

Learning from Pathology Service Improvement Pilot Sites and Improvement Examples

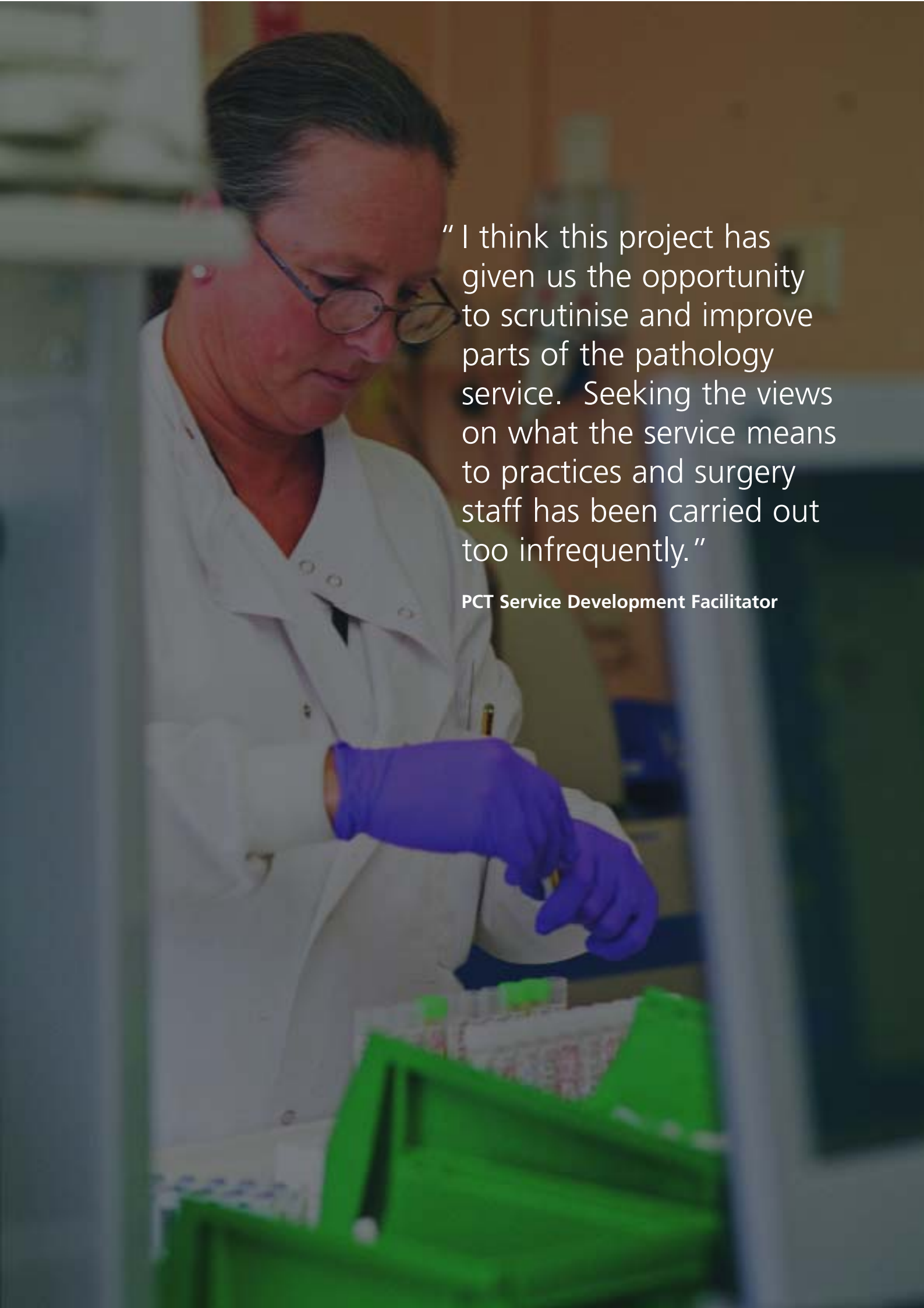
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A woman with glasses, wearing a white lab coat and purple gloves, is focused on her work in a laboratory. She is looking down at a tray containing several small vials. The background is slightly blurred, showing a typical lab environment with shelves and equipment.

“ I think this project has given us the opportunity to scrutinise and improve parts of the pathology service. Seeking the views on what the service means to practices and surgery staff has been carried out too infrequently.”

PCT Service Development Facilitator

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Foreword

Pathology service improvement has played a key role in the Department of Health's Modernising Pathology Programme. The National Pathology Service Improvement Team has helped to raise the profile of pathology and provided practical support across the NHS to put in place key improvements in laboratories.

The Team's work with the six pilot sites funded by DH to implement the tools and techniques of pathology service improvement in laboratories has developed vital learning for other pathology services. Their work - set out in this report - shows that service improvement in pathology delivers effective change and supports an improved service for patients and benefits for staff.

Pathology has an important role to play in delivering improved choice and a more convenient health service for patients. The practical learning in this report is a key tool in bringing that about.



Dr Ian Barnes

National Clinical Lead for Pathology, Department of Health

1. Executive summary

The pathology service improvement pilot sites set out on a journey to test service improvement and Lean principles across the whole patient pathway. The pilots were funded by the Department of Health to test improvements over a period of 12 months starting in April 2005.

The key principles of the work were to compress time, reduce turnaround times, reduce the steps that add 'no value' to the patient, maximise staff skills and use technology effectively. The focus was to meet the needs of patients and clinical users.

The learning demonstrates that:

- achievements can be made rapidly, for little or no cost, demonstrating immediate results that motivate others to accelerate the pace of change, and deliver significant efficiency gains

Examples in this document include:

- **releasing 1.5 hours** per week of non productive time by reduced staff motion
- **50% reduction** in average sample processing times, by reducing batching of specimens and introducing one piece flow
- **50% reduction** in phone calls in specimen reception
- **36% increase** in number of samples labelled per hour
- **66% reduction** in processing times in histopathology
- **releasing 2.5** consultant sessions per week in histopathology
- **100% of patients seen in 20 minutes** by introducing Point of Care Testing (POCT)

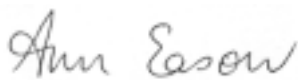
Service improvement should not be seen as a one off improvement initiative that ticks a box to satisfy objectives. Equally it must not be something that is 'done to' teams, where those with improvement skills walk away without leaving a 'legacy of learning' to support continuous improvement. The improvement philosophy needs to be part of the organisational culture, that gives pathology staff:

- skills they can use in their everyday working life
- an opportunity to learn by doing
- the ability to continually look to improve flow by removing waste
- a patient focused approach to service provision

Whilst Lean Improvement is the methodology of choice for pathology, it will not replace the need for organisations to focus on a sound implementation strategy based around the key success factors of:

- effective clinical leadership and executive support
- involvement of ALL pathology staff
- investment in dedicated time out, to reap huge rewards

We hope you find the examples of improvement and learning useful.



Ann Eason
National Manager
Pathology Service Improvement



Lesley Wright
Associate Director
Diagnostics

2. Introduction

Why service improvement?

The DH publication, *Modernising Pathology Services* (Feb 2004), recognises the role service improvement and redesign has to play in providing modern pathology services. Such services should be responsive to the challenges posed by new scientific and technical developments, changing practice and patient expectations.

The core principles of service improvement are to:

- ensure the patient is at the heart of the service
- streamline processes by eliminating non-value adding steps
- utilise staff skills appropriately
- maximise the use of technology

The pathology service consists of a series of processes essential to provide value for patients and clinical users. To maximise value and eliminate waste, it is important to fully understand the process. Value must flow across the entire pathway, ensuring the needs of patients and users are met.

To ensure patients flow through the system, whilst receiving quality and timely care, it is essential pathology services are fully integrated, performing the appropriate test, at the right time, in the most appropriate location to ensure results influence clinical decision making.

Service improvement tools and techniques as rigorously applied by the pathology service improvement pilot sites have resulted in:

- patient focused pathology service provision
- lean processes that ensure clinical excellence is supported by process excellence
- timely and reliable services
- appropriate utilisation of staff
- increased cost effectiveness
- improved efficiency and service flexibility
- optimised use of capacity

Key factors for successful service improvement

Leadership and strategic support

Experience from all previous service improvement initiatives has taught us that success is dependent upon strong effective leadership and strategic support. The commitment must start at the top of the organisation and involve a whole system redesign. This is also true for pathology. The process of improving pathology services cannot be achieved by the purchase of technological solutions alone. Strong commitment, inspiring and motivating leadership are crucial to support effective initiatives that build and create sustainable change. Leaders must be prepared to challenge the culture of their organisation encouraging staff to behave differently, test ideas for change and believe in newly created processes thus gradually allowing the service to evolve.

Protected time out

Equally important, is the opportunity to provide sufficient protected time out to give staff the opportunity to test and implement change. Sacrifices made in quality time out is a small investment that needs to be made, compared to the potential gains that can be made to reap the rewards for the future.

Finally, we cannot solve the problems by looking at data alone and theorising about a solution. We need to fully understand the actual situation, identify the root cause and implement the correct solution.

3. Background to project

Pathology teams in England were given the opportunity to bid for funding to become one of six pilots, to test service improvement techniques.

Successful sites were expected to:

- map each pathology discipline
- develop and implement an action plan
- demonstrate reduced turnaround times, from decision to test to result
- measure capacity and demand at key points across the pathway ensuring optimum use of pathology services
- develop clear protocols and systems to ensure effective management of demand
- evaluate patient choice in pathology to improve certainty for patients who wish to use pathology services
- review the use of technology in improving pathology services
- evaluate the role of point of care testing in provision of local pathology services
- demonstrate changes in skill mix
- share learning nationally
- submit monthly progress report and present progress to the National Pathology Oversight Group on a regular basis

Project commenced April 2005 for a period of 12 months

4. Pilot sites

Blackpool, Fylde and Wyre Hospitals NHS Trust

Whinney Heys Road, Blackpool, Lancashire. FY3 8NR

Calderdale & Huddersfield NHS Trust

Huddersfield Royal Infirmary, Acre Street, Lindley, Huddersfield HD3 3EA

Coventry & Warwickshire Pathology Network

University Hospitals Coventry & Warwickshire NHS Trust
South Warwickshire Acute NHS Trust
George Eliot Acute NHS Trust
Department of Pathology, Walsgrave Hospital, Clifford Bridge Road, Coventry CV2 2DX

Partnership Pathology Services - A joint venture between Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

c/o Frimley Park Hospital NHS Trust, Portsmouth Road, Frimley, Camberley, Surrey GU16 7UJ

North East London Strategic Health Authority (SHA)

Eneurin Bevan House, 81 Commercial Road, London E1 1RD

Including:

Whipps Cross University Hospital
Barking and Havering and Redbridge Hospitals NHS Trust
Homerton University Hospital NHS Foundation Trust
Newham University Hospital NHS Trust
Barts and the London NHS Trust

Royal Devon and Exeter NHS Foundation Trust

Pathology Department, Royal Devon and Exeter Hospital, Room A213, Barrack Road, Exeter, Devon EX2 2DW

The sites chosen to be pilots cover a wide and diverse range of service providers:

- Foundation Trust
- District General Hospital with large fluctuations in summer population
- Dual Site Trust
- Pathology network of hospitals including a University Teaching Hospital
- SHA wide pathology service approach for services in primary care

Whilst all the sites were very different in size, structure and location, each identified similar issues and all utilised the same tools and techniques to make the necessary improvements.

