Evaluation, Research and Development Unit

Report

The use of Lean methods for service improvement in the early diagnosis of lung cancer, a realistic evaluation

Dr D Hodges, Prof G Rubin, Prof A Crosland

1 Department of Pharmacy, Health and Wellbeing, Faculty of Applied Sciences, University of Sunderland
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Executive Summary</td>
<td>3</td>
</tr>
<tr>
<td>2 Background</td>
<td>5</td>
</tr>
<tr>
<td>3 Programme Description</td>
<td>6</td>
</tr>
<tr>
<td>4 Methods</td>
<td>8</td>
</tr>
<tr>
<td>4.1 Realistic Evaluation</td>
<td>8</td>
</tr>
<tr>
<td>4.2 Ethical Considerations</td>
<td>9</td>
</tr>
<tr>
<td>5 Results</td>
<td>10</td>
</tr>
<tr>
<td>5.1 Kaizen Events</td>
<td>11</td>
</tr>
<tr>
<td>5.1.1 Common Structure and Themes</td>
<td>11</td>
</tr>
<tr>
<td>5.1.2 Happy House</td>
<td>13</td>
</tr>
<tr>
<td>5.1.3 Southwick Medical Centre</td>
<td>16</td>
</tr>
<tr>
<td>5.1.4 Deerness Park Medical Centre</td>
<td>19</td>
</tr>
<tr>
<td>5.1.5 Report Outs</td>
<td>21</td>
</tr>
<tr>
<td>5.2 Rapid Process Improvement Workshop</td>
<td>27</td>
</tr>
<tr>
<td>5.2.1 Planning</td>
<td>27</td>
</tr>
<tr>
<td>5.2.2 Event Descriptions</td>
<td>28</td>
</tr>
<tr>
<td>5.2.3 Report Outs</td>
<td>34</td>
</tr>
<tr>
<td>6 Discussion</td>
<td>39</td>
</tr>
<tr>
<td>6.1 Primary Care Changes</td>
<td>39</td>
</tr>
<tr>
<td>6.2 Secondary Care Changes</td>
<td>40</td>
</tr>
<tr>
<td>6.3 Engagement of Participants</td>
<td>41</td>
</tr>
<tr>
<td>6.4 The Role of Lean for Facilitating Improvement</td>
<td>42</td>
</tr>
<tr>
<td>6.5 Limitations of the Study</td>
<td>46</td>
</tr>
<tr>
<td>7 Conclusions</td>
<td>47</td>
</tr>
<tr>
<td>8 Recommendations for Future Use of VMPS and Lean</td>
<td>48</td>
</tr>
<tr>
<td>9 References</td>
<td>50</td>
</tr>
<tr>
<td>Appendix A</td>
<td>52</td>
</tr>
</tbody>
</table>
1 – Executive Summary

Background
The Cancer Reform Strategy second annual review reiterated the importance of early diagnosis of cancer. For lung cancer, diagnosis often occurs at late stages with advanced disease, leading to palliative instead of curative care. Recommendations to improve GP access to diagnostic tests including chest x-rays is recognised as one factor which could improve five-year survival rates. Two primary care organisations (PCOs) in the North of England were funded by the National Cancer Action Team to conduct service improvement initiatives to improve the early diagnosis of lung cancer in primary and secondary care.

Aims and Methods
This study evaluates improvement initiatives for lung cancer diagnosis organised by PCOs using a Lean management approach known as the Virginia Mason Production System (VMPS). This was an observational study using the qualitative method of Realistic Evaluation. Findings are presented in terms of the contexts in which improvements are made, the mechanisms which lead to their success or failure, and the intended or unintended outcomes which result. The relationship of these three factors generates a theory of how lung cancer diagnosis can be improved by other primary healthcare organisations.

Findings
Two different Lean methods to facilitate service improvement were evaluated. These used either Kaizen workshops targeting individual GP practices or a Rapid Process Improvement Workshop (RPIW) addressing primary and secondary care improvements together.

Targeting individual GP practices resulted in practices being able to identify areas of improvement within their own systems, and to create solutions specific to these problems. Systems to track patients with symptoms suspicious of lung cancer were introduced to provide prompt patient review and to prevent patients becoming lost to follow up. Access to services was addressed through review of appointment systems to allow patients with suspicious symptoms to be seen the same day. Opportunities for patient education during chronic disease management reviews and opportunistic health promotion within the practice were also identified. This created a high level of engagement for those involved. There was evidence that one of the mechanisms which made the improvements successful was the high level of ownership that occurred as a result of being directly involved in the improvement. Disseminating the findings to other practices within the PCO was difficult. This appeared to be due to the need for ownership of the process in order to fully adopt changes within a practice. In excluding secondary care from the improvement process, areas of concern regarding radiology processing of chest x-rays were identified but there was no immediate mechanism to address them.

The RPIW combined stakeholders from primary and secondary care to review the process of x-ray referrals from GP requesting an x-ray to receiving a report. Bringing these groups of stakeholders together allowed discussion of processes currently outside individual stakeholder control but relevant to the whole PCO, and to make practical suggestions as to how these might change to improve patient care. A practice guideline for the provision and referral of chest x-ray services was designed from these discussions. This removed the majority of system delays and is to be implemented following review and agreement from
clinical governance. Problems occurred with maintaining engagement from stakeholders involved in the process, with the responsibility of implementing change devolving to the organising PCO. This resulted in significant delays in the implementation of improvements.

**Conclusion**

Lean methods provide a structured approach for service improvement and offer solutions for combining the expertise of primary and secondary care. Making improvements with individual GP practices results in specific changes being made which may lead to a significant service improvement, but are not necessarily transferrable to other practices. When working with larger groups of stakeholders, the creation of guidelines and protocols to improve locality services can be achieved, but care has to be taken to maintain the engagement of those involved to achieve. The use of Lean through the VMPS has identified a series of improvements to the diagnostic pathway for lung cancer which could be adopted by other healthcare organisations.
2 – Background

The diagnosis of lung cancer can be a complex process due to the variability in both the presentation of symptoms and their severity in the early stages of disease. Nationally, the Cancer Reform Strategy second annual report\(^1\) has reiterated the importance of early diagnosis, highlighting that the stage of cancer at diagnosis is a significant challenge facing the NHS. Too many patients are currently diagnosed at late stages with consequently more advanced disease, leading to palliative instead of curative care. This is reflected in low one-year survival rates; the most recent rate published in 2009 for one-year survival across all PCTs is 28.1%, with all three PCTs in this study marginally above this figure (County Durham PCT 29.1%, Darlington PCT 34.5%, and South of Tyneside PCT 30.1%). To achieve earlier diagnosis the report recommends that work needs to be done to promote awareness and early presentation to primary care, to eliminate delays within primary care and provide GPs with better access to diagnostic tests. Early diagnosis through improved use of radiological investigation is recognised as one means of improving five-year survival rates for lung cancer.

The results of a significant event audit (SEA) funded by the National Awareness and Early Diagnosis Initiative (NAEDI) examined recent diagnoses of lung cancer within general practice, and provided collaborating evidence of unnecessary delays in diagnosis\(^2\). Delays of greater than one month were found between first presentation and referral of lung cancer in 45 of 132 cases, and it was recognised that the process of requesting and reporting of chest x-rays was a significant contributing factor to this delay. As a result of this work, two primary care organisations, County Durham and Darlington, and South of Tyne and Wear, were commissioned by the North of England Cancer Network to implement service level improvements informed by the findings of the SEA.

Within the North East of England there has been a strategic shift towards implementing a single structured approach to service improvement known as the North East Transformational System (NETS). This concept encompasses three key values, vision, compact and method. The vision is to become a ‘leader in excellence in health improvement’ with a compact, or agreement, that all members of the organisation will work together and share a common approach to working practices. For the method, the SHA has adopted the Lean methodology of the Virginia Mason Production System (VMPS). The approach used by this Seattle based healthcare provider is viewed as the leading approach to use of Lean within the healthcare setting. The evidence for the use of this approach in healthcare along with the rationale for selection is beyond the remit of this study but can be found in the initial scoping study for NETS\(^3\).
3 – Programme Description

Both participant PCOs had been involved with the significant event audit of lung cancer diagnosis in 2009. The initiative under study is a response to these findings, with the aim of reducing delays within primary care and generating a shift towards earlier diagnosis. The project was funded by a grant from the National Cancer Action Team.

South of Tyne PCO chose to use Kaizen events to facilitate change within three GP practices. Kaizen events are short workshops typically of two days duration, which take a focused approach to a well defined problem. The structure of these events includes a planning meeting held six to eight weeks before the Kaizen event to provide staff education on the Lean methods to be used, along with data gathering to generate an overview of the current state of practice. The two day event then systematically examines the current state to identify areas of improvement to be implemented over the following 90 days, leading to a ‘future state map’ of how the redesigned service should look at the end improvement process. The steps taken towards implementing the changes are examined at 30, 60 and 90 days to ensure the project remains focused and it achieves the targets. Each GP practice held its own Kaizen event independent of the other practices, focusing on its own needs to change and improve practice. Participating practices were invited to be involved as a result of their previous involvement in PCO service development and innovation, and because they were perceived to be early adopters of change within the locality.

