lessons from the Flow Cost Quality programme are not new but contribute to the growing body of knowledge and understanding on managing complex, large-scale change in health and social care. Some of these lessons remain hard to act upon in a heavily performance-managed culture, where there is pressure to provide immediate solutions.



Generating the will for change

Both trusts found that focusing on the real experience of patients was a key driver for change. Highlighting the impact of poor quality systems on individuals gave meaning to the work on improving flow.

The teams used multiple approaches to keep focused on patient experience, including following patients through their journey of care, starting project meetings with a patient story, and involving patients in the evaluation of changes. The Sheffield team also created 'George', a fictitious frail older patient. 'Designing for George' helped them ensure that the changes they made to services and care processes were centred on the patient rather than on the professionals.

Combining patient stories with a deep analysis and understanding of data proved particularly powerful in engaging clinical staff. A focus on data enabled staff to 'see' their invisible processes and systems, including the apparent relationship between poor flow and the death rate within the hospital. This was key to engaging staff and galvanising change. Using data and proven improvement techniques, such as process mapping, also enabled staff to identify the waste in their system. Engaging people in understanding the problems increased their ownership of solutions.

Together, a deeper understanding of patient experience, error and waste in the system and the relationship between poor patient flows and mortality helped build a 'burning platform' and generate the will to change the system. A clear, shared purpose enabled managers and clinicians to work together and helped facilitate potentially difficult changes for staff, including new ways of working and changes to job plans and rotas.

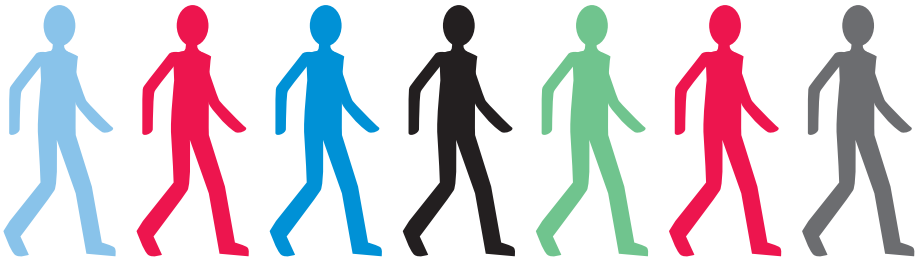
Building capability

Improving flow requires organisations to build internal capability in problem solving, data analysis and improvement methods. For both sites, helping staff to identify and make improvements themselves enhanced ownership of change. This was particularly true for nursing staff who often have a preference for more concrete, pragmatic thinking. Giving them the skills to identify where they thought the problems were and measure them helped engage them in the work.

The sites also found that the improvement skills required by clinical staff and managers were best learned in real time as they 'worked on the work'. However, the level of expertise needed to provide high quality coaching of staff may not currently exist internally, or be easily available from an external source as it was for the teams participating in the Flow Cost Quality programme. Within the current financial climate, the NHS faces a challenge in developing the capability in systems thinking, data analysis and improvement practice needed to work on flow on a large scale.

Context and culture

The two trusts brought different strengths and attributes to the programme and each employed a different approach to the work. South Warwickshire adapted the improvement methods of the programme into a more traditional programme management structure that worked well for their level of executive and clinical engagement. Sheffield took a more emergent approach, identifying clinical champions from 'the shop floor' and utilising the Oobeya process to engage wider stakeholders. They found that making involvement voluntary was a powerful way of increasing staff ownership.



The size of the two trusts had an impact as well as their different organisational cultures. As a small district general hospital, South Warwickshire was able to take an organisation-wide approach to improving flow, whereas Sheffield's size and dual site structure meant it needed to choose where to start the work. Emergency care of the frail elderly was critical within their system and enabled them to focus on maximising improvements and learning.

Different improvement structures and approaches will suit different contexts and cultures – there is no 'one size fits all'. Organisations need to be honest about their strengths and weaknesses, and employ an improvement approach that works for them. However, there are a number of key principles that are important whatever the approach.

- Leadership is key, whether from the top or distributed through different levels of the organisation and professional groups.
- Relationships are important. The involvement and participation of multidisciplinary teams and wider stakeholders, including primary care and social services, is essential to both understanding the system and identifying solutions to its problems.
- Service improvement needs an adaptable, participative process with real-time measurement and feedback loops.
- Staff require time and improvement expertise to make successful, sustainable change.