5. Developing the learning

Each site participated in a series of four workshops, the focus of which was to provide time to:

- understand the application of service improvement tools, techniques and lean methodology
- share experiences, network, adopt and adapt service improvement ideas

Key aspects of the workshops were:

- the role of leadership/ownership
- effective communication
- introduction to Lean techniques
- mapping techniques
- capacity and demand
- measurement for improvement
- promoting new ways of working – skills escalator
- patient involvement
- managing demand
- user involvement
- sustainability and spread

Expert input was provided by the following:

- **NHS Pathology Service Improvement Team**

- **Lesley Wright**

- Associate Director, Diagnostics

- **Ann Eason**

- National Pathology Manager

- **Dr Ian Barnes**

- DH Pathology Lead

- **Mitzi Blennerhassett**

- Patient Representative

- **Deirdre Feehan**

- DH Pathology Modernisation Programme

- **Mike Hallworth**

- Royal Shrewsbury Hospital

- **Professor Sue Hill**

- Chief Scientific Officer – Skills Escalator

- **Ian Maidment**

- Patient Information Manager –
Cancer Services Collaborative 'Improvement Partnership' (CSC'IP')

- **Dr Stuart Smellie**

- Bishop Auckland General Hospital

- **Paul Whalley**

- Lecturer Warwick University

Additional support and input included:

- project manager development programme
- conference calls
- site visits

6. Involving patients and developing user engagement

The importance of understanding patient needs came to the fore with the DH publication '*Creating a patient-led NHS*' (March 2005). Three key aspects were highlighted:

- people have a far greater range of choices and information
- there are stronger standards and safeguards for patients
- NHS organisations are better at understanding patients and their needs, use new and different methodologies to do so and have better and more regular sources of information about preferences and satisfaction

Patient and public involvement can be a long and complex subject; it is particularly challenging for some pathology disciplines where there is little, if any, direct contact with patients.

As providers of a service we cannot assume to know what our patients consider to be a good or bad service. Patient satisfaction is based on meeting or exceeding patient requirements, and we need to engage with them to understand their needs.

Several methods exist for gathering patient views, each have different benefits and can be used to gain and provide information:

- questionnaires
- surveys (360 degree)
- question and answer sessions
- 1:1 interviews
- posters
- newsletters
- compliments and complaints
- utilisation of Patient and Public Information Groups and PALS

See Chapter 11 - References, resources, useful information, acknowledgements and further reading.

Key findings from patients

Findings from each of the sites were remarkably similar:

- patients were often unaware of the reason for the test being performed and the implication of the results
- staff often gave conflicting information about the need to fast before particular tests
- car parking charges, difficulty finding a space, abuse of disabled spaces
- lack of access to the service in the early morning/late evening and weekends for patients who work

- long waits to have blood taken – varying from 10 minutes to 4 hours
- long waits for results to be available
- lack of privacy and dignity when giving personal information to staff
- poor access to phlebotomy services

Patient Line of Site (PLS) methodology

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

The aims of this project were to:

- take the patient line of sight and identify how the change of technology will have a direct impact on the experience for the following groups of patients:
 - a GP patient (diabetic)
 - community hospital patient (diabetic)
 - emergency medical admission (chest pain)
 - elective surgery admission (prostate)
- evaluate the pathology model of centralised and de-centralised pathology and evaluate the benefits to both patients and clinical users
- produce a development plan for the next five years based on learning from this project

Findings

Overheads incurred by patients

Pathology tends to discount or ignore overheads borne by the patient. Financial costs to patients and carers in the course of giving a sample can be substantial.

Inflated turnaround times

Most patients do not know the technical turnaround times or what the required standards are and are currently not sensitive to this issue.

"Usually have blood taken at GP surgery, told result will be back in 8 to 10 days time. I will be called if there is anything wrong. No news is good news. GP's don't notify you if the result is normal."

Preciousness of sample

For patients, providing the sample is their experience of pathology. A patient will only become aware of the mechanics if something goes wrong.

"When I come to see Dr X, he gets annoyed if my results aren't ready for him, so when I got here I checked at reception and they told me they were ready. Although it wasn't my fault that he didn't get them that one time, I do feel slightly anxious because he said it was a wasted appointment and I'd have to come back."

Retesting – the patient bears the burden

It is easy to overlook the pain and discomfort patients experience when providing specimens. If for some reason the specimen is unsuitable, inappropriate or of poor quality and therefore cannot be tested, the patient bears the burden of having a repeat test.

"I used to have 6 samples taken with no anaesthetic but now I have a local. This time they knocked me out as I had to have 30 tests."

"The sample taking procedure hurt but I was given cream to help the pain."

"I had to have the test done but I had heard a lot of things like it hurt and the embarrassment of something pushed up there. I just wanted to get it over with."

"Although I haven't been told the actual results of my blood test my GP gave me the impression that everything was fine, with my ECG as well, but that they would perform these extra tests as "belt and braces" so I am here just to make sure"

"I have had 4-5 blood tests in the last month and I think the last one was just that the locum Dr wanted to do it again himself to make sure nothing was wrong."

Learning points from patients using PLS methodology

- the pathology pathway for patients starts with getting an appointment
- costs associated with travelling to the hospital to have a test done are a burden for many patients
- the amount of effort patients go through to give what can be a unique specimen
- for patients with chronic long term illness, their preferences may not coincide with those of their health care practitioners
- patients are generally not aware of the technical turnaround time for their tests
- patients are most aware of issues at the beginning and the end of the pathology pathway
- although patients were generally happy with the service they received, most pathology staff felt they had become isolated from the patients they serve

Learning points about using the methodology

- plan and arrange story collection early
- choose interviewers with good interpersonal skills
- consider role play, the story collection technique, recruitment of patients and feedback to staff
- easier to collect stories in general clinic waiting areas especially those directly controlled by pathology
- use an electronic template for story transcription

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Establishing patient focus groups and user forums

Calderdale and Huddersfield NHS Trust

Involving patients

The team preferred to talk directly to patients rather than get their views through a survey / questionnaire as it was felt that this would provide high quality and meaningful information.

- recruiting patients by directly approaching them in phlebotomy clinic was difficult
- recruiting patients by sending a letter to a random sample of patients who had attended phlebotomy clinic was more successful
- interviews were conducted over the phone and a patient focus group established

Questions asked fell into 3 categories:

- information provided about the test
- access to pathology
- results

Comments from patients

"I ring my GP for the test results and I am told its OK but I don't really know what this means, it would be better if you got a little bit more detail"

"I had tests undertaken for food allergies but was not told of the result, I can only presume that the test was normal"

Issues for patients

- patients did not know what test they were having or why
- hygiene issues in phlebotomy
- patient having to wait a long time in phlebotomy clinic

Benefits of focus group

The focus group has given the pathology department food for thought, they have been, and are determined to make changes from the comments made. Further work is ongoing in the primary care setting, this is seen to be the one area that patients had the most concerns with.

Involving users

Engaging users proved much easier. Users were invited to join the process mapping session which started from the point of referral through to the

result being available to the referer in secondary and primary care. Questions were asked about the process and the issues for them as users of the service.

As a result of this engagement a user group including A&E, ICU, Medical Assessment, and CCU and laboratory staff has been established.

Table 1 illustrates the examples of patient and user comments and subsequent action taken.

Contact: **Dr Huw Griffiths**
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Table 1

Patient/User Comments	Action
I don't know what happens to my blood once it has been taken.	Poster developed – checked with patients – put up in phlebotomy department.
The Phlebotomist did not wash his / her hands before taking my blood.	Alcogel installed in all cubicles and staff asked to wash hands between each patient and to do so in front of the patient.
I have to wait to have my blood taken.	Poster developed and displayed showing busy times and quiet times.
On one site patients arriving in phlebotomy are asked to take a numbered card. Concerns were expressed that these cards are reused but probably not cleaned thus posing a health risk.	Q matic system is being purchased on both hospital sites. Patients will take a disposable ticket from dispenser.
A& E staff reported having login/passwords issues with pathology reporting system.	IT staff informed and issues addressed for individuals.
A & E requested a paper copy of results printed out in A & E as they became available. Staff felt they did not have time to keep checking the computer to see if results were available.	A&E staff introduced to a "latest results" screen which does not time out enabling them to see at a glance when results are available. IT department trained staff on best way to use the screen.

Using patient views to improve anticoagulation services

North East London Strategic Health Authority

Understanding the problem

Provision for anticoagulation was inadequate in North East London. The following issues were identified:

- lack of direct patient involvement
- little or no patient choice of time, location and type of encounter
- unnecessary steps in the process
- limited flexibility and responsiveness
- poor understanding of the cost / benefits of alternative methods of providing the service
- conditions in the waiting area were poor. Patient surveys confirmed this

Patient comments about waiting room conditions.

Figure 1 demonstrates that 81% of patients felt the conditions weren't as good as they could be.

Changes implemented

Issues such as poor flow and waste were addressed.

Changing the process and introduction of point of care testing had a number of benefits:

- shorter waits for patients
- ability to provide patient choice

- clinical staff given more time to concentrate on patient care rather than administration

Measurable outcomes

Figure 2 demonstrates the impact of the improvements made.

Figure 1 - Patient views of clinic waiting areas

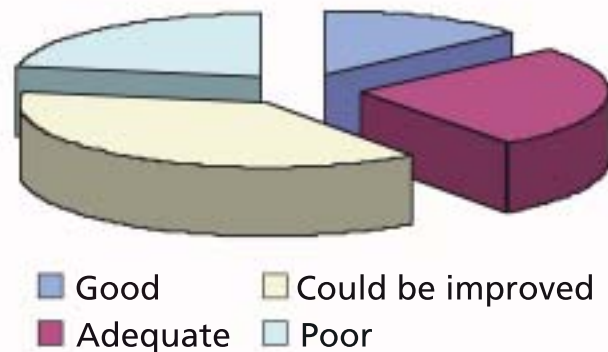
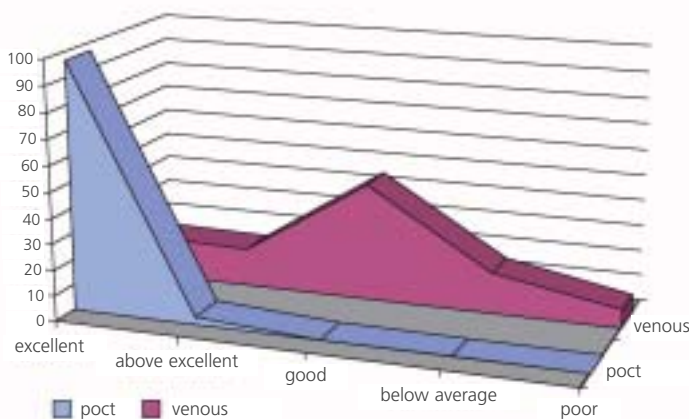


Figure 2 - Patients views of the anticoagulation service after the introduction of POCT



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7. Process improvement

Improving flow, eliminating waste

Establishing an effective flow of work through the pathology process is crucial to ensure rapid turnaround times. Techniques such as value stream, process and spaghetti mapping illustrate non value adding steps and demonstrate poor flow. These techniques point to the areas where changes and improvements need to be made. At each point of the pathway there are barriers to flow.