County Durham and Darlington chose an alternative approach of a single rapid process improvement workshop (RPIW). Recruitment was targeted at practices that had worked with the PCO on previous similar events. An RPIW spans five days, and brings together multiple primary and secondary care stakeholders into a large working group. The scope of the event is broader than in a Kaizen event, but approaches the task using the same methods of establishing the existing current state prior to the event and then using this to identify changes and plan a future state. With a larger scope, problems and areas of improvement may be examined to a greater depth and address whole system processes. Follow up meetings to measure improvements are arranged at 30, 60 and 90 day stages. The Lean approach is demonstrated below as a linear process to service improvement.
Common to both of these events is the importance of having a facilitator for the event who is trained in the use of the Lean methods of the VMPS. These skills were available since both PCOs had adopted the VMPS approach as their managerial method. External consultants from Virginia Mason were also involved in the RPIW as PCT staff training was ongoing in this approach.
4 – Methods

4.1 – Realistic Evaluation

This study uses the method of realistic evaluation (RE) developed by Pawson and Tilley⁴. A realist approach in this context can be described as evaluating ‘what works for whom and in what circumstances’. The data is presented in terms of the contexts, mechanisms and outcomes (CMO) of the programme being evaluated. The choice of RE as the research methodology was based upon the need to understand the complex interactions which result during service changes within the NHS, allowing for discovery of the interplay between stakeholders and the political and cultural settings which lead to improvement in patient services. It is an approach which aims to look beyond the short term benefits of a single evaluation, and advocates the importance of looking at ‘evaluations in the plural’⁵ to generate a robust evidence base which builds upon prior knowledge and experience to capture a wider view of the evaluation in the context in which it exists. The approach is described by the authors as follows;

‘gives research the task of testing theories of how program outcomes are generated by specific mechanisms and contexts, a task which involves making inter- and intra-program comparisons in order to see which context-mechanism-outcome configurations are efficacious…’⁶

Observation of CMO combinations lead to conjecture about potential future CMO configurations which may or may not exist in one program, which can then be measured against further programs to generate theories on the true nature of what leads to successful change within these events.

Originally applied in the fields of sociology and criminology, the use of realistic evaluation within healthcare is a relatively recent development and as such high quality examples are limited. A large scale study in London demonstrated the role of realistic evaluation in measuring health care transformation, utilising the methods to make continual improvements to a modernisation programme⁷. The utility of realistic evaluation for PCT programmes has been demonstrated by Kennedy et al. who analysed the mechanisms needed to support the implementation of the national expert patient programme⁸. The application of realistic evaluation of Lean methodology in healthcare has been previously attempted⁹, but drew conclusions without exploring the importance of identifying the underlying mechanisms for change. Work by Tolson et al. highlights the benefit of using realistic evaluation in primary care development of clinical networks for palliative care, describing it as ‘facilitative, problem solving approach’¹⁰. This is further supported by Byng et al. who developed the use of realistic evaluation with analytical induction and demonstrated its potential role in identifying the factors which led to achieved and failed outcomes of an interventional study within the NHS¹¹.

In this study direct observation of events supplemented by documentary analysis provides the data for the realistic evaluation. Documents used include;

- Minutes and action plans arising from PCT planning meetings
Internal evaluations and reports of the recommendations arising from the events
Learning resources used to implement Lean methods provided through the North East Transformation System with the SHA
PCT, SHA and national policy documents

Direct observation or interviews which could lead to the identification of those involved are not used within this study. Instead, the researcher’s experience in observing the events is utilised to describe in detail certain key elements which would not otherwise be described by documents alone. Where the improvements focused on individual practices the choice was given to whether they wished to be identified, and all three gave consent for this.

Data is constructed using a progressive approach, with each event observed generating combinations of contexts, mechanisms and outcomes. Theorisation of how these may apply to the next event is then tested to create an evolving hypothesis of what the true CMOs for successful service improvement may be. The goal is to define a clear understanding of the CMO which can then be disseminated to a wider audience for future application and testing.

4.2 – Ethical Considerations

The proposal for this study was submitted to the NHS Regional Ethics Committee for South of Tyne and Wear PCT prior to the commencement, and was deemed to be service evaluation and as such did not require formal NHS ethical review. The proposal was also submitted to the University of Durham, School for Health Research Ethics Committee who agreed this work did not require a full ethical submission. All participants within the event were aware of the presence of a researcher during the process, and opportunity was taken to explain that no identifiable data would be used within the report. As such written consent was not sought, and implied consent to participate in service review and improvement as part of the Lean events was seen to be implicit to the process.
# 5 - Results

The three Kaizen events were conducted sequentially, followed one month later by the RPIW. Analysis was done between each event to develop and refine the CMO configurations and to develop theory as the evaluation progressed. The contexts which existed at the beginning of this process are described below. Observed CMO configurations are developed to build upon the increasing knowledge base generated by each event to demonstrate the evolutionary nature of the process.

## Table 1 – Original Contexts

<table>
<thead>
<tr>
<th>National and Regional</th>
<th>PCT</th>
<th>Primary Care (Conjectured)</th>
<th>Secondary Care (Conjectured)</th>
<th>Individuals (Conjectured)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer reform strategy recommending work needs to be done on awareness and early diagnosis</td>
<td>Role of the North East Transformational Service (NETS) in improving effectiveness and patient care</td>
<td>Practice commitment to improve the patient experience and reduce potential harms and delays</td>
<td>Potential for service improvement and cost savings</td>
<td>PCO managers need to be trained and gain experience of Lean to develop a critical mass of Lean practitioners</td>
</tr>
<tr>
<td>National Awareness and early diagnosis initiative raising profile of the importance of early diagnosis</td>
<td>Adoption of Lean methodology through the VMPS as their managerial method</td>
<td>Involvement of research practices with funding for involvement in such events and a vested interest in improving patient care</td>
<td>Desire to improve the patient experience and choice of service delivered</td>
<td>GPs funded through the PCO to lead on cancer service improvements</td>
</tr>
<tr>
<td>Results from the significant event audit demonstrating unnecessary delays</td>
<td>Corporate projects within public health for reducing early cancer deaths</td>
<td>Not planned as a method of reducing costs but of improving efficiency of service delivered to patients</td>
<td>Early adopters, staff interested in Lean innovation at an early stage</td>
<td></td>
</tr>
</tbody>
</table>

---

10 / 53
5.1 – Kaizen Events

Three practices participated in the Kaizen event from the invited practices in the South of Tyne and Wear PCT. They represented similar populations within the city of Sunderland, and the practice demographics are listed below

Table 2 – Practice Demographics

<table>
<thead>
<tr>
<th>Practice</th>
<th>Patient List Size</th>
<th>Whole time equivalent GPs</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happy House</td>
<td>4,500</td>
<td>2</td>
<td>Urban</td>
</tr>
<tr>
<td>Southwick MC</td>
<td>10,000</td>
<td>6</td>
<td>Urban</td>
</tr>
<tr>
<td>Deerness Park</td>
<td>9,000</td>
<td>8</td>
<td>Urban</td>
</tr>
</tbody>
</table>

5.1.1 – Kaizen Events: Common Structures and Themes

All three Kaizen events followed a structured method as set out in the VMPS. All events had a sponsor who took responsibility for the event, providing an initial motivational push and outlining the aims and objectives of what should be achieved through the workshop. The sponsor must be sufficiently senior to be able to influence implementation and should be aware of the role of the sponsor and preferably (but not essential) have undertaken full training and accreditation through the VMPS. They offer support to the organisation of the event, and are the individual to whom the findings are presented at 90 days. For all three Kaizen events the sponsor was the PCT Director of Public Health. Having high level representation at these individual practice events, demonstrated the degree of priority given to lung cancer diagnosis by the PCT.

The Director of the Cancer Network acted as the event organiser and facilitator, assuming a dual role of providing education on the VMPS methods, and providing facilitation to the improvement process. No agenda of proposed changes was brought by the PCT to these events, instead the process was expected to be organic with ideas generated reflecting the views and opinions of the participants for service redesign.

The events followed a fixed structure. Six weeks prior to the event a half day training session was held in the practices, there was education on the VMPS for the two practices not previously involved with this method, whilst the third practice mapped out the current pathway for x-ray referrals. This process is represented in diagram 2.
Diagram 2 – Primary Care Referral Process

The first day of the event is spent reviewing VMPS and Lean in terms of the method, and the wider context within the local NHS. This is followed by a review of the pathway from investigation to referral generated from the planning meeting. Referred to as the current state map, it identifies the stages of the patient journey from presentation with a potential cancer symptom to the diagnosis or exclusion of disease. Timings are added which represented approximations of the delay which existed at each step, calculated from data collected from each individual practice. Visually this is represented within the pathway, and demonstrates where the greatest delays currently exist. The total length of time taken for the pathway was referred to as the lead time. The decision had been taking during the organisation of the event within the PCT to aim for a reduction of lead time by fifty percent as this was felt to be an achievable target.

The choice of who would attend the Kaizen event was at the discretion of the practices involved. Every member of the team was asked to produce a minimum of five ideas based on avoidable delays, describing current problems from their perspective within the system. These are the basis for an in-depth discussion of how these should be approached and potentially resolved. Those ideas which show promise are taken forward for further discussion and development. Workable solutions are devised and refined ready to be taken back to the workplace at the end of the event to be put into action straight away. The ideas are used to refine the current state map, creating a future state map which demonstrates the reductions in delays and how the process should exist once all the ideas have been implemented.