Achieving impact takes time

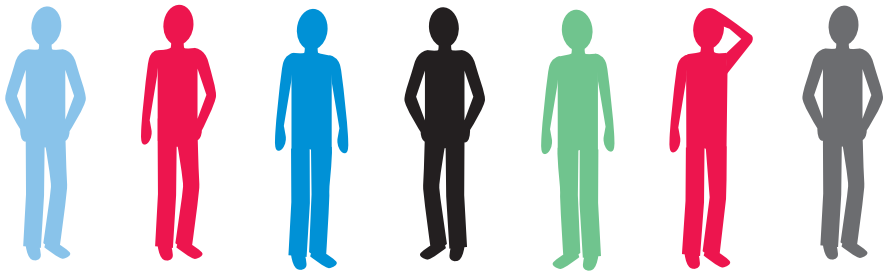
The Flow Cost Quality programme demonstrated the need to recognise that multi-strand system improvement is complex and will take time to achieve results. Despite some initial 'quick wins', the time taken to see real change at a system level was two to three years for both sites and continues. There are no quick fixes. Solutions cannot be 'dropped in' from elsewhere. Each trust had to spend time analysing and really understanding their own system to identify the real problem areas and unlock the bottlenecks.

Involving the range of clinical staff, managers and other stakeholders needed to make system-level change also takes time. However, using tried and tested improvement methods, including small-scale testing, helps to facilitate large-scale change by building confidence and increasing staff engagement.

What remains an issue for leaders within the health and social care system is how to marry the reality of complex, large-scale change with the continued pressure to meet new challenges and deliver rapid results.

A system approach for executive leaders

Quality, efficiency and cost have traditionally been the domain and responsibility of different executive roles within NHS organisations. The learning from this programme reinforces the argument that these elements are inextricably linked and underlines the imperative for executive leaders to work on them together, as a team, taking a whole-system view of both problems and solutions. This teamwork also contributes to developing a high reliability system, with the consistency of decision making and standardised operating procedures that help reduce errors and harm.



5.3 Conclusion

The ongoing challenge in relation to improving flow, cost and quality is to understand what changes need to be made to existing structures, work processes and culture in order to improve patient flow through the whole health and social care system, enhance the quality of patient care **and** maximise the value of precious resources.

The Flow Cost Quality programme has demonstrated that there needs to be a combination of understanding a number of interdependent system-spanning flow challenges, and then redesigning specific processes.

The ideal future state would see the capacity of every functional service and associated staffing levels matched to meet variations in demand. In many cases, doing today's work today is not enough: the aim should be to do this hour's work this hour. While the ideas explored in this programme have been around in the NHS for some time, providers should challenge themselves about how far they have given the potential of improving flow the attention and support it deserves. To do so could help address some of the most pressing financial and quality imperatives facing the health service.

Appendix: References and further reading

Other programmes working to improve flow

Programme	Citation
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Esther Project in Jönköping, Sweden	Improving Patient Flow: The Esther Project in Sweden. Boston: Institute for Healthcare Improvement; 26 July 2011. (Available at: www.ihi.org/knowledge/Pages/ImprovementStories/ImprovingPatientFlowTheEstherProjectinSweden.aspx)
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NHS Modernisation Agency's Action On programmes	See, for example: *Action On General Surgery: Good Practice Guide* (Gateway Ref: 4645). Leicester; NHS Modernisation Agency; 2005. (Available at: www.institute.nhs.uk (password required)).
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Intermountain Healthcare, Wyoming	James BC, Savitz LA. How Intermountain trimmed health care costs through robust quality improvement efforts. *Health Aff (Millwood)*. 2011;30(6):1185-91. Available at: (http://content.healthaffairs.org/content/early/2011/05/17/hlthaff.2011.0358.abstract)
Flinders, Adelaide, Australia	Ben-Tovim DI, Bassham JE, Bennett DM, et al. Redesigning care at the Flinders Medical Centre: clinical process redesign using 'lean thinking.' *Med J Aust* 2008;188(6 Suppl):27-31. (Available at: https://www.mja.com.au/journal/2008/188/6/redesigning-care-flinders-medical-centre-clinical-process-redesign-using-lean)

Further reading

Websites

The Health Foundation
www.health.org.uk/

Healthcare Value Network – www.createvalue.org/delivery/hvn/

Institute for Healthcare Improvement – www.ihi.org/Pages/default.aspx

Lean Enterprise Academy – www.leanuk.org

NHS East Midlands The Improvement Network – www.tin.nhs.uk/tools-techniques

NHS Improvement – www.improvement.nhs.uk

NHS Institute for Innovation and Improvement – www.institute.nhs.uk

NHS Scotland – www.scotland.gov.uk/Resource/Doc/76169/0019037.pdf and www.clinicalgovernance.scot.nhs.uk/section2/redesign.asp

NHS Wales 1000 Lives Plus – www.1000livesplus.wales.nhs.uk/

The King's Fund – www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/leadership-for-engagement-improvement-nhs-final-review2012.pdf

MIT and The Beer Game http://en.wikipedia.org/wiki/Beer_distribution_game

Books

A practical guide to mapping hospital processes:

- Baker M, Taylor I, Mitchell A. *Making Hospitals Work*. Lean Enterprise Academy, Goodrich, UK; 2009.

A great reference for tools and techniques:

- Bicheno J. *The Lean Toolbox for Service Systems.* Buckingham: PICSIE Books; 2008.