Access to phlebotomy

Work with patients at each site uncovered delays to phlebotomy services. These ranged between 1 day and 4 weeks. On reaching the clinic patients experienced delays in waiting for phlebotomy.

Transport

Delays caused by both internal and external transportation of specimens can be particularly dramatic.

Specimen reception

Here the impact of delayed and batched transport systems is a frequent occurrence.

Validation of results

Significant delays can occur at validation of results and is most often associated with manual validation.

Access to results

Surveys of pathology users demonstrated significant delays and difficulty in accessing pathology results. Although departments report electronically, many users do not have relevant access to the IT systems. Many clinical areas i.e. wards or outpatient clinics have no or too few terminals. Hard copy reports are subject to delays associated with processing and transporting to the appropriate location. Many inpatients have been discharged when the paper report arrives on the ward.

Waste in pathology

To improve flow we need to eliminate waste, i.e. actions undertaken that do not add any value to the final result.

Waste can be classified as:

- over production
- waiting – patients and staff
- transport
- motion
- defects
- inventory
- customer time
- intellect and skills
(case study example, see page 23)

Eliminating Waste - 5S approach

5S is a Lean technique that provides pathology teams with the first step to develop stability and promote flow by removing obvious waste in a standardised and sustained approach.

Sort (seiri) – sort through items and keep only what is needed. Dispose of anything that is not needed

Straighten (seiton) – organise and label a place for everything. “a place for everything and everything in its place”

Shine (seiso) – clean it

Standardise (seiketsu) – create procedures to maintain the first 3S

Sustain (shitsuke) – make it mainstream, use regular audits to stay disciplined. Continually improve.

Implementing this technique in isolation will not improve process flow, but will start to highlight associated problems.

Understanding the impact of delays in transport

Coventry and Warwickshire Pathology Network

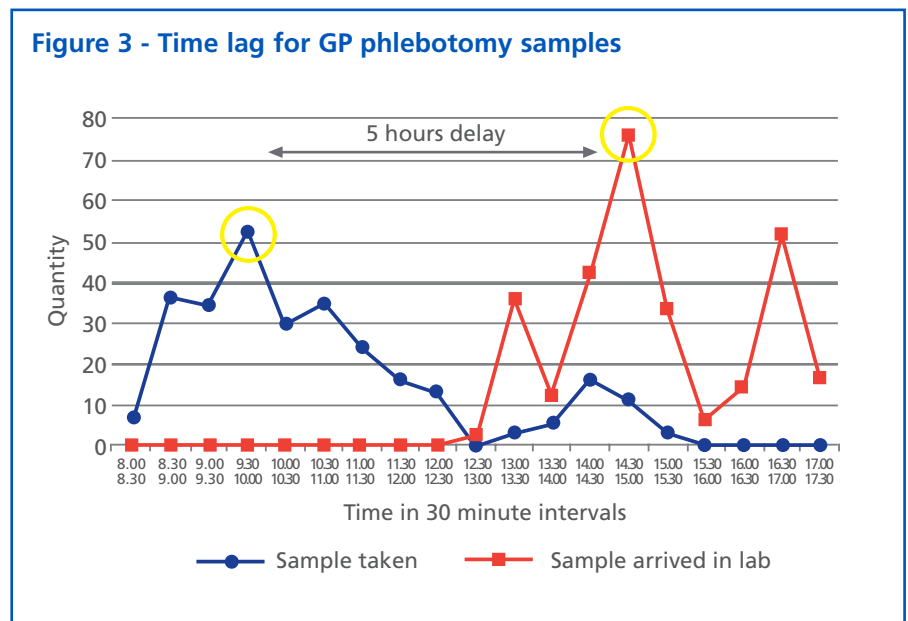
Understanding the problem

Work was undertaken to identify the true extent of transport delays, both external and internal on pathology services.

Learning

In order to reduce the time it takes from the patient having a test to receiving the results, it is necessary to analyse this data. Pathology services must take a lead to use this data to influence transport provision, highlighting the impact on turnaround times and imbalance of workload flow and staff capacity.

Figure 3 demonstrates variation and delays in transportation from primary care.



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 Coventry and Warwickshire Pathology Network
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Transport issues affecting patients attending hospital for phlebotomy services

Blackpool, Fylde and Wyre Hospitals NHS Trust

Figure 4 demonstrates how patients use transport to attend for pathology tests.

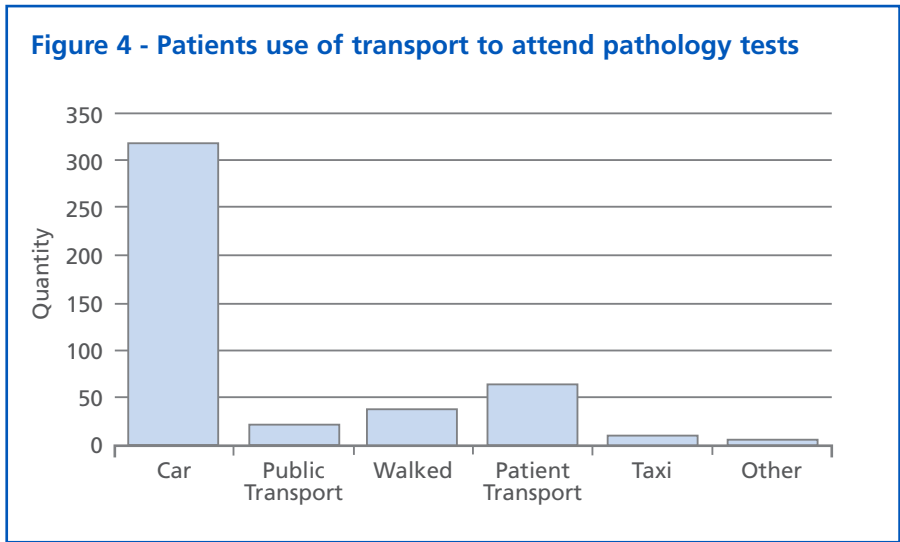
Findings

- 317 (72%) patients used the car to attend – this has a significant impact on already overstretched car parking facilities
- average journey time to hospital was 35 minutes

Figure 5 shows the number of patients attending hospital based phlebotomy services each week.

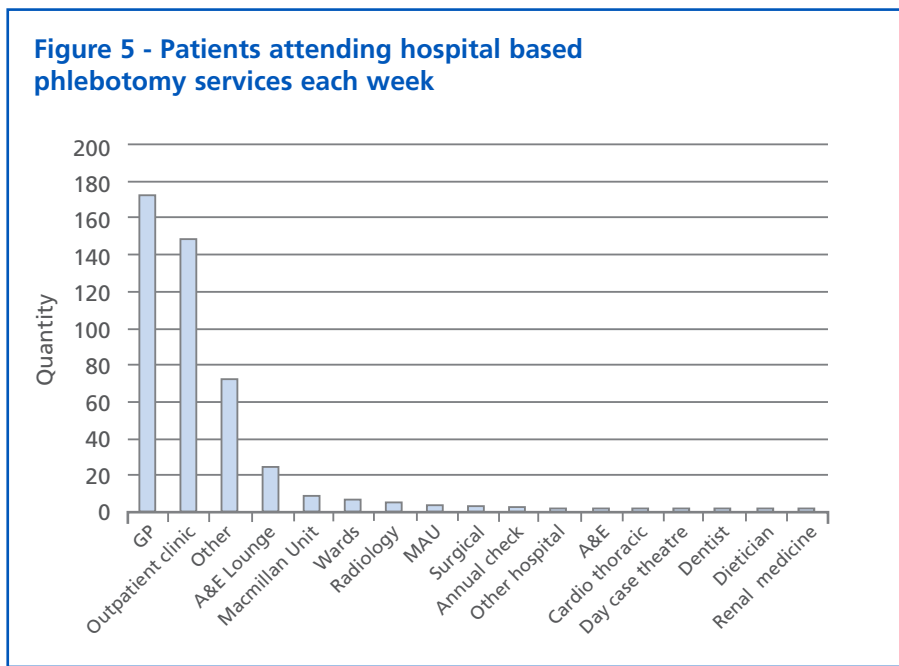
Of patients attending for phlebotomy::

- 172 (38%) patients were asked to attend by their GP
- 269 (59%) patients were requested to attend from within the hospital
- 148 (33%) from outpatients
- 24 patients (5.3%) were requested to attend by the Admissions & Discharge Lounge
- 212 (47%) patients attended the site for no other reason than phlebotomy



This information has been presented to local primary care trusts to influence future service provision.

Contact: **Wendy Lewis-Cordwell**
 Blackpool, Fylde and Wyre Hospitals NHS Trust
wendy.lewis-cordwell@bfwhospitals.nhs.uk



Removing non value adding steps

Blackpool, Fylde and Wyre Hospitals NHS Trust

Figure 6 demonstrates the pre-analytical process map.

Understanding the problem

Mapping the service demonstrates:

- non value adding activity
- lack of multi skilled staff
- work spread across a wide area (see figure 6)
- significant delays caused by prioritisation, leading to wide variance in turn around times (TAT) encouraging requesters to flag samples as urgent
- inconsistent flow of samples to the analysers creating backlogs
- capacity of staff did not match workload demands
- unnecessary movement due to (see figure 8)
 - layout of the rooms
 - position of necessary equipment
 - interruptions by telephone enquiries averaging 2.3hrs per day
 - impact of incorrectly labelled samples
 - delays caused by large batches and prioritisation increasing turnaround times by 59 minutes