With the Kaizen events, because they only involved representatives from primary care organisations, problems within the patient journey which fell outside of primary care control
could be identified but not acted upon. To avoid unnecessary discussion of these problems, the ideas are placed on a separate ideas list referred to as the ‘parking lot’ which can be taken forward to the sponsor as barriers to be investigated further, but are outside of the influence of this event.

A final report is drafted to include all the actions to be taken as a result of the Kaizen event, allocating responsibility for the tasks to individual away team members and setting the timeframe in which the change should be completed. By 90 days, all the changes should have been made with the future state value stream becoming the new current state, ready to be disseminated to a larger group of practitioners.

5.1.2 – Kaizen Events: Happy House

This practice chose representatives from clinical, managerial and clerical teams. The presence of the GP and practice nurse represented staff who offered an understanding of the patient’s needs and the current barriers to investigation and diagnosis. The practice manager and data entry clerk provided a perspective of the organisational barriers which could cause internal delays within the practice.

Two principal areas of delay were identified by this group. The first was the delay between patients presenting to the doctor with symptoms suspicious of lung cancer and these symptoms being recognised and acted upon. The second delay was in the time elapsed between a request for radiological investigation and the GP reviewing the patient with results.

Having a wide spread of professionals within the group allowed for a diverse approach to the problem of patient presentation to the practice. The practice nurse explained that most of the patients who present with symptoms of lung cancer are already under review for other chronic diseases on an annual basis, the most likely being COPD. As such, discussion centred on patient awareness of the signs and symptoms of lung cancer as an integral part of chronic disease management. It was agreed that the practice would pilot COPD review forms which included questions around potential lung cancer symptoms, along with patient information regarding these symptoms. During the second day, time was made available to start designing these forms during the Kaizen event, so that when the team returned to the practice they already had a workable document to implement. To supplement this, the practice manager agreed to create patient information adverts for showing on the television screens in reception to highlight the priority lung cancer diagnosis has in the practice offering opportunistic patient education.

There was recognition that there would be aspects of the chest x-ray pathway that would be outside of the control of the Kaizen event, but that this should not stop the practice making their own processes as efficient as possible. There was considerable frustration at the delays perceived to occur within secondary care, and discussion of what influence primary care should have over this ensued. The current role of commissioning services from primary care was criticised, with a feeling that secondary care did not provide a service that was acceptable. This idea was parked, but an attending Cancer Network manager agreed to review this at a later stage. There was a hope that if other practices felt similarly then this could be addressed through the future commissioning of radiology services within the region.
Practice changes to the appointment system were identified jointly by the practice manager and data entry clerk. There were problems with access to urgent appointments if a patient presented with new onset red flag symptoms, and it was felt that often urgent appointments were viewed as extra appointments to be filled with any patient once all the other appointment slots had been filled. Resulting from this, a full review of the urgent appointment system was planned within the next month, with the aim of making urgent appointments only available for urgent problems, with GP screening of patients for allocation to these slots. In addition to this, the GP partner felt that there could be scope for telephone consultation leading to referral for urgent chest x-ray or a direct two week rule referral before the patient is seen to reduce delays in these systems. This was again to be piloted following the event to see if this was a feasible idea. One problem noted was that lung cancer symptoms, although one of the most common cancer seen in primary care, represent a small percentage of overall consultations, and that making significant changes to the practice systems to reduce delays may impact upon other areas which are equally important. This would also make evaluating improvements to systems difficult due to the rarity of patients presenting with symptoms choosing to book telephone consultations.

A lack of understanding of the urgency of chest x-ray requests from both the practice and the patient was seen to be a major modifiable delay. These delays had been seen in the time taken from patients receiving the x-ray request to attending for chest x-ray. Patients were currently required to attend during working hours at a time suitable for them. A visual control method, using red stickers attached to x-ray requests stating the x-ray must be taken within two days was designed, as a prompt to patients to have the x-ray done as soon as possible. Concerns that x-ray results were taking too long to be received by practices and a lack of awareness of if and when the patients had attended for x-rays, had been highlighted by the SEA and was discussed. A system for tracking all requests and results was thought to be needed to manage this problem. The decision was made to keep a rolling index of chest x-ray requests which would be monitored by the reception team, checking weekly through the electronic results system if the x-ray had been taken, and if it had been reported. This would be used to contact the patient if they had failed to attend and to monitor delays in secondary care, with requests for more urgent reporting if these delays were found to be significant.

A review of the practice’s use of electronic records was also proposed. There was a concern raised by the Cancer Network manager that patients would often present several times to their GP before referral for further investigation was made. Discontinuity of care when patients saw different healthcare staff for similar problems could delay diagnosis, so a review of the system was agreed to see if medical records could offer great linkage of problems.

Urgent referral for suspect lung cancer through the two week rule referral were currently done through faxed requests. The provision of choose and book appointments for this had recently occurred in the PCT, and the practice made a commitment to utilise this service immediately.
<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>MECHANISM</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCT Adoption of LEAN methodology through the VMPS as their managerial method</td>
<td>Structured approach of LEAN methodology with the Kaizen event</td>
<td>Plan for 30, 60, 90 day report out</td>
</tr>
<tr>
<td>Regional implementation of ‘choose and book’ for two week rule referrals without requirement for use</td>
<td>Cancer network manager present to explain and reassure about the use of ‘choose and book’</td>
<td>Choose and book implementation for 2 week rules</td>
</tr>
<tr>
<td>Lean methods recognising the importance of involving all staff members with the Kaizen event</td>
<td>Involvement of clerical and administration staff to examine the appointment system objectively. Value stream map demonstrating practice delays to patient journey</td>
<td>Restructuring of appointment systems in improve patient access</td>
</tr>
<tr>
<td>Practice commitment to improve the patient experience and reduce potential harms and delays Results from the significant event audit demonstrating unnecessary delays</td>
<td>Findings from SEA demonstrated previous areas of delays in diagnosis – involvement with preceding SEA study</td>
<td>Chest x-ray prioritisation, visual reminders and commitment to early action</td>
</tr>
<tr>
<td>Lean methods recognising the importance of involving all staff members with the Kaizen event</td>
<td>Involvement of nursing team who manage chronic disease and are able to link lung cancer awareness to the work they do</td>
<td>Patient awareness programme and COPD pilot review form</td>
</tr>
<tr>
<td>PCT funding for further practice audits</td>
<td>Further three SEA conducted as part of preparation work for Kaizen event</td>
<td>Improvement in patient records through improved linking of consultations</td>
</tr>
<tr>
<td>PCT commitment to reducing cancer deaths as key policy</td>
<td>Attendance of regional cancer services manager to event Use of parking lot for ideas</td>
<td>Areas of local commissioning problems identified and actions agreed for these</td>
</tr>
</tbody>
</table>
The team composition included representation from all staff groups within the practice, with two GP partners, practice manager, practice nurse and senior secretary attending the event.

Individual motivations for involvement within the Kaizen events were an important aspect of the practice’s choice to be involved with this event. Several team members recognised following the original half day planning session that the methods described by Lean could be applied to other aspects of the practice, and that this event could be the first step to implementing Lean thinking within the practice. This view was balanced with the rejection of some Lean ideas which were thought to be too regimented and did not reflect the individual nature of primary care delivery.

The concept of standard work appealed to this practice, and they felt that with problems as significant as lung cancer symptoms it would be important to ensure that all patients received the same high level of care. There was strong motivation from the GPs involved to look closely at their current management of patients diagnosed with lung cancer to see where the delays currently occur. The practice had examined its current state through a retrospective audit of lung cancer diagnoses in the last 3 years and presented the data from this. Many of the findings complemented those already highlighted in the SEA, but an important addition was the examination of the co-morbidities of this patient group. Less than half the patients diagnosed with lung cancer had been coded as having COPD or other chronic respiratory disease, and smoking status was often coded incorrectly. This posed the question of how the practice could target at risk groups, if these patients have not been identified as high risk before the diagnosis of lung cancer. It was agreed that further review of patients with lung cancer would be done to identify where interventions such as patient education could be targeted for maximal efficacy.

This practice also thought that secondary care delays with CXR reporting would limit the scope to reduce time delays. The practice wanted a local agreement on the timeframe for reporting CXR, so that their protocols could be designed to incorporate this. This was placed within the parking lot to be taken forward after the event for secondary care providers to examine.

Investigation into new onset respiratory symptoms was seen, through the internal practice audit and external SEA, to vary between GPs within a single practice, and between different GP practices. This practice wanted to create an agreed set of investigations that would be done routinely in any patient presenting with new onset symptoms, so that all necessary tests would be performed routinely and delays from misdiagnosis at initial presentation could be avoided. The idea of a respiratory screen to include chest x-ray, spirometry, ECG and baseline blood investigations was designed, this would be implemented and evaluated in the 90 days following the event.