Another good reference for tools and techniques:

- Bicheno J and Holweg M. *The Lean Toolbox: The Essential Guide to Lean Transformation.* (4th ed) Buckingham: PICSIE Books; 2009.

A great overview of improving NHS systems and the logic of doing so:

- Fillingham D. *Lean Healthcare.* Kingsham Press: UK; 2008.

A novella explaining the Theory of Constraints but can be cumbersome to read so it is always good to google 'theory of constraints', 'drum buffer rope', and 'Goldratt' for the summary messages of this publication:

- Goldratt E, Cox J. *The Goal.* Gower Press (2nd ed); 1999.

A popular read on the logic and application of improvement methods:

- Graban, M. *Lean hospitals*. London: Productivity Press; 2010.

A good explanation of the 'business' model of improvement:

- Grunden N. *The Pittsburgh Way to Efficient Healthcare*. New York: Productivity Press; 2007.

A good read and introduction to the A3 format for learning and improvement:

- Jimmerson C. *A3 Problem-solving for Healthcare*. New York: Productivity Press; 2007.

A good practical exposure to mapping processes:

- Jimmerson C. *Value Stream Mapping for Healthcare Made Easy*. New York: Productivity Press; 2009.

A guide to improving system performance for the next generation of managers:

- Joiner B. *Fourth Generation Management*. New York: McGraw-Hill; 1994.

A good overview of an exemplar provider that has imported lean manufacturing methods:

- Kenney C. *Transforming Healthcare: Virginia Mason Medical Center's Pursuit of the Perfect Patient*. New York; 2010.

The touchstone for learning and improvement – a really good read:

- Kolb DA. *Experiential learning. Experience as the source of learning and development*. New York: Prentice Hall; 1984.

Does exactly what it says in the title. A nice summary read:

- Langley J, Nolan K, Nolan T, Provost L. *The Improvement Guide*. San Francisco: Jossey-Bass; 2009.

An interesting book which will make you reflect on your leadership styles and the principles you promote across your organisation and pathway:

- Liker JK. *The Toyota Way*. New York: McGraw-Hill; 2004.

An influential publication which is British in focus:

- McNulty T, Ferlie E. *Reengineering Healthcare: The complexities of organisational transformation*. Oxford: Oxford University Press; 2004.

A good reader to accompany the Cindy Jimmerson publications and Liker's *Toyota Way*:

- Moen R, Nolan T, and Provost, L. *Improving Quality Through Planned Experimentation*. (3rd ed). New York: McGraw-Hill; 2012.

For readers who want to know the source of the lean systems this is the book to go for – Ohno formalised the Toyota approach which became known as lean:

- Ohno T. *The Toyota Production System: Beyond Large-Scale Production*. Portland, Oregon: Productivity Press; 1988.

A book that offers reflections on change and how to get it to stick:

- Rich N, Bateman N, Esain A, Massey L, Samuel D. *Lean Evolution, lessons from the work place*. Cambridge: Cambridge University Press; 2006.

A very practical (albeit car part manufacturing based) approach to mapping processes:

- Rother M, Shook J. *Learning to See: Value Stream Mapping to Add Value and Eliminate Muda*. Cambridge, MA: Lean Enterprise Institute; 1999.

A book that will challenge your thoughts and view of management in a big way. It offers good recommendations in terms of how managers should embrace the improvement process:

- Seddon, J. *Freedom from Command and Control*. Buckingham: Vanguard Education Ltd; 2003.

An old but a good read for change managers. This book also provides a small insight into system dynamics (poor information systems associated with the 'Bull whip' demand effect). The popular version of this system problem is known as 'The Beer Game' (http://maaw.info/TheBeerGame.htm) and is highly relevant to the provision of healthcare services:

- Senge P. *The Fifth Discipline. The art and practice of the learning organisation*. London: Century Business Press; 1990.

A good read for change managers:

- Spear S. *The High-Velocity Edge: How Market Leaders Leverage Operational Excellence to Beat the Competition*. New York: McGraw-Hill; 2009.

The keystone text and a 'must read' for any service improver:

- Womack J, Jones DT. *Lean Thinking. Banish the waste and create wealth in your corporation*. London: Simon and Shuster; 1996.

The original findings which proved lean systems outperformed traditional management systems:

- Womack J, Jones DT, and Roos D. *The machine that changed the world*. New York: Rawson Associates; 1990.

A good insight into service improvement:

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The improvement science blog – www.saasoft.com/blog/

Information training for NHS Managers – www.kurtosis.co.uk/

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Discussion paper by John Darlington and Daniel Jones:

- www.leanuk.org/downloads/LS_2010/paper_lean_business_case.pdf

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- www.saasoft.com/blog/?p=2263

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- http://www.saasoft.com/jois/jois_view_abstract.php

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90 Long Acre
London WC2E 9RA
T 020 7257 8000
F 020 7257 8001
E info@health.org.uk

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