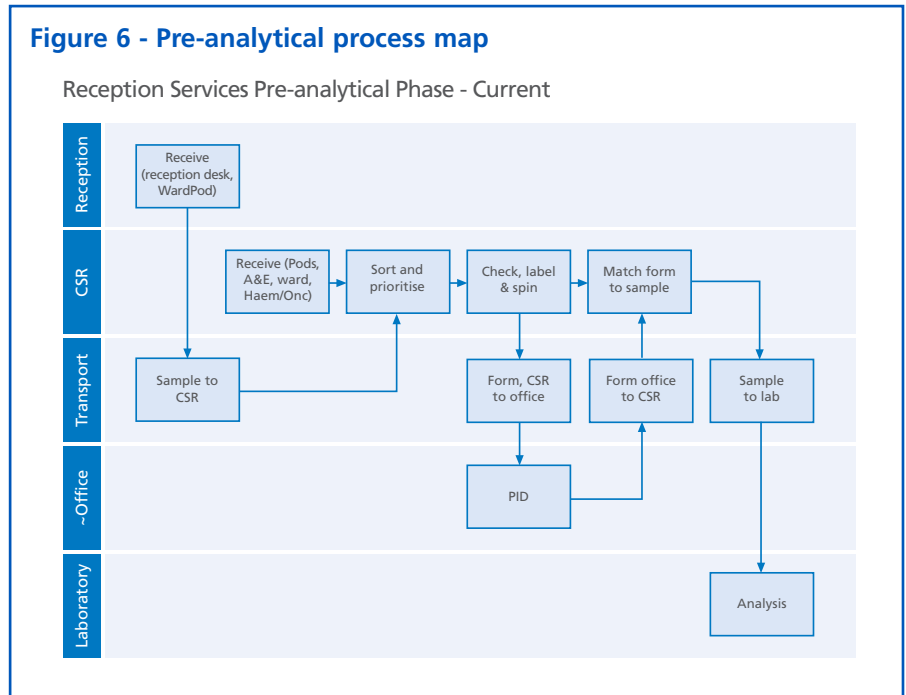
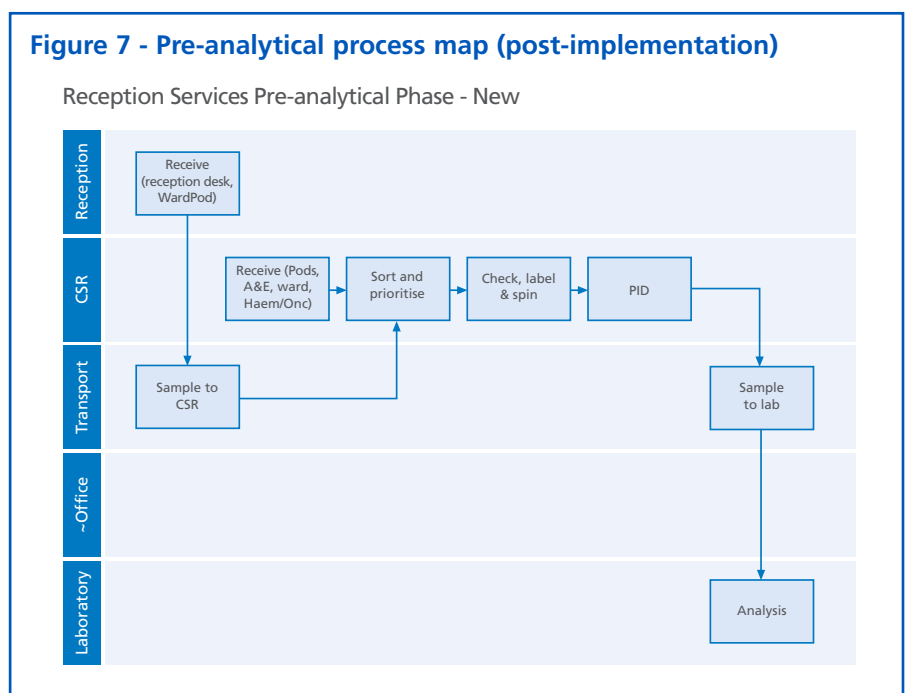


Figure 7 demonstrates pre-analytic process map (post implementation)



Changes implemented

- layout of equipment and work area reconfigured. (See figure 9)
(See case study on page 21)
- non value adding steps were removed
- over processing waste reduced
- number of handoffs reduced
- batching minimised
- unnecessary travel eliminated

Measurable outcomes

Table 2

Measurable outcomes	Pre-Implementation	Post-Implementation
Sample processing time	59 min	26 min
Number of steps in the process. Figure 7	11	8
Staff movement Figure 9	2,000 mtrs /day	474 mtrs /day
Number of work areas	3	2

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Improving flow in specimen reception

Blackpool, Fylde and Wyre Hospitals NHS Trust

Understanding the problem

Lack of flow in specimen reception resulting in unnecessary transportation of staff and specimens.

Spaghetti map findings

- one member of staff walks 1.2 miles each day
- 5 staff walk a total of 6 miles each day
- at 4 miles per hour, this equals 1.5 hours working time
- an operator can prepare 48 samples for analysis in this time
- this is a cost equivalent to £2200 - £2900 per annum

Changes implemented

- reconfigured layout
- individual workstations standardised
- equipment repositioned to support workflow
- specimens processed in smaller batches
- each batch of samples are labelled checked and loaded into the centrifuge by a single operative

Measurable outcomes

- see table on page 20

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Figure 8 - Original spaghetti map of central specimen reception

The movements of one member of staff during a 10 minute period

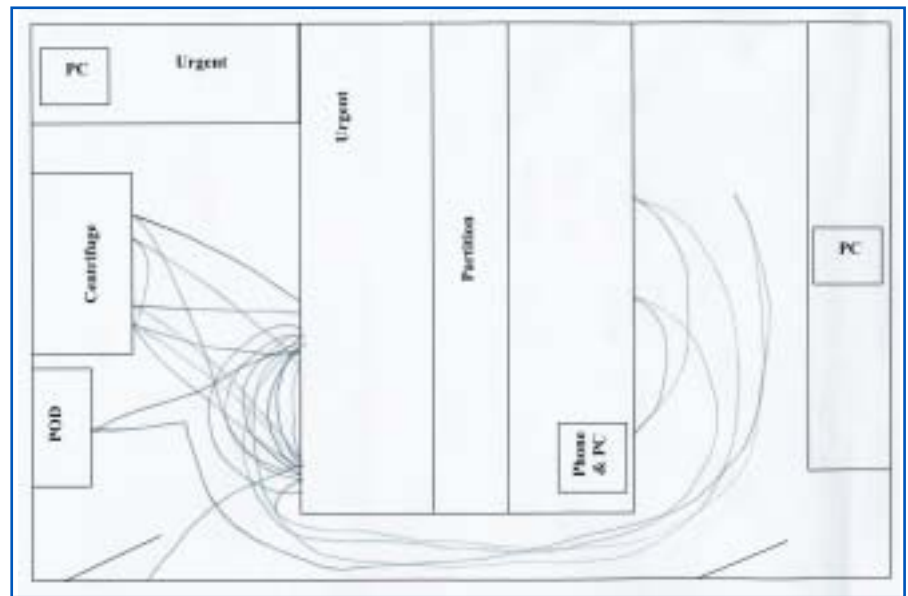


Figure 9 - Reconfigured layout spaghetti map of central specimen reception



Reducing steps and handoffs in specimen reception

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

- analysis of the process identified unnecessary steps and handoffs. Simplification of the process allowed the team to make better use of resources and increase efficiency and productivity in specimen reception

Changes implemented

Changes were made to the usual working practice. One Medical Laboratory Assistant (MLA) would deal with the numbering and unpacking to decrease the number of steps and handoffs.

Measurable outcomes

- increase productivity (see figure 10)
- fewer steps and handoffs (see figure 11)
- reduce time spent on non-value adding activities (see figures 12 and 13)

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Number of steps and handoffs before and after process change

Figure 10 - Amount of samples unpacked by one MLA and numbered by another MLA in an hour

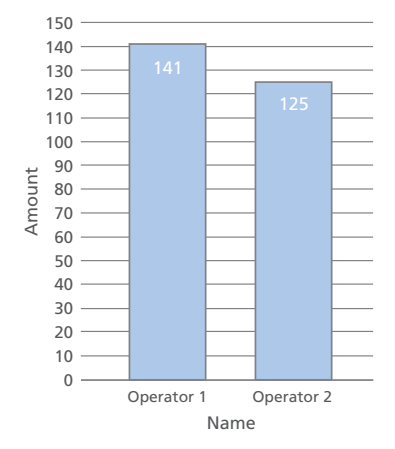
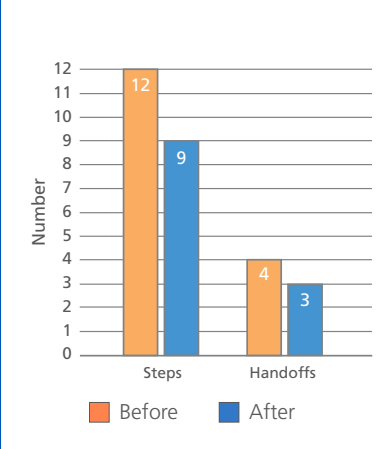


Figure 11 - Number of steps and handoffs before and after process change



Additional audits were undertaken to assess the impact

Figure 12 - Number of phone calls before and after process change in specimen reception

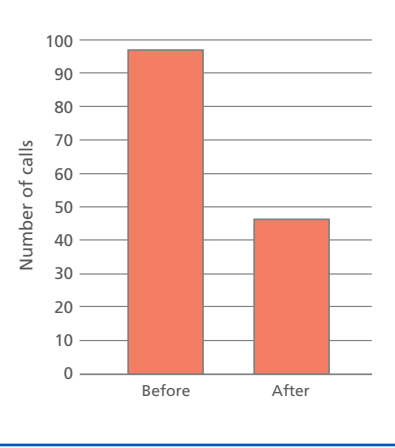
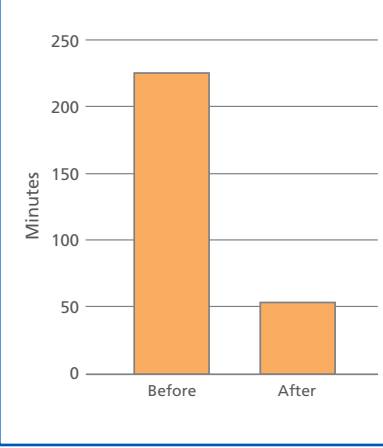


Figure 13 - Impact of change in reducing time spent dealing with problems in specimen reception (mins)



Reducing waiting times for patients by implementing Point of Care Testing (POCT)

North East London Strategic Health Authority

Understanding the problem

- excessive waiting times in anticoagulation clinics (up to 120 mins)
- patients waiting in cramped and poor conditions
- staff over whelmed and undertaking unnecessary non clinical duties

Changes implemented

- improved waiting areas provided
- point of care testing implemented
- provision to be made in primary and secondary care settings

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Measurable outcomes

Figure 14 - Waiting times for patients before and after the introduction of POCT

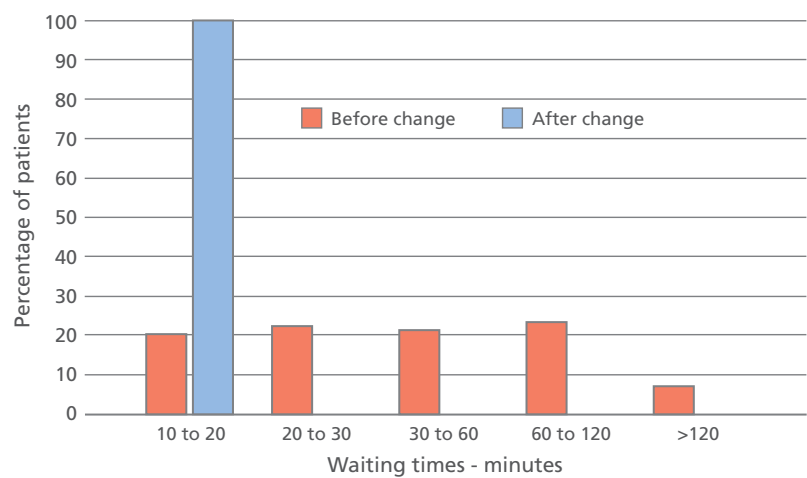
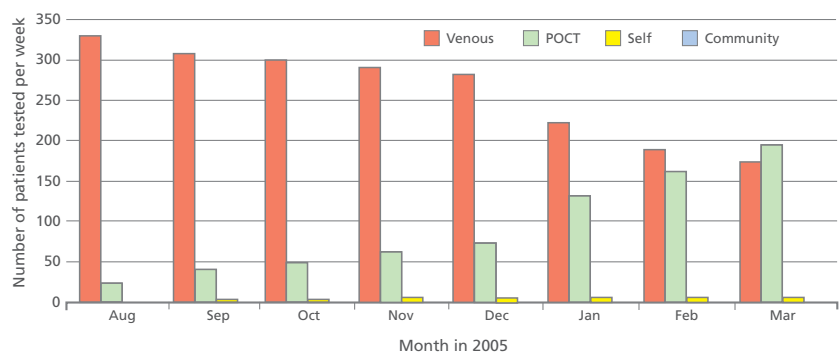


Figure 15 - Rate of introduction of new methods



Identifying waste in the pathology pathway

Calderdale and Huddersfield NHS Trust

Table 3

Type of Waste	Examples
Waiting i.e. waiting for samples or equipment	Patient waits to attend phlebotomy or clinic Patient waits at clinic Waiting for specimens to arrive Delays to booking Waiting for analysis Waiting for machines to finish Delays to validation Waiting for results to be released out of hours Requester awaiting results Patient waits for results
Transportation i.e. unnecessary movement of specimens equipment or reagent due to poor layout.	Patients travelling to secondary care when request was made in primary care Samples travelling from GP practices to the lab Location of the pathology service
Motion i.e. unnecessary movements made by staff as a result of poor ergonomic design	Twisting to access equipment Bending to reach poorly located reagents or kit Performing unnecessary key strokes when recording information on IT system
Inventory i.e. stock reagent or work in progress	Over ordering of stock Large batches of reagent made Specimens in progress awaiting next process step
Overproduction i.e. too much or too soon	Unnecessary test requests Sorting and resorting of specimen Unnecessary barcodes or labels More specimens taken from the patient than required Re entry and duplication of data Batches of specimens awaiting next processing step
Defects	Haemolysed samples Specimen received with insufficient details Wrong sample type Result not available as required
Intellect and skills	Clinical staff performing admin Scientists performing non scientist duties
Customer time	Patients attending appointment where results are not available Staff phoning for results or information that should be accessible elsewhere

As a result of identifying this waste an action plan was established to systematically remove this waste and improve flow.