Incorporated into this respiratory pathway would be a system of tracking the results of these tests, and importantly accessing CXR results in a timely fashion. The practice currently waited for CXR results to be sent in either electronic or paper format to the practice before being acted upon. The data the practice had regarding this was reviewed between the two days of the event, with one partner returning to the practice to review the requests for the last
month. They found results would often be available through the electronic results system several days before being formally sent to the practice. Proposals were made that results could be pulled through the system by the practice using the electronic link to secondary care to access these results, rather than waiting for the results to be pushed to them. The concept of employing a pull opposed to push system is one demonstrated through Lean methods to reduce delays as a proactive approach to managing results and data, and gives ownership of responsibility to those requesting the tests, rather than being reactive to the actions of others. The need for this proactive attitude was viewed by the GPs to be a result of secondary care failing to deliver a service which was fast and reliable.

There were concerns that two week rule referrals were delayed because the GP did not immediately submit the referral. The practice has developed new guidance which incorporates an agreement that requests must be fully completed the same day.

Ideas were generated for education opportunities and improving awareness amongst both staff and patient groups. The team were keen to look at other public health strategies for increasing awareness of lung cancer which have been implemented in Doncaster and Rotherham, and they also wanted to know more about the Hamilton risk scores which are under design to identify the importance of specific symptoms in lung cancer. There was not sufficient time to explore these findings in-depth, so the practice planned to hold a staff education update within the 90 day timeframe to discuss aspects which are transferrable and easily applied to their patient population.

Working in a busy GP practice was raised as a potential barrier for facilitating change. There was recognition of the benefits from being outside the practice during this event. It offered an opportunity to be objective about changes, broke down professional barriers between team members, and reduced the likelihood of interruptions. The decision was made that in order to fully benefit from the findings of the event, protected time would be provided to all away team members in order to successfully implement the changes on returning to the day to day running of the practice.
## Southwick Medical Centre Specific CMO

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>MECHANISM</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEA findings demonstrate variation in investigation patterns for suspicious lung symptoms</td>
<td>Lean methodology of devising standard work</td>
<td>Design of a respiratory pathway for the investigation of potential lung cancer symptoms in primary care including result tracking system</td>
</tr>
<tr>
<td>Regional implementation of 'choose and book' for two week rule referrals without requirement for use</td>
<td>Lean methodology of devising standard work</td>
<td>Protocol for referrals under the two week rule</td>
</tr>
<tr>
<td>PCT requirement to act on cancer as part of its strategic vision</td>
<td>Funding to provide locum cover to create protected time away from the practice</td>
<td>Team productivity resulting from reduced interruptions and breaking down of professional barriers. Protected time to implement changes after the event.</td>
</tr>
<tr>
<td>Practices with previous involvement in improvement events or research</td>
<td>Highly motivated individuals involved willing to commit time and practice resources to cancer care</td>
<td>Desire to implement public health strategies locally and to be engaged in ongoing research in this field. Commitment to ongoing internal audit and research to identify patient groups to target for lung cancer awareness education</td>
</tr>
<tr>
<td>High quality information technology systems within the PCT</td>
<td>Recognition of potential underuse of current information technology services available</td>
<td>Proactive approach to pull chest x-ray reports into the practice instead of waiting for results to be pushed to them</td>
</tr>
</tbody>
</table>
5.1.4 – Kaizen Events: Deerness Park Medical Centre

As with the previous two practices, the team composition for Deerness Park included two GP partners, the practice manager and the senior nurse, but did not include a member of the reception team. The lead GP at this practice had been previously involved in Lean training and had previous experience of using Lean methodologies to improve his own practice. This factor influenced both the decision to be involved and the enthusiasm within the group.

There was a feeling within this group that the practice appointments system, although designed to allow access to a health professional within 48 hours for any patient, was not sufficiently sensitive to identify and address urgent problems such as the symptoms that lung cancer might present with. The ability of patients to book urgent appointments for non-urgent conditions was identified as a major problem. The number of urgent slots was deemed to be acceptable, but how the slots were utilised was not. The practice manager felt that it was impossible to ask the reception team to assess the urgency of the problems as they were not medically trained. A redesigned system was suggested where urgent slots could only be booked after the patient had been triaged by a telephone consultation with the on-call GP. This would be piloted to assess the impact on the GP workload prior to full adoption.

Deciding if a chest x-ray request should be categorised as urgent or routine was a problem the practice recognised, with differences found in the time taken to receive the report depending upon the priority given. The cancer network manager reminded the team that if they are considering cancer as a differential diagnosis, regardless of how likely it may be, that they should consider the chest x-ray request to be a priority. The GP with previous Lean experience wanted to change the diagnosis pathway for patients with lung cancer, at present only 10% of patients were diagnosed through an initial urgent chest x-ray, whereas he felt this number should have been closer to 90%. Having an agreement both within the practice and with the secondary care trust regarding what constituted an urgent x-ray request would address this, and this action was agreed to be taken forward to the next practice meeting for discussion.

As a result of the unpredictable length of the time taken to receive chest x-ray reports, the practice felt there was a need to develop a system of tracking requests and patient attendance. The practice was dependant on receiving reports from secondary care either through the electronic results system or via paper copies. There was often a delay between the results becoming available electronically, and the electronic result being sent to the practice to review. GPs could look in the hospital information system for these results not yet back, and there was agreement that this could be done on a routine basis. This mirrored the findings of Southwick medical centre, designing a method where results would be pulled into the practice. A system to track results was to be tested, with reception or admin staff being asked to keep a record of all requests and searching for the results on a regular basis after this time. The option would then be available to contact patients if they failed to attend, or if they needed to be seen urgently as a result of the x-ray findings.

Prioritising results was important, with the team deciding they should be committed to contact patients within 24 hours of results being received, either by via telephone or by booking a review consultation. This would be a priority for abnormal results, but there was also a commitment to review patients even if the result was negative as persistent symptoms
might still warrant an urgent respiratory referral. The key barrier to contacting patients was the inaccuracy of the electronic patient records, with telephone numbers held being incorrect. Agreement was made that the referring GP would take responsibility for ensuring that the contact details were correct and that this would be included into part of the standardised protocol the GPs would follow when arranging chest x-rays.

Consideration of how patients present to GPs with symptoms of lung cancer highlighted the belief that cancer was often found incidentally when investigating other conditions. Many of the patients who were found to have lung cancer were already being seen regularly for chronic disease management, most often COPD. The opportunity was seen to improve patient awareness of cancer symptoms in this patient group, and so there was agreement to include advice on the signs and symptoms as part of the patient management plan the practice used for COPD patients.

**Deerness Park Medical Centre Specific CMO**

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>MECHANISM</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>National requirement to offer appointments within 48 hours for all patients</td>
<td>Kaizen event allowed practice manager to highlight that allocating urgent appointments is a clinical decision</td>
<td>GP telephone triage for patients requesting urgent same day appointments</td>
</tr>
<tr>
<td>No local PCT or secondary care protocol for deciding urgency of CXR requests</td>
<td>Opportunity for primary care to discuss concerns with cancer service leads about use of current service</td>
<td>Agreement to consider all x-rays referred for suspicious symptoms as urgent</td>
</tr>
<tr>
<td>SEA findings demonstrate variation in investigation patterns for suspicious lung symptoms</td>
<td>Lean methodology of devising standard work</td>
<td>Tracking system for requests and reports and agreement to contact patients within 24 hours of results being available</td>
</tr>
<tr>
<td>Lean methods recognising the importance of involving all staff members with the Kaizen event</td>
<td>Involvement of nursing team who manage chronic disease and are able to link lung cancer awareness to the work they do</td>
<td>Introduction of symptom awareness through chronic disease management</td>
</tr>
<tr>
<td>Practice commitment to improve the patient experience and reduce potential harms and delays</td>
<td>Review of internal delays through structured lean methods</td>
<td>GP responsibility for patient contact details</td>
</tr>
</tbody>
</table>
To maintain the momentum of the events, progress reports were organised for 30, 60 and 90 days following the initial workshops. The events were in late January and early February 2010, a time recognised by all involved as one of the busier periods in the general practice year due to the importance of submitting data for the Quality Outcomes Framework by the end of March. To facilitate this, the decision was made to hold the 30 day report outs within practices during lunch breaks, and for the 60 and 90 day reports to be held outside the practices but in the locality during the practice lunch hours.

The 30 day review checked that the practices were beginning to implement the immediate changes agreed during the events, and that ideas that needed further discussion had been discussed and plans for implementation were in place. Progress at this stage was not measured, but this acted as a reminder to the practices of the commitments they had made and tried to continue the initial enthusiasm the events had created.

The 60 day review was held at a local football stadium, with the date for this having been agreed by all three practices during the planning events. Unfortunately only two practices attended, with Deerness medical centre unable to attend due to other commitments. This meeting was an opportunity for the practices to share their ideas with each other, and the theme of engaging patients and improving their awareness of lung cancer was one of the key topics of debate. Problems with secondary care delays were also discussed; again this was recognised as a parking lot problem which could not be influenced. Both practices were keen to highlight this as an ongoing issue to the facilitators as they felt that this still formed a significant proportion of the delay in diagnosis.