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Using 5S to remove waste in specimen reception

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

Area cluttered, hindering effective flow and standard working for staff. 5S implemented to identify items that could be:

- moved to a more appropriate location
- discarded

Changes implemented

- waste removed
- standard workstations developed
- improved utilisation of space

Measurable outcomes

- space released in data entry room and specimen reception
- work areas tidier and more organised
- effective way of changing practice, taking 1½ days of effort including works department to remove cabinets
- working conditions improved
- teamwork improved
- staff appreciated additional space and organised area
- generated interest in the service improvement programme

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8. Understanding demand, utilising capacity

Demand management

Demand for pathology services has increased considerably over the past few years. Data demonstrates that clinical chemistry laboratories saw an increase in workload of 15-30% between 2000/2001 and 2002/2003. This has increased further as a result of key NHS reforms such as the Quality and Outcomes Framework. In addition the Healthcare Commission (2005) highlighted a number of common problems including:

- an estimated 25% of common tests are duplicated and have no additional impact on patient care
- many requests are illegible, contain insufficient clinical information, causing significant delays and rework
- poor contact with clinical users – 20 - 25% of ward managers reported that delayed access to pathology results had a significant impact on care or discharge of patients at least once per week

Optimising staff skills

Pathology services are facing issues of an ageing workforce and difficulties in recruiting new staff.

To lessen the impact we need to optimise staff skills and utilisation.

“Being trained to carry out factory V Leiden testing in Haematology. Using the molecular has been very beneficial to me, enabling me to learn and practice new techniques as well as supporting my personal development and improving the services.”

Trainee Clinical Scientist, Haematology

Utilising technology

To cope with the increasing workload it has been necessary to invest in new technology. Experience world wide has shown that this investment should not be made without prior consideration and understanding of the pathology process.

“Automation can provide a more efficient way of doing the wrong thing.”

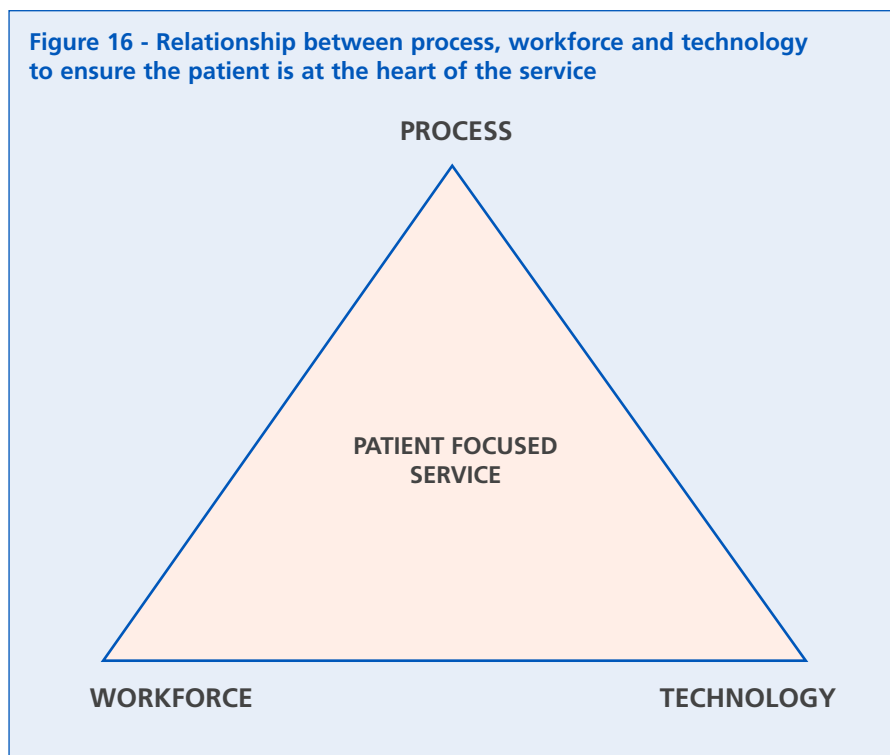
Reengineering the Corporation

“Automation can actually cost the lab more money if the overall process is not first considered.”

Advance

Developing a truly patient focused service will depend upon the successful combination of:

- streamlining the processes
- utilising skills of staff
- maximising the use of technology



Understanding variation in demand for diabetic screening tests

Blackpool, Fylde and Wyre Hospitals NHS Trust

Understanding the problem

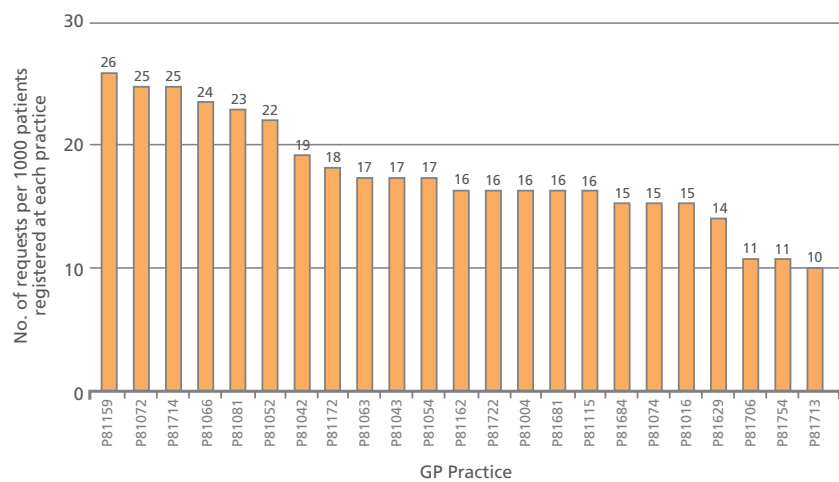
Demand data was collected and analysed from the primary care users of the pathology service. The data highlighted significant differences in requesting patterns of individual surgeries.

Learning

Further investigation highlighted that nursing staff were not requesting according to protocols developed by the PCT.

The data has been used to influence future requesting patterns and to improve usage of the pathology service by GP practices.

Figure 17 - HbA1c requests per thousand patients for Blackpool PCT (April - June 2005)



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Reducing unnecessary/duplicate requests for thyroid function testing

Coventry and Warwickshire Pathology Network

Understanding the problem

Monitoring of Thyroid Stimulating Hormone (TSH) requests demonstrated an increasing number of duplicate tests. After discussions between the pathology department and endocrinologist it was decided to reject TSH requests made within one week of a previous request.

Changes implemented

Initially tests were rejected when a previous result had been given within 7 days; this was then extended to 2 weeks.

Measurable outcomes

Table 4

Month	TSH requests	Number rejected	Percentage rejected
Oct	9006	371	3.96
Nov	8796	313	3.44
Dec	6927	251	3.50
Jan	9247	300	3.24
Feb	8725	257	2.95
Mar	9664	414	4.28
Apr	8853	310	3.50
May	9597	372	3.88

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Reducing inappropriate testing for thrombolytic patients

Coventry and Warwickshire Pathology Network

Understanding the problem

Significant thrombolytic (D-Dimer) requests were felt to be inappropriate.

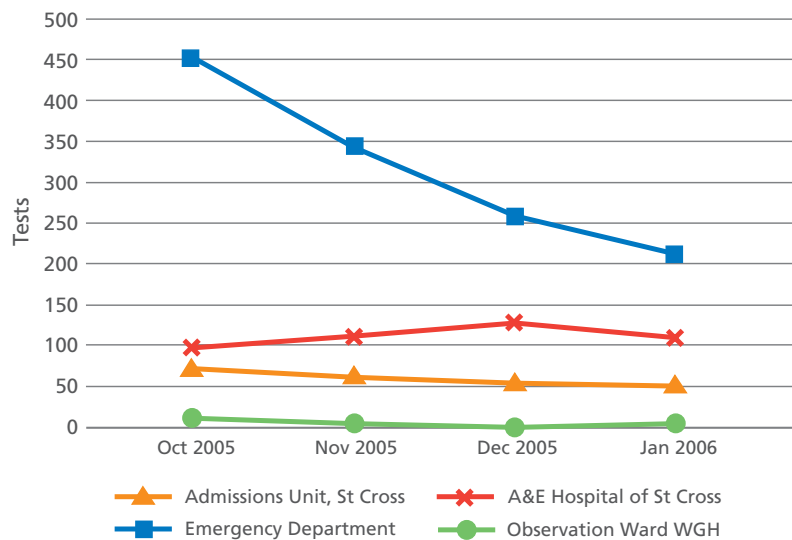
Changes implemented

- the pathology network redesigned the request form for use within the A&E department
- profiles of tests for specific conditions were agreed with clinical teams
- staff now indicate a possible diagnosis (eg chest pain) when requesting pathology tests
- requests for D-Dimer tests are only accepted if a Wells score is appropriate.

Measurable outcomes

Significant reductions in the number of requests for D-Dimer were seen. (See figure 18).

Figure 18 - Changes in D-Dimer request patterns



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Reducing inappropriate urine requests in microbiology

Royal Devon and Exeter NHS Foundation Trust

Understanding the problem

It was felt that a significant number of urine requests were inappropriate, leading to unnecessary workload and delays to results for patients.

Changes implemented

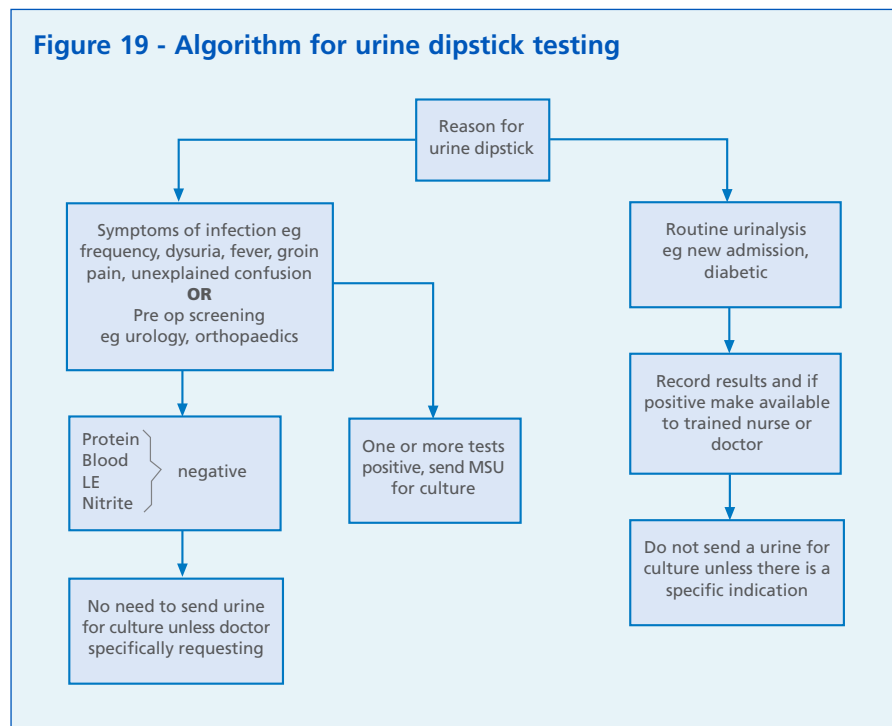
Trust and community users of the pathology service were willing to engage in this piece of work, particularly after a visit to the laboratory to see the intensive nature of processing urine specimens.

After meetings with users a new urine testing protocol was developed and has been distributed within the RD&E Trust. A separate algorithm is being developed for community users. The urine request form is undergoing redesign to support users to provide sufficient information to the laboratory, and this can be used with the 2D barcode system already successful in clinical chemistry.

Measurable outcomes

- A reduction in urines received by the lab. This will be regularly audited to ascertain success of algorithm

Figure 19 - Algorithm for urine dipstick testing



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Improving staff utilisation to match demand

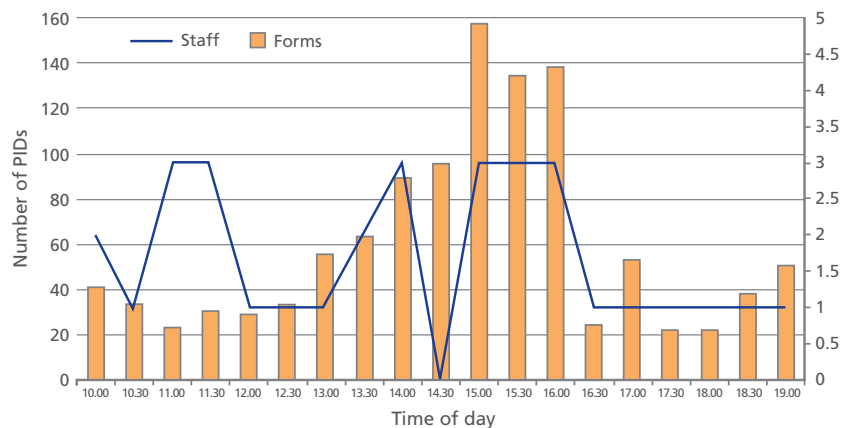
Blackpool, Fylde and Wyre Hospitals NHS Trust

Figure 20 demonstrates the mismatch of staff capacity against the demand on the service. This causes significant delay in simple processing.

Changes implemented

- administrative and technical staff are combined into one team
- batch sizes have been reduced to a maximum of 16 in boxes numbered in order of arrival (first in - first out)
- each batch of samples is checked, labelled and loaded into the centrifuge by a single operative
- whilst samples are in the centrifuge the operator inputs patient and test data. On completion samples are taken to the laboratory to be loaded on to the analysers
- standard workstations established, with each station housing its own centrifuge and PC
- the number of workstations increased to 11 with one dedicated to 'urgent' samples
- samples that cannot be processed immediately are placed in a "problem box" to be dealt with by another operator
- all causes of problem samples are identified, reviewed, and protocols developed to deal with problems
- each day one operator is designated to deal with difficult requests and phone calls
- staff working hours and rosters modified to meet demand

Figure 20 - PID staff demand chart



Measurable outcomes

Table 5 - Sample processing time, number of stages in the process

Measurable outcomes	Pre-implementation	Post implementation
Sample processing time	59 min	26 min
Number of steps in the process. Figure 7	11	8
Staff movement Figure 9	2,000 m/d	474 m/d
Number of work areas	3	2

(See case study on pages 19/20)

Staff benefits include:

- improved morale and reduced pressure on staff
- staff taking ownership of work targets
- individual workstations eliminated waits for centrifuges
- problem samples removed from general workflow

Extended benefits include:

- continuous flow of samples to the biochemistry and haematology analysers
- processing of samples will not be held up by a shortage of staff or equipment in one part of the process

Future development

Although demand and capacity is still out of balance, staff are experiencing the benefits of the changes already made and are now more open to roster changes. In addition there is a greater scope for career development by the introduction of supervisory and team leader posts in the future.

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Understanding service demand and staff capacity

Each of the six pilot sites demonstrated a mismatch between demand and capacity at various points across the pathway (see examples from sites in figures 21 and 22).

With these factors in mind it is important to make best use of the resources we have by:

- having a clear understanding of demand
- influencing clinicians requesting patterns
- maximising the technology available
- using technology appropriately

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Figure 21 - Calderdale and Huddersfield NHS Trust

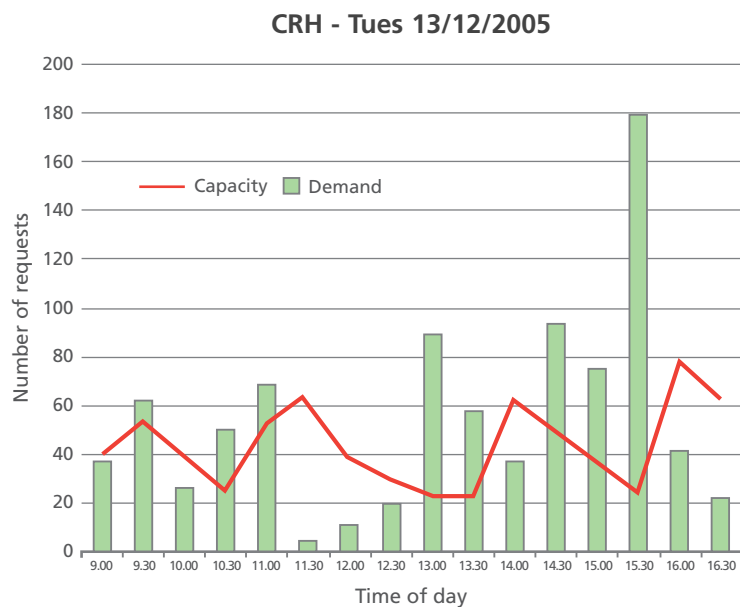
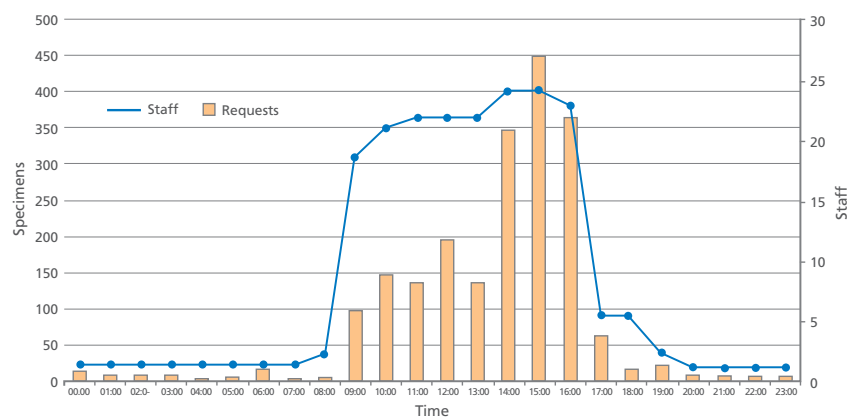


Figure 22 - Royal Devon and Exeter NHS Foundation Trust



Improving clinical information on immunology requests to release staff capacity

Royal Devon and Exeter NHS Foundation Trust

27% of factor V Leiden requests contained insufficient clinical information to allow appropriate processing of this type of request causing significant delays.

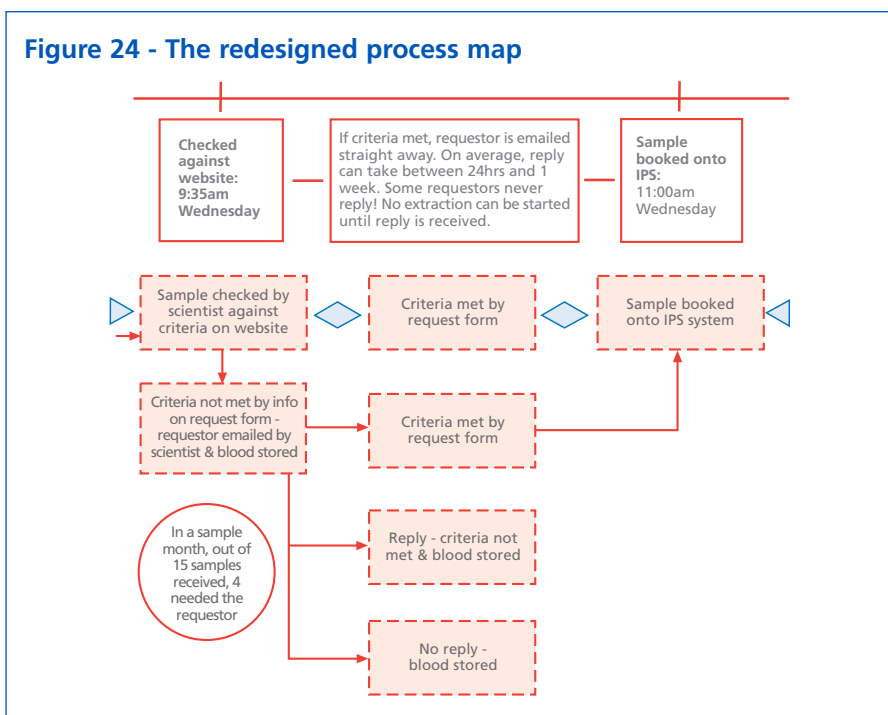
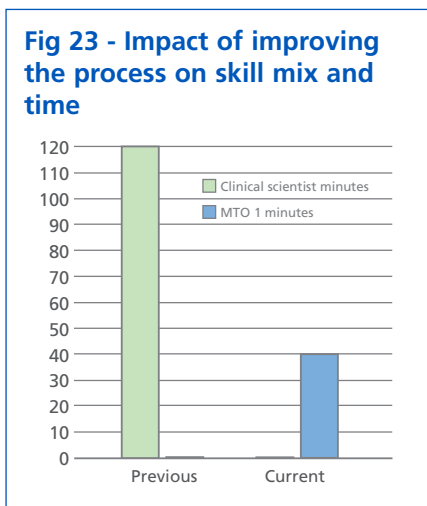
Changes implemented

- request form redesigned to capture necessary request information
- eliminated non value adding steps of clinical scientists contacting requesters for additional clinical information

Measurable outcome

The amount of time required to obtain necessary clinical information has significantly reduced. Clinical scientists are now free to carry out other duties.