The most significant report out was the 90 day event. This was the deadline for achieving all that had been planned in terms of practice changes. It offered the chance for all three practices to meet and discuss their findings on implementing the changes. The report out was also an opportunity to engage with other local practices and to disseminate ideas and potential changes to a wider audience. All the GP practices within the PCT were invited to attend. The programme was introduced by the Director of Public Health who placed the events within a local context, highlighting the estimated 250 years of life lost in Sunderland every year due to lung cancer.

Each practice presented the improvements they had planned following their Kaizen event and the progress they had made in the implementation of these.
## Happy House Surgery

<table>
<thead>
<tr>
<th>Planned Outcomes</th>
<th>Outcome progress at 90 days</th>
<th>Outcome achieved at 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two week rule referrals to be organised through the choose and book system</td>
<td>Practice policy created so patients referred under the two week rule for lung cancer now have their appointments booked by the choose and book system</td>
<td>Yes</td>
</tr>
<tr>
<td>Introduction of visual reminders on the importance of urgent chest x-rays</td>
<td>Reception staff now place red urgent stickers onto the patient held x-ray request and explain the urgency of the x-ray</td>
<td>Yes</td>
</tr>
<tr>
<td>System to track requests sent and results received for all chest x-rays</td>
<td>Copies of all requests are placed in a card index, with a weekly rolling review to check attendance and for any outstanding reports</td>
<td>Yes</td>
</tr>
<tr>
<td>Reduction in the number of urgent appointment slots available to increase review appointments for patients with respiratory symptoms. Triage of urgent slots by GP.</td>
<td>New appointment system agreed by the practice, piloted and now fully introduced</td>
<td>Yes</td>
</tr>
<tr>
<td>Patient and electronic information leaflets for the signs and symptoms of lung cancer to be made available.</td>
<td>Patient information designed, and is now available in reception for all patients</td>
<td>Yes</td>
</tr>
<tr>
<td>Improvement in the coding of consultations to link those with respiratory symptoms together.</td>
<td>Practice agreement that this will be done for all future consultations</td>
<td>Yes</td>
</tr>
<tr>
<td>Prioritisation of chest x-ray reports so they are reviewed the same day by a GP</td>
<td>Practice policy agreed for this. Arrangement for on-call GP to review chest x-ray results if requesting GP is not available</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Southwick Medical Centre

<table>
<thead>
<tr>
<th>Planned Outcomes</th>
<th>Outcome progress at 90 days</th>
<th>Outcome achieved at 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory protocol to include standardised tests all patients presenting with unexplained respiratory symptoms at risk of potential lung cancer</td>
<td>Following discussion with the partners in the practice, the original protocol was thought to be too complex and included unnecessary testing.</td>
<td>No</td>
</tr>
<tr>
<td>Electronic system for the tracking of chest x-ray requests and reports. Incorporates set review criteria for patients referred and transfers responsibility for accurate patient demographics to the referring GP</td>
<td>System piloted and now fully implemented. Patients are now reviewed routinely following a chest x-ray to discuss positive and negative results.</td>
<td>Yes</td>
</tr>
<tr>
<td>Patient information leaflet to be distributed to at risk patient groups</td>
<td>Patient information leaflet designed, and is included as part of chronic disease reviews for patients with COPD, IHD and CKD.</td>
<td>Yes</td>
</tr>
<tr>
<td>Standardisation of how two week rule referrals are organised by the practice</td>
<td>Practice protocol designed which includes responsibilities for same day referral and checking the patient attends</td>
<td>Yes</td>
</tr>
<tr>
<td>Practice audit of previous lung cancer cases to review any further practice improvements that could be made</td>
<td>Audit of twenty eight patients completed which demonstrated the association between chronic disease and lung cancer. Practice now targeting these patient groups with patient information leaflets</td>
<td>Yes</td>
</tr>
</tbody>
</table>
# Deerness Park Medical Group

## Planned Outcomes vs. Outcome progress at 90 days

<table>
<thead>
<tr>
<th>Planned Outcomes</th>
<th>Outcome progress at 90 days</th>
<th>Outcome achieved at 90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review urgent appointment provision to assess the uptake and appropriate usage, aiming to reduce the number of urgent slots and increase time available to review patients with respiratory symptoms</td>
<td>The review recognised that many slots were being used for non urgent problems. GP triage has been introduced which has reduced the need for urgent appointments in the practice, creating more routine appointment slots for patient reviews.</td>
<td>Yes</td>
</tr>
<tr>
<td>To consider all chest x-ray requests where lung cancer is a possible diagnosis urgent.</td>
<td>Practice policy agreed that all chest x-ray requests for new respiratory symptoms are urgent in nature.</td>
<td>Yes</td>
</tr>
<tr>
<td>Electronic system for the tracking of chest x-ray requests and reports.</td>
<td>System introduced, ensures patients are contacted if they have not attended for chest x-ray within 5 days. When results are received patients are contacted and offered the next available appointment, regardless of the result.</td>
<td>Yes</td>
</tr>
<tr>
<td>Patient information on the signs and symptoms of lung cancer to be added to patient held COPD management plans</td>
<td>Patient held COPD management plan redesigned to incorporate cancer information. All COPD plans will be replaced at the next chronic disease review.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
In addition to the outcomes that the practices had agreed during the events, comments about the processes and difficulties were presented.

- Practices felt limited in the improvements they could make as they controlled only one part of pathway for lung cancer diagnosis.
- IT problems existed for accessing results and booking appointments. These acted as barriers to improvement.
- The timing of the Kaizen events coincided with submissions for the Quality and Outcome Framework which made allocating staff time for improvements difficult.
- Protected time was important to allow the practices to commit to the process. Holding activities outside the practice and having funding to pay locum cover resulted in the practice being able to allocate staff resources to the event.
- Practices are seeing opportunities to adopt Lean methodologies in other areas where delays or waste is seen and would be willing to participate in similar future events.

Problems placed within the ‘parking lot’ were presented by the regional cancer director. Concerns that the role of secondary care in diagnostic delays had not been addressed and that primary care viewed this delay as a significant barrier to be overcome were discussed. Discussions with secondary care representatives had been undertaken, with the aim of organising a further Lean event which will take forward the concerns raised by these Kaizen events, the possible format being an RPIW. Issues around IT problems and the electronic transfer of requests and results were not discussed.

When comparing the achievements of the three practices, common outcomes were evident, with similar associated mechanisms and contexts. Combining these gives an overall configuration which summarises the CMO structure of the event as a whole.
## Combined Kaizen CMO Configurations

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>MECHANISM</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C&lt;sub&gt;1&lt;/sub&gt;</strong> – PCT adoption of the Lean methodology of VMPS as their managerial method</td>
<td><strong>M&lt;sub&gt;1&lt;/sub&gt;</strong> – Structured approach to innovation events</td>
<td><strong>O&lt;sub&gt;1&lt;/sub&gt;</strong> – Formal 30, 60, 90 day report outs to demonstrate progress and results</td>
</tr>
<tr>
<td></td>
<td><strong>M&lt;sub&gt;2&lt;/sub&gt;</strong> – Emphasis on clinical and non-clinical staff to be involved in Kaizen events creating a team approach to problem solving</td>
<td><strong>O&lt;sub&gt;2&lt;/sub&gt;</strong> – Practice level changes to administrative processes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Appointment system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GP telephone triage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GP responsibility for patient demographics</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>O&lt;sub&gt;3&lt;/sub&gt;</strong> – Nurse led interventions and opportunistic screening for risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>O&lt;sub&gt;4&lt;/sub&gt;</strong> – Developing of a practice led tracking systems for x-ray requests</td>
</tr>
<tr>
<td><strong>C&lt;sub&gt;2&lt;/sub&gt;</strong> – Funding available to practices to cover costs of involvement</td>
<td><strong>M&lt;sub&gt;3&lt;/sub&gt;</strong> – Locum cover for GPs to allow time to attend Kaizen event</td>
<td><strong>O&lt;sub&gt;5&lt;/sub&gt;</strong> – Protected time during Kaizen prevents interruptions and allows for full commitment of those involved</td>
</tr>
<tr>
<td></td>
<td><strong>M&lt;sub&gt;4&lt;/sub&gt;</strong> – Payment for conducting significant event audits</td>
<td><strong>O&lt;sub&gt;6&lt;/sub&gt;</strong> – Recognition and redress of practice specific problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• EMIS coding</td>
</tr>
<tr>
<td><strong>C&lt;sub&gt;3&lt;/sub&gt;</strong> – Significant event audit conducted regionally demonstrating common areas of known delays</td>
<td><strong>M&lt;sub&gt;5&lt;/sub&gt;</strong> – Introduction of standardised work to minimise error</td>
<td><strong>O&lt;sub&gt;7&lt;/sub&gt;</strong> – Design of respiratory pathway for investigation of suspicious symptoms in primary care</td>
</tr>
<tr>
<td></td>
<td><strong>M&lt;sub&gt;6&lt;/sub&gt;</strong> – Practice recognition of similar problems as highlighted by SEA</td>
<td><strong>O&lt;sub&gt;8&lt;/sub&gt;</strong> – Prioritisation of chest x-ray results, introduction of patient visual reminders and commitment to early action on chest x-ray reports</td>
</tr>
<tr>
<td><strong>C&lt;sub&gt;4&lt;/sub&gt;</strong> – PCT corporate project for reducing early deaths from cancer</td>
<td><strong>M&lt;sub&gt;7&lt;/sub&gt;</strong> – Profile of event highlighted by attendance of director of public health and regional cancer services manager</td>
<td><strong>O&lt;sub&gt;9&lt;/sub&gt;</strong> – Introduction of ‘choose and book’ for two week referrals</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>O&lt;sub&gt;10&lt;/sub&gt;</strong> – Areas of local commissioning problems identified and actions to review agreed</td>
</tr>
<tr>
<td><strong>C&lt;sub&gt;5&lt;/sub&gt;</strong> – Practices chosen with previous research or innovation experience</td>
<td><strong>M&lt;sub&gt;8&lt;/sub&gt;</strong> – Individual motivation to continue service improvements in cancer care beyond scope of Lean event</td>
<td><strong>O&lt;sub&gt;11&lt;/sub&gt;</strong> – Desire to become involved in public health strategies and commitment to further research and audit into lung cancer diagnosis</td>
</tr>
</tbody>
</table>
5.2 – Rapid Process Improvement Workshop

The RPIW involved representatives from three practices in the Durham and Darlington PCT. The head of department for radiology attended, along with managers from secondary care and the cancer network.