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Implementing BMS cut up to release Consultant Histopathologist time

Royal Devon and Exeter NHS Foundation Trust

Understanding the problem

Pressure on the histopathology department to maintain turnaround times and cope with the workload.

Changes implemented

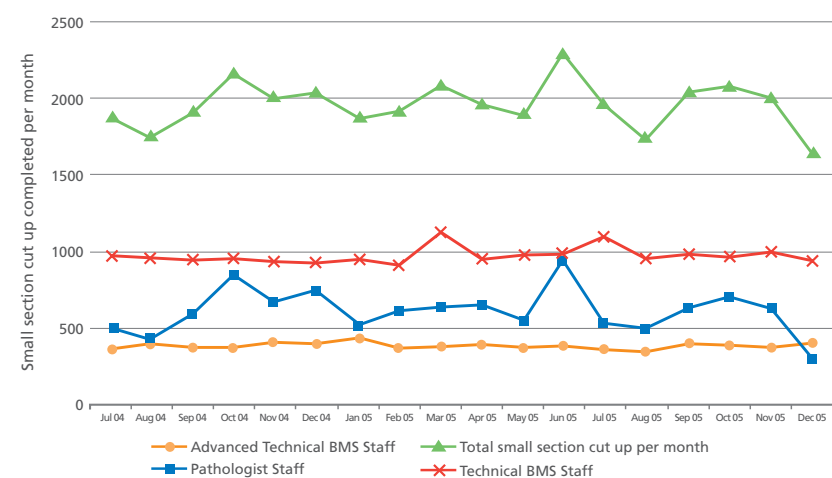
Advanced practitioner Biomedical Scientists (BMS) were trained in histopathology cut up.

Measurable outcomes

- time saved – 10 hours consultant cut up time per week (2.5 consultant sessions per week)
- 30.5 % of cut up now performed by advance practitioners

“We must be working along the right lines in developing advanced practitioners in cut up because when we are not able to perform this role teddies are thrown from prams.”

Figure 25 - Pathologist consultant time saved by advanced BMS completing small section cut up July 2004 - December 2005



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Introducing Point of Care Testing (POCT) to reduce turnaround times in A&E

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

Some of our patients needed a quicker turn around time (TAT) than the clinical laboratory could provide.

The POCT performance and utilisation was compared with the clinical laboratory.

We reviewed the use of the Pentra analyser in A&E and found 10% of samples that could have been tested at POCT were sent to the laboratory.

A user audit was performed to review use of the POCT in two regular clinics.

The POCT was reviewed to highlight opportunities for:

- laboratory savings
- skill mix change
- further investment
- reducing duplicate testing
- optimising capacity

Findings:

- some samples were being retested overnight
- Consultant Haematologist discovered inadequacy with analysers

Changes implemented

- reduced duplication
- introduction of POCT facilities in additional clinical areas
- medical technical assistant role introduced

Measurable outcomes

Full Blood Count (FBC) in A&E

- 65 samples / day
- 66% of all FBC requests done by POCT
- 90% of FBC only requests done by POCT
- decreased lab workload

Gases/chemistry

- 180 samples / day
- 100% of gases done at POCT
- duplication seen with U&Es*
- no obvious decrease in lab workload but difficult to audit

POCT Costs

Calculated with respect to laboratory savings and wider investment in POCT analysers

Turnaround times for Royal Surrey County Hospital clinic

Averages

- arrival to venepuncture (VP): 13 minutes
- VP to POCT results (on LIMS): 29 minutes
- VP to first lab results: 1hr 33 minutes

Turnaround times for Frimley Park Hospital clinic

Averages

- arrival to venepuncture (VP): 9 minutes
- VP to POCT FBC result: 4 minutes
- VP to lab FBC result: 2 hours

Equipment downtime

When small teams of staff are dedicated to specific analysers, downtime levels were halved.

Reduction in laboratory tests

For some tests laboratory usage dropped to zero e.g. troponin.

Skill mix

Ward based Medical Technical Assistants (MTAs) play a key role in:

- freeing up clinical medical resource
- reducing inappropriate use of POCT
- increasing uptake of equipment

High Acceptance of POCT in A&E setting

A survey of junior doctors documented:

- 100% acceptance of POCT as essential
- “not able to make the A&E 4 hour target (government directive) without it”

Unused capacity

- not all results can be recorded on the laboratory system because of analyser configuration deficiencies
- in current POCT we have unused capacity which could be used by other parts of the hospital

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* because laboratory computer does not automatically hold the result, but does for FBC

Introducing histology robotics to maximise available skill mix

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

There were difficulties in recruiting suitably qualified staff to a highly manual process, a large backlog of specimens had built up. Design of the building was inadequate. There was poor utilisation of space and inefficient workflows.

Changes implemented

- processes mapped
- reviewed system performance measures (TAT, request backlog, instituted an ongoing data collection of case throughput statistics, consultant reporting throughput, number of outstanding cases over specified time periods)
- purchased and installed robotic technology to process samples continuously rather than batching for overnight processing
- extended day and weekend working partially implemented. Discussion ongoing with staff

Measurable outcomes

- improvements affect 30,000 patients
- speedier diagnosis following surgery
- first phase shows processing time reduced by 66%
- reducing fluctuations in slide production, consultant reporting efficiency was improved

Key findings

Improved turnaround times

Robotic technology is useful in improving processing times:

- first phase of implementation has improved turnaround times significantly
- second phase will further improve processing time

Skills mix

- potential for skill mix redesign around this system

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Introducing automated liquid based cytology to reduce waiting times for cervical screening results

Partnership Pathology Services - Frimley Park Hospital NHS Trust and Royal Surrey County Hospital NHS Trust

Understanding the problem

Liquid Based Cytology (LBC) was introduced as a result of guidance from the National Institute for Health and Clinical Excellence (NICE). A regional training laboratory for Kent, Surrey and Sussex was established in our catchment area.

Changes implemented

- purchased and installed LBC processing equipment
- mapped the additional processes required by LBC

Measurable outcomes

- improvements affect 56000 patients
- inadequate sample rate reduced from 10% to 1-2%. As a consequence laboratory workload has been reduced by 20%
- all cervical cytology samples were reported within 4 weeks (June 2005)
- reduction of workload would allow this laboratory to take on more work

Screening backlog

Pre LBC: Before introduction to LBC the backlog was up to 13 weeks. The NHS Cancer Screening Programme (CSP) standard is 6 weeks maximum.

Post LBC: After LBC was introduced 30% of cervical smears were being reported in 4 weeks and 100% within 6 weeks.

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9. Learning for future improvement teams

Involve patients

Understand what patients need from the pathology service. When it is necessary to make changes in an area, for which pathology is not directly responsible, it is important to work across organisational boundaries to support change. This could include transportation, information about pathology tests, access to phlebotomy or access to results.

Involve clinical users and commissioners of pathology services

The key to supporting end-to-end patient care is to understand the needs of clinical users' at each point in the patient pathway. Engage commissioners by working in partnership to ensure patients needs are best served.

Have a vision

Determine the long term vision of the pathology service. Ensure the long term quality agenda focuses on providing value for patients in association with the traditional quality assurance methods. Work to effectively integrate the service into the entire healthcare pathway.

Seek perfection, not only in terms of quality but by providing exactly what clinical users require, at the right time with minimum waste.

Take responsibility

Accept responsibility for the role of pathology in the patient pathway.

If the pathology pathway is unable to demonstrate the impact of transport on their service then who else can? Who else has the ability to see it from the pathology perspective?

There is always a solution to be found; it is about understanding what we can do, not why we cant.

Start small

Undertaking service improvement can be daunting, begin with a short non complicated process and gain experience in using the service improvement tools and techniques. Small changes often have the biggest impact.

Involve everybody

Ensure **ALL** staff are aware and involved in any service improvement effort. Communicate effectively and repeatedly so all staff understand the value that pathology adds to the patient pathway. Build a culture of identifying and fixing problems as they arise. Give all staff regardless of their position in the organisation authority to highlight problems and recommend changes. Establish a forum to share and discuss potential changes.

Walk the walk

All staff including high level managers should 'walk the walk' of the specimen pathway for themselves to ensure they have a thorough understanding of the pathology process. Identify the root cause of problems, never act on data or information that has not been verified.

Teach those who are doing the day job to see waste, empower them to make change.

Identify training needs and provide necessary support

Some of the changes clinical teams need to make will firstly require investment in training and development of staff. Do not instigate change without first ensuring staff are prepared and supported throughout implementation.

Address skill mix issues

Review the process to determine the skills necessary at each point. Only after this has been done can you start to change the skill mix in each area. Do not implement new roles on poor processes.

Invest wisely in technology

Introduction of new technology should not be used as a substitute for improving processes. Always ask the following questions:

- how does this technology support value adding processes?
- does it eliminate waste?
- if demand changes can the technology adapt without necessitating further expensive investment?
- does the technology support laboratory staff in continuous improvement of the process?
- is it the most flexible and least complex available?
- is technology being used as a sticking plaster to solve the symptom of a problem where poor process is the root cause?

Liker. JK, Meier. D. (2006)

Accelerating the pace of change

Whilst the pilot sites were engaged to test the learning and develop the changes over a period of 12 months, it is now clear that rapid improvements utilising these techniques and Lean Principles can be achieved in a relatively short period of time.

Lean Kaizen events over a period of 5 days enable issues to be identified, improvements to be implemented and the impact of changes felt immediately. This in turn encourages others that the time invested early on reaps huge rewards

Communicate, communicate, communicate

The need for good communication is often underestimated. All staff need to be aware of any improvement work being undertaken. Use all communication methods that are available. Staff meetings, newsletters, improvement notice boards where maps and data can be displayed, are useful in providing all staff with up to date information. Communicate regularly with users and those on whom the changes will impact. Feedback progress and results to patient and user groups. Provide feedback to executive and management leads.

“I think this project has given us the opportunity to scrutinise and improve parts of the pathology service. Seeking the views on what the service means to practices and surgery staff has been carried out too infrequently.”

PCT Service Development Facilitator

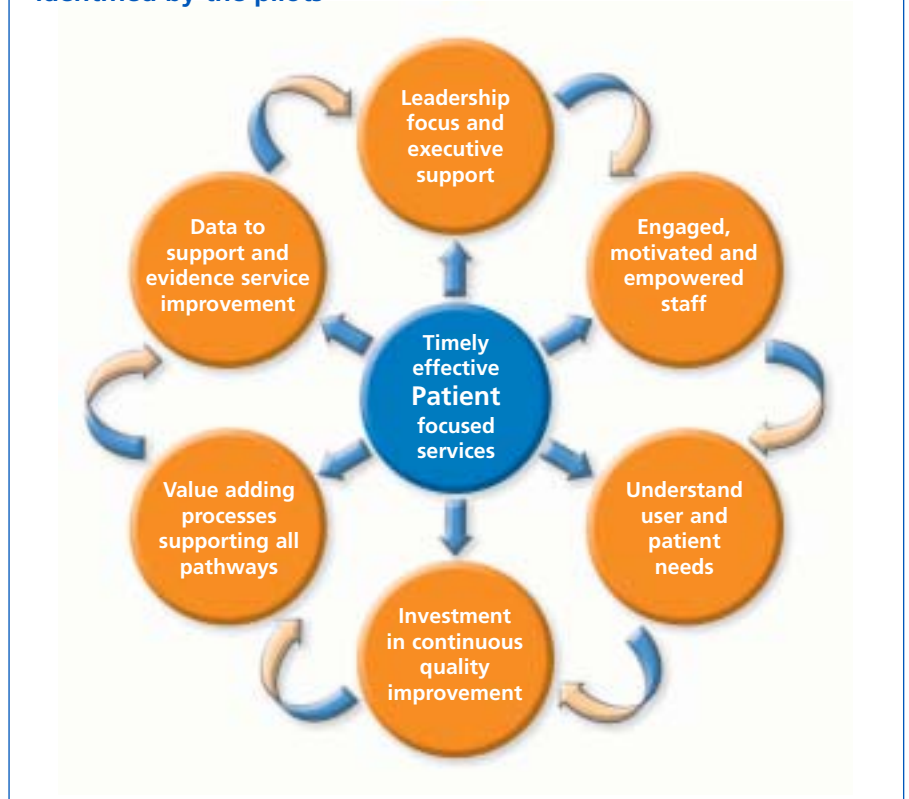
10. Building for sustainable change

Building for sustainable change

As part of the learning, the pilot sites were asked to consider the factors for achieving sustainable improvement. Figure 26 identifies the main elements the teams considered were essential to build sustainable change.

These elements are similar and consistent with redesign in other clinical services and are not unique to pathology. The work undertaken by the Cancer Services Collaborative 'Improvement Partnership' around sustainability of service improvement supports these findings and builds on the existing body of knowledge about sustainability.

Figure 26 - Factors for achieving sustainable improvement as identified by the pilots



“Spread and sustainability. The project has stimulated interest in pathology service improvement and is providing a sound basis to extend and continue these processes”

Royal Devon and Exeter NHS Foundation Trust

Looking to the future we need to understand the characteristics that will define a redesigned service, and be prepared to meet the challenges and actions required to achieve this.

What are the characteristics of a redesigned service?

- efficient and reliable patient focused services
- timely access and timely results
- implemented evidence based protocols
- agree standards against which the service is regularly performance managed
- appropriate use of skill across all staff groups with training and investment as required
- empowered and motivated staff with strong leadership – displaying a 'can do' attitude
- a culture that is not resistant to attempting change, where all job descriptions reflect an element of service improvement
- robust data collection systems
- processes in place that add value and support excellent clinical skills
- flexible capacity with the ability to meet changing service needs

What are the challenges?

- identifying and establishing strong clinical leadership and executive support
- mapping the service, identifying and eliminating steps that add no value
- gaining feedback from patients and other service users
- collecting, interpreting and understanding data
- design and accreditation of new roles to support redesigned processes
- supporting streamlined patient pathways and requesting patterns

What are the key actions to achieving this?

- understand user requirements – gain patient and user feedback regularly
- pathology staff using service improvement tools and techniques on a daily basis
- give staff the first opportunity to solve problems
- agree measures that reflect end-to-end patient experience
- appropriate development and utilisation of skills
- use technology to support value adding processes
- don't underestimate the work involved!

11. References, resources, useful information, acknowledgements and further reading

Pathology Service Improvement

Pathology: National Framework for Service Improvement - Sept 2005

Challenges and Top Tips for Pathology Service Improvement - Sept 2005

Modernising Pathology Services Toolkit - A Practical Guide to Redesign - Sept 2005

What a difference a day makes - Oct 2005

All documents available at:
www.pathologyimprovement.nhs.uk

Email: pathology@cscip.nhs.uk

Department of Health

Modernising Pathology Services - 2004

Modernising Pathology: Building a Service Responsive to Patients - Sept 2005

Creating a Patient-Led NHS - Mar 2005

All documents available at: www.dh.gov.uk

Cancer Services Collaborative 'Improvement Partnership'

Sustaining Cancer Waiting Times Through Effective Pathway Management - June 2006

How to Guide ... Achieving Cancer Waiting Times - Feb 2005 - June 2006

High Impact Changes for Achieving Cancer Waiting Times - Feb 2005

All documents available at:
www.cancerimprovement.nhs.uk

Useful websites

Pathology Service Improvement Website
www.pathologyimprovement.nhs.uk

Department of Health
www.dh.gov.uk

Cancer Services Collaborative 'Improvement Partnership'
www.cancerimprovement.nhs.uk

Cancer Patient Information and Experience
www.cancerimprovement.nhs.uk/patientexperience

18 weeks delivery programme
www.18weeks.nhs.uk

Commission for Patient and Public Involvement in Health
www.cppi.org

Database of Individual Patient Experiences
www.dipex.org

Department of Health. Patient and Public Involvement
www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/PatientAndPublicInvolvement/fs/en

Expert Patients Programme
www.expertpatients.nhs.uk

Improvement Leaders' Guides. Involving patients and carers
www.cancerimprovement.nhs.uk/nhs_ma_publications.html

Patient Advisory Liaison Service (PALS)
www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/PatientAndPublicInvolvement/PatientAdviceAndLiaisonServices/fs/en

Royal College of Pathologists. Patient Resources
www.rcpath.org/index.asp?PageID=11

What do patients want from primary care?
<http://bmj.bmjournals.com/cgi/content/full/331/7526/1199?ijkey=6UQvnx7hLRtfxP7&keytype>

Further reading

Bicheno J. (2000) Cause and Effect Lean. Lean Operations, Six Sigma and Supply Chain Essentials. PICSIE Books ISBN 0 9513 8301 9

Carey RG. Lloyd RC. (1995) Managing Quality Improvement In Healthcare. A Guide To Statistical Process Control Applications. Quality Resources. ISBN 0527762938

Goldratt E.M., Cox J., (2003) The Goal. Gower. ISBN 0 566 07418 4

Goldratt E.M., Schragenheim E., Ptak C.A. (2000) Necessary But Not Sufficient. The Nort River Press Publishing Corporation. ISBN 0 88427 170 6

Harrington H, (1998) Statistical Analysis Simplified. The Easy Guide to Statistical Process Control and Data Analysis. McGraw-Hill Education. ISBN 0079137296

Hart. MK, Hart RK. (2002) Statistical process control for healthcare
Duxbury Thompson Learning ISBN 0-534-37865-X

Liker. JK, Meier. D. (2006) The Toyota Way Fieldbook. McGraw Hill ISBN 0-07-144893-4

Womak JP. Jones Daniel T. (2003) Lean thinking. Banish Waste and Create Wealth in your Corporation. Free Press. ISBN 0-7432-4927-5'

Womak JP. Jones DT, Roos D. (1991) The Machine That Changed the World. The Story of Lean Production. First HarperPerennial. ISBN 0 06 097417-6

Resources

Pathology discussion board provides email communication system to support queries. Help share best practice and experiences.

To join contact:

Shirley Steeples

Tel: 0116 222 5113

www.pathologyimprovement.nhs.uk

For further information on pathology service improvement and the application of lean in pathology contact the Pathology Service Improvement Team.

Pathology Service Improvement Team

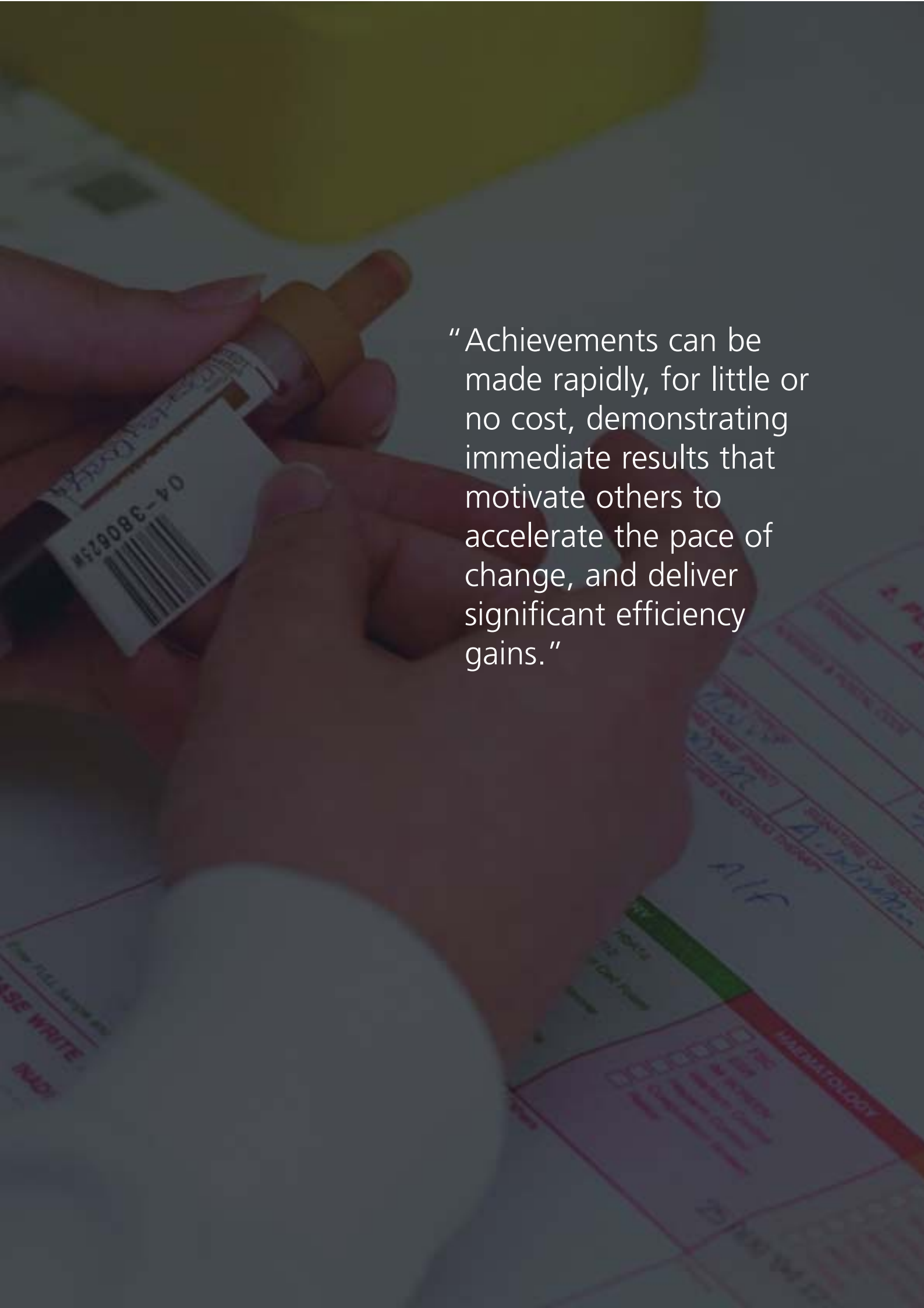
3rd Floor, St Johns House, East Street, Leicester LE1 6NB

Tel: 0116 222 5113

Email: pathology@cscip.nhs.uk

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A person's hands are shown holding a small vial with a white label. The label has a barcode and the number '04-380623M'. The vial is held over a document that features a table with columns and rows, some of which are highlighted in green and red. Handwritten notes, including 'AIF' and 'A. J. J. J.', are visible on the document. The background is dark and out of focus.

“Achievements can be made rapidly, for little or no cost, demonstrating immediate results that motivate others to accelerate the pace of change, and deliver significant efficiency gains.”



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