5.2.1 – Rapid Process Improvement Workshop: Planning

The RPIW was a single event, held in March 2010, which invited representatives from stakeholder groups involved in the diagnosis of lung cancer. The organising team took responsibility for capturing the current state of the system prior to the event taking place as part of the VMPS approach. This involved identifying the key stakeholders, the pathways for referrals, and capturing real time measurements of processes creating a ‘current state map’ of how services are currently configured. From this the total time of the process from requesting x-rays in suspected lung cancer to receiving results was measured, referred to as the lead time, which would be the principal measure to be reduced during the event.

The RPIW was originally intended for the end of 2009, and the first series of planning meetings and measures were conducted prior to this. Within the final two weeks of planning, it was recognised that there would not be sufficient stakeholder representation from either primary or secondary care, and the decision was made to delay the RPIW until a time when more staff would be available to attend.

A further four planning meetings occurred in the month prior to the rearranged RPIW which occurred in March 2010. They were used to arrange data collection and gather an accurate understanding of how practices were currently working. Tasks were allocated to individuals in the PCT, and weekly progress reviews were held. This stage required specifically for the Lean method that a large amount of numerical data to be collected and analysed. Lean approaches reduction in delays and service improvement through the use of statistical tools to calculate patient flow, referral rates and clinician time commitments which required high quality data collection.

This RPIW was one of several organised within the PCT at the same time. As part of the ongoing accreditation process for individual organisers and the wider PCT it was necessary for representatives from Virginia Mason to be present. The coaches would attend various stages of the RPIW to offer expertise in the organisation of the events and in applying ideas and testing new models within a healthcare setting. The final stage of the RPIW week would be a presentation of the outcomes to the event sponsor and those involved with RPIW processes that week.
5.2.2 – Rapid Process Improvement Workshop: Event Description

The RPIW lasted five days, starting on a Monday morning and finishing on a Friday afternoon. Conformity to the timetable presented by the VMPS was essential for recognition and accreditation of those involved. The first day was dedicated to participant education on Lean thinking and the methodologies used by VMPS. As part of the organisational implementation of Lean, many working within the PCT took the opportunity to attend this training to improve their understanding of the methods. Training is a mandatory part of the event, and its inclusion is seen as vital if the time in the RPIW is to be used effectively. The last day of the event was committed entirely to presenting the changes made by the RPIW. This left three days for the service improvement event to investigate, implement and evaluate potential changes to the current system.

It was difficult for team members to commit to the whole five day process. Participants appeared to attend at points where they felt their contributions would be most needed, whilst fitting in other work commitments.

All the information gathered in the build up to the RPIW was displayed on the walls around the room, and the group spent time reviewing the data from each practice and department where measurements had been made. The RPIW collected a large volume of data before the event, and generated more during which represented significant amounts of work for those involved, a sample of this can be seen in the photograph 1.

Photograph 1 – Data collected and generated for the RPIW
Using this data, the group then constructed a diagrammatic representation of the process using a tool called ‘visual flow mapping’. This method placed every step in the patient journey onto a large diagrammatic chart, connecting each step with coloured string to represent the time between steps. Each step was then considered as to whether it was a value adding step i.e. stages in the patient journey which are seen as necessary for the patient, measured by VMPS as whether the patient would be willing to pay for this stage in the process.

The final product from this was a very large diagram with close to fifty individual steps. Of these, there was consensus that only a dozen would be perceived as value adding. The total time seen for the process had already been calculated as 11 days, excluding outlying practices where specific problems were leading to a delay greater than this.

Using the value stream map, the challenge set to make a significant reduction in the stages of the process to reduce the Lead time from 11 days. During the planning phase it was thought that a 3 day Lead time would be achievable. The delays that the visual flow map demonstrated suggested that in an ideal system the process would take less than 2 hours, and it was proposed that this should be the target. This idea was strongly backed by the coach from Virginia Mason who felt that any delays should not be accepted and that the group should not be factoring in the attitude of accepting that delays that currently occurs within the NHS. Some members of the group disagreed, citing factors such as geography and transport systems that meant this would not be achievable.

It became apparent during the generation of the visual flow map that members of the primary care team had little understanding of the processes which occur in secondary care, and vice versa. To narrow this gap, the group decided to visit the radiology department in secondary care to walk through the journey that the patient and x-ray request take to see the steps and to help understand where changes to the system might be feasible. In total there were 19 steps in this part of the process, each taking only a short amount of time, but delays between these could result in a large overall delay in taking and reporting of chest x-rays.

The walk through of the radiology department took longer than expected. As a result the decision was made to not visit the individual GP practices to observe the processes in place, and instead these were described by the GPs present and discussed as a group. These processes are seen in photograph 2.
The afternoon was used to generate ideas about what changes could be made now the group had a clear idea of what was involved within the processes in primary and secondary care. Ideas had already been submitted by staff who could not attend the event and these supplemented the ideas generated from those present. These were then sorted into related sections of the pathway. Working groups took these ideas and planned how they could be delivered. The changes to be made were planned and agreed, and targets set using a structured approach describing the tasks, targets and individuals allocated. This would provide accountability for the ongoing developments. The fact that some team members
would not be present throughout the event resulted in staff from the PCT and secondary care taking the majority of the responsibility for the work with support from those who could attend less frequently.

The group reconvened on the morning of the third day to discuss how the proposed changes could be implemented and if any problems had arisen by this stage. There were concerns that the redesign of services needed to remain cost neutral, and that no financial or staffing costs should be needed to implement the change. Targeting a reduction of the lead time to two hours was prohibitive for this reason. For example chest x-rays could be taken on weekends at present but the administration support needed to process the results would not be available until Monday. Changing this would need the involvement of PCT commissioning teams to request inclusion of services with the current contract. This led to a review of the current contract to identify areas where outcomes should be included, and these comments were sent to the commissioning managers responsible. In considering the two hour target again, it was felt that this was perhaps unrealistic and that setting targets which couldn’t be achieved would lead to negative feelings about the event and may discourage future participation. As a result, the group decided to work to a lead time of two days instead as this more accurately reflected the constraints of the current system.

Some changes, if implemented, would potentially reduce costs, an example being the elimination of paper based reports for chest x-rays. The facilitator wondered whether this money would be redistributed to make improvements elsewhere within the system. Representation from radiology indicated that this money would contribute towards the efficiency savings required as part of their year on year commitment to improve value for money.

Specific changes to the current system needed to be drafted, with protocols for the new procedures identified and agreed. Some ideas were tested directly, the mapping of read codes and their use for patient tracking was done using remote access to GP records, which demonstrated that this could easily be applied. The organising team had arranged for IT support from the trust to be available and they assisted in the redesign of how x-rays would be coded by secondary care in order to allow for easier GP tracking.

A printed x-ray request which imports patient demographics directly from the patient electronic records was designed to replace the current paper request forms. This would be attached to a patient information leaflet which would highlight the importance of the x-ray, and include the opening hours of the local radiology departments. The RPIW confirmed that all the secondary care trusts would accept this request in this new format once piloted.

No decision was made as to how best to disseminate the findings of the RPIW. The responsibility of dissemination was passed back to the PCT to discuss subsequent to the event.

At the end of this day, the organising team met to have a progress meeting with the event sponsor. The ideas generated were agreed to be achievable and realistic. There was also a commitment by the sponsor to take the findings of the RPIW forward to influence future service commissioning for radiology and to get a written agreement on reporting times for x-rays from secondary care providers.
On the fourth day, the future state which would exist if all the changes were made was calculated and represented on a Yamazumi chart. This is a VMPS method which places the stages of a process in a vertical stack. Photograph 3 demonstrates this chart, with the yellow squares representing time delays which could be reduced through improvements to the process.

Photograph 3 – Yamazumi Chart

The specific details of when these changes should be made was discussed, with the view that individual practices should be able to pilot straight away so that by the 30 day report out there would be evidence that they could be introduced to a greater number of practices. Similarly with secondary care, changes would be made straight away, with the main target being a turn around time from x-ray to report of two working days.

Visits took place to map these changes out; the Lean method for the RPIW had to include a walk-through of the future state map from the beginning to the end of the process. This demonstrated that printed x-ray forms did work in a practice already using them, and that
attending directly for chest x-ray was possible. This walk-through was a time intensive
process and involved visiting various NHS sites. Opinion was divided on whether this was
really necessary as the experience of those involved should have given an answer regarding
the practicality of the changes.

Following the visits the group identified barriers which were still in place for implementing
changes. There remained a lack of clarity as to whether there was a need to differentiate
urgency for chest x-rays if radiology was committed to reporting within two days, and there
was no agreement on what criteria should be used to decide this. Secondary care managers
wanted to avoid having two queues of patients, those who were urgent and those non-urgent,
since they would both be reported in a timely fashion.

Problems to be carried forward into the 30 day period were those where checks needed to be
made on existing IT systems, and where agreement was needed from either management
committees or partnership meetings before implementation of the improvements planned.

The final day was committed to orchestrating the report out of this event, which had a
structure prescribed by VMPS methods. This relied heavily on the documentation generated
during the event, looking at the reduction of lead time and the difference between the current
and future state. Each group member was expected to present one document and discuss the
changes seen in relation to this. Time was spent planning what each person involved would
say, and was rehearsed several times. The report out included groups from all the RPIWs
taking place that week, lasted ten minutes, and had no feedback from the observers regarding
the proposed improvements.
Due to the number of changes planned following the RPIW, a working group within the PCT consisting of those who attended the event took responsibility for maintaining the momentum. An RPIW improvement plan was written which identified all the intended outcomes and allocated individuals responsibility for these. This was reviewed on a fortnightly basis by the working group, with participants expected to attend at 30, 60 and 90 days to evaluate progress.

30 Day Report Out

The aim was to ensure that all the planned pilots for improvements had been implemented, ready to be evaluated in the following 30 day period. The date had been agreed during the RPIW with attendance expected from all staff involved in the event. Representation at the meeting included only one member of the primary care team, with other members sending apologies and citing clinical commitments as the reason for their non-attendance.

Electronic referrals for ms for chest x-rays had been developed and drafted, and were ready to be integrated into GP systems for launch. This included an electronic copy of the previous paper request form. An information leaflet had been produced explaining where and when patients can have their x-ray taken, and what follow up arrangements should be made. It was agreed to trial this in a single practice over the next 30 days to assess its impact and potential problems before a larger roll out. Another PCT improvement project had also identified the benefit of electronic x-ray requests and was at the implementation stage, so responsibility for this task was transferred, leaving the team to implement only the patient information element.

A formalised chest x-ray referral protocol was prepared for submission to PCT clinical governance for review and approval. As part of the protocol development, practices had agreed to review their own referrals to audit the rates of non-attendance for requested chest x-rays, but this work had not yet been done.

Ideas relating to patient awareness of lung cancer symptoms were discussed with the social marketing manager, and support from Macmillan services identified, but no details on the possible outcomes were presented.

A proposal for the elimination of printed x-ray reports for practices was submitted to the clinical governance board for informatics. However nine practices within the PCT did not have paper light accreditation to allow for the use of electronic results, so this could not progress further until this barrier had been addressed. A pilot practice had been identified for the withdrawal of the existing courier service for written requests, replacing this with a telephone booking service.

60 Day Report Out

Following poor GP attendance at the 30 day event, the 60 day report out was delayed to allow further time for implementation of pilots. This occurred closer to the 90 day stage, and highlighted the same improvement plan that had been in place at 30 days. No GP participants attended this meeting, and responsibility was assigned to PCT managers who did attend to work with the practices on implementation of the planned pilots.
90 Day Report Out

There were significant delays to the 90 day report out, which finally took place two months later than planned. The meeting was dominated by representation from the PCT, along with the Cancer Network and the lead for radiology services. There was no general practice representation.

The structure of the final report out is designed to provide feedback on the progress to the event sponsor. It follows the VMPS approach for 90 day report outs, concentrating on the documentation generated to demonstrate the improvements made. Outcomes were described as products ready to use in primary or secondary care.

The piloting of improvements had been implemented at four GP sites. Data collection to measure delays for chest x-ray requesting and reporting was conducted using the same baseline measurements as the original data collection. Comparing the proposed future state model to the previous current state, three of the four sites showed a reduction in the Lead time. This reduction was on average one day at each of the sites.

Radiology services reported that urgent chest x-rays were now reported within two working days as standard, which included notification of the results to the requesting GP. In the majority of cases this was being delivered within twelve hours. The elimination of paper copies of chest x-ray reports has not been achieved as there were still practices in the PCT without adequate IT systems to manage results in electronic format.

Four products were presented as offering significant improvements to the primary care management of potential lung cancer. The electronic chest x-ray request forms were in full use across all practices within the PCT. This development of this process has been shared with other teams within the PCT. The additional patient information leaflets which would be individual to each practice depending upon their local radiography department had been piloted, but not yet adopted across the PCT.

Standardisation of Read codes between primary and secondary care had been agreed. By introducing this through secondary care, the use of these would be automatically adopted in primary care removing the need for dissemination.

The time taken for GPs to inform patients of abnormal and normal x-ray results had been agreed by the PCT and primary care representatives. This was a late addition to the RPIW outcomes, and represented the opinions of the PCT and GP representatives that chest x-rays alone were not diagnostic of lung cancer, and that patients should be reviewed regardless of x-ray outcomes.

These outcomes were combined together to create a PCT protocol (Appendix A) for the requesting and reporting of urgent chest x-rays. This makes the roles and responsibilities of primary and secondary care explicit, incorporating time limits for each stage of the process. The protocol was under review by clinical governance, and was planned for introduction within the next two months.
### RPIW Outcomes

<table>
<thead>
<tr>
<th>Planned Outcomes</th>
<th>Outcome progress at 90 days</th>
<th>Was the outcome achieved at 90 days?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol for the requesting and reporting of chest x-rays for primary care.</td>
<td>Protocol at final draft stage, under review with clinical governance.</td>
<td>No</td>
</tr>
<tr>
<td>Standardised Read codes for chest x-rays to be used by primary and secondary care.</td>
<td>Introduced in radiology departments. Reporting of chest x-rays for primary care now utilises standardised codes.</td>
<td>Yes</td>
</tr>
<tr>
<td>Printed radiology requests for chest x-rays.</td>
<td>Adopted in all practices within the PCT. Secondary care trusts responsible for radiology services now accepting printed requests.</td>
<td>Yes</td>
</tr>
<tr>
<td>Printed patient information to accompany radiology requests.</td>
<td>Piloted in four practices. Plan for dissemination to all practices dependant on the chest x-ray protocol.</td>
<td>No</td>
</tr>
<tr>
<td>Elimination of duplicate paper x-ray reports. Practices to receive reports in electronic format only.</td>
<td>Several practices within the PCT are not accredited as ‘paper light’ preventing the use of sole electronic reports. Radiology now examining the possibility of sending paper reports to these practices only.</td>
<td>No</td>
</tr>
<tr>
<td>The use of a courier bag system to transport x-ray requests to radiology departments to be replaced by telephone booking system.</td>
<td>Introduced into all practices currently using a courier system without problems occurring.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
**RPIW CMO Configuration**

<table>
<thead>
<tr>
<th>CONTEXT</th>
<th>MECHANISM</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>C₁ – PCT adoption of the Lean methodology of the VMPS as their managerial method</td>
<td>M₁ – Structured approach to innovation events</td>
<td>O₁₂ – Time used for activities which represented learning opportunities for PCT staff, but did not result in service improvement</td>
</tr>
<tr>
<td></td>
<td>M₉ – PCT maintains high level of control over RPIW due to the amount of time invested in the preparation phases</td>
<td>O₁₃ – Limited primary care engagement by the end of the RPIW</td>
</tr>
<tr>
<td></td>
<td>M₁₀ – Interaction between primary and secondary care teams to agree timeframes for reporting allows primary care to commit to timeframe for results</td>
<td>O₁₄ – Radiology department commitment to perform x-rays and provide reports within two working days</td>
</tr>
<tr>
<td></td>
<td>M₁₁ – Interaction between PCT departments for the approval of improvements not adapted to Lean approach</td>
<td>O₁₅ – Implementation of recommendations delayed by PCT committees reviewing changes</td>
</tr>
<tr>
<td></td>
<td>M₁₂ – Identification of duplication of work following interaction of primary and secondary care teams</td>
<td>O₁₆ – Electronic reporting of x-ray to primary care and elimination of duplication through printed reports planned but not achieved</td>
</tr>
<tr>
<td>C₂ – Funding available to practices to cover costs of involvement</td>
<td>M₁₃ – Locum cover for GPs available to allow time to attend RPIW event and meetings not utilised</td>
<td>O₁₅ – Implementation of recommendations delayed due to limited attendance at report out meetings O₁₇ – Attendance to RPIW by primary care representatives inconsistent</td>
</tr>
<tr>
<td>C₄ – PCT corporate project for reducing early deaths from cancer</td>
<td>M₁₄ – Access to IT support off-site provided by PCT</td>
<td>O₁₈ – Patient information leaflets to increase awareness on the reasons to attend for x-ray piloted O₁₉ – Regionally agreed standardisation of Read codes to improve data management and audit</td>
</tr>
<tr>
<td></td>
<td>M₁₅ – Review of current radiology contract due to be commissioned</td>
<td>O₁₀ – Areas of local commissioning problems identified and suggestions for future contract documented</td>
</tr>
<tr>
<td>CONTEXT</td>
<td>MECHANISM</td>
<td>OUTCOME</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>C₅ – Practices chosen with previous research or innovation experience</td>
<td>M₁₅ – Examples of good practice from GPs involved identified to be implemented within all practices in the PCT</td>
<td>O₁₉ – Regional agreement on the use of standardised electronic chest x-ray referral form</td>
</tr>
<tr>
<td></td>
<td></td>
<td>O₂₀ – Elimination of the use of courier bags in preference of telephone booking system</td>
</tr>
</tbody>
</table>
6 – Discussion

This report examines whether and how Lean methods could support service improvement for lung cancer diagnosis. The discussion is divided into four sections.

- Primary Care Changes
- Secondary Care Changes
- Engagement of Participants
- The Role of Lean in Facilitating Change

6.1 – Primary Care Changes

Achieving change in primary care is dependent upon the engagement of staff involved in the process in question. Using the diffusion of innovation model\(^\text{12}\), practices involved in this exercise represented early adopters of change and would be expected to demonstrate enthusiasm and commitment to the process based upon their own internal motivations. It is known that financial incentives can be successful in the restructuring of practice organisation, as demonstrated by the improvements made following the introduction nationally of the Quality and Outcomes Framework\(^\text{13}\). Faced with the current financial uncertainties in the NHS, Lean methodology is thought to offer a minimal cost approach to engaging practices to implement changes without the need for significant financial incentive. As such, the underlying motivation to change can be anticipated to be an individual and practice level desire to improve services.

The Kaizen events focused upon processes that could be improved to reduce time delays. This translated into how chest x-rays were requested, tracked and managed. Practice systems for the management of electronic patient records, and the problems surrounding continuity of care were also identified as areas needing improvement, although the methods through which these could be improved were uncertain and not clearly described. These improvements presented clear benefits to the practices involved; improving efficiency for both clinical and administrative patient management and directly impacting upon referral policies to influence the earlier diagnosis of lung cancer. Practice motivation for implementing these was therefore high, with the majority of planned improvements achieved by the end of the 90 day period.

Changes proposed by the Kaizen event needed to be discussed and agreed by all partners within each practice. Following these meetings, two proposed improvements had alterations made before being accepted as practice policy. This demonstrates a difficulty that exists with improvement processes in general practice, which requires the consensus of all practice stakeholders and represents a significant obstacle to the application of the VMPS approach.

When disseminating findings, multifaceted approaches to changing practice are more effective than using one single method\(^\text{14}\). The findings of the three Kaizen events were presented at a large scale event attended by representatives of the majority of practices within the PCT. Written details of the proposed changes were sent to every practice that registered an interest. The principal findings presented at the dissemination event described the service improvements made, the cost neutrality of the approach, and the anticipated benefits for other
practices and their patients if those attending chose to adopt these changes. There had been no measurement of the change in diagnosis rates, increases in x-ray requests or the reduction in time delays, so conclusions regarding the impact of the changes proposed following the Kaizen events could not be drawn.

For the RPIW, individual practices did not undertake an in depth review of their own systems. Instead, the data gathered was pooled at PCT level. The shared experience of the three practices was utilised to create a protocol for the management of chest x-rays which would be valid to use within all practices in the PCT. These practices represented sites willing to be involved in the piloting of proposed change, as opposed to sites seeking individually designed improvements. Some specific practice level problems were identified, and recommendations for improvement targeted at these problems were made. These did not represent problems seen in the majority of practices in the PCT, but did represent areas where clear improvement could be made to poorly functioning systems.

The differences seen between the two approaches could be summarised as offering either micro or macro management of the given problem. By approaching practices as a heterogeneous group, Kaizen events sought to alter individual practice behaviours to a high degree of detail offering a tailored solution to those involved. This in turn limited the applicability of the findings to other practices. The alternative approach of RPIW attempted to reduce the variability of service delivery between practices, and offer a protocol which would seek to homogenise the approaches of all practices within the PCT. In both cases, a lack of measurement of the impact on lung cancer diagnostic pathways following the introduction of improvements resulted in a lack of evidence for sustained change for both approaches.

6.2 – Secondary Care Changes

Service redesign in secondary care can be a complex process, is time intensive and involves multiple stakeholders. The VMPS aimed to tackle this by gathering key stakeholders together, requiring rapid action for change within a defined timeframe. The process depends upon having the right people present, who have sufficient influence to ensure change can be made.

The Kaizen approach centred on engaging GPs with the improvement process, at the expense of excluding secondary care. Seeking to make changes to the radiology pathway, the Kaizen events identified areas creating unacceptable delays, but lacked a clear mechanism for making alterations to the systems already in place. Representatives from the local cancer network could meet with secondary care to discuss the problems identified, but had no direct mandate to make change within the secondary care environment.

The wider scope of the RPIW produced representation and input throughout the event from radiology and managerial teams in secondary care. The lead radiology manager attended for the majority of the week and had a high degree of influence in deciding what would be realistic to achieve. GP participants utilised his presence to address issues surrounding current design of the referral process, exemplified by the problems with discrepancy in Read coding. Secondary care identified methods of how, through this dialogue with primary care,
changes to their appointments could be made by simplifying the methods in which patients are currently referred according to degrees of urgency. By gaining GP agreement on how referrals would be changed to simplify this, secondary care could then commit to a shorter timeframe for the reporting of results.

The role of service commissioning was discussed within both the Kaizen events and RPIW. There was an intention to use the outcomes of these events to influence future commissioning of radiology services. The current radiology contract in County Durham, which was due for renewal, was reviewed with feedback sent to officers responsible for the commissioning process about what should be included. No commitment for definitive changes could be made as commissioning managers were not involved. Their presence could have been expected to speed up the commissioning process, removing the need of the RPIW to formally report back to the commissioning team on their findings.

6.3 – Engagement of Participants

One aspect of Lean which is credited with gaining results is the ability to achieve a high level of ‘buy-in’ from the stakeholders of the process. The importance of this is well recognised from previous work within US healthcare\(^\text{15}\) and highlights the need for shared vision and goals. Research into service changes through commissioning found that a lack of funding, lack of GP buy-in and problems within PCT structuring are common problems encountered at implementation\(^\text{16}\). The application of VMPS in this study included steps to address these concerns.

The successful engagement of local GPs within the events was dependent upon multiple factors. Those involved in Kaizen were already known within the PCT to have had successful previous experience of improvements events and included individuals who have an interest in improving local services. Although advantageous for this study, they may not be representative of other practices. Financial compensation for lost consulting time was identified as enabling practices to attend events away from their own premises. The uptake of this financial compensation was high to provide locum cover for GPs. Reimbursement was available for nursing and non-clinical staff, but there was no availability of such locum cover within the locality so this could not be utilised.

For those involved in the RPIW, commitment to the whole five days was difficult to achieve, though secondary care staff were better able to participate as part of their usual role and responsibilities. No representatives of either general practice or secondary care were able to attend for the whole five day process, due to other work commitments which were unavoidable within the week of the event. This was to the detriment of the event as it resulted in a lack of participants to develop ideas and draft proposals. This then delayed the piloting of improvements as protocols had not been drafted and agreed sites not identified.

Ownership of the process was pivotal in determining the level of commitment from GP participants. In the Kaizen events, GPs worked on their own systems in the belief this would make a demonstrable difference to their day to day work. Responsibility for how and when implementation of these changes occurred was decided by the practices, with support and guidance available if needed. The GP role in the RPIW was not specific to their individual
practices, and may have impacted upon their level of commitment. The ownership and drive for the event came instead from the PCT team who organised the event. Meetings regarding the RPIW took place within PCT buildings, often at times which made attendance for GPs very difficult. This further reduced the level of GP engagement and resulted in complete disengagement with the process by the final report out.

The issue of funding to improve attendance is therefore unclear, as the two different approaches required different levels of commitment despite similar payment offers. Although the ability to provide cover for missed clinical sessions is important, the individual commitment and desire to see benefits which impact in their own practice appears to play an equal if not greater role in achieving GP engagement.

6.4 – The Role of Lean for Facilitating Improvement

The choice of Lean as the quality improvement tool for service improvement was a result of both PCTs, through the SHA, having already invested in staff training and developing an internal infrastructure which facilitated the application of Lean methods. This is not an organisational approach which can be found elsewhere in the country. In part this study examines what Lean can achieved and the lessons for other healthcare organisations.

Previous studies of projects that used Lean methods cite the inability to fully implement Lean as a main factor for failure. This view was supported by the findings of the NETS pilot study, which identified issues around maintaining enthusiasm in the context of the multiple commitments of those involved. The highly structured approach promoted by VMPS has been adopted by PCTs and the North East SHA in an attempt to overcome this.

Event Preparation

The choice of event, either Kaizen or RPIW, determined the level of investment required by the PCT prior to the event. The aim of the preparation in both cases was to discover the steps which existed within the process to be improved, with empirical measurements to quantify the current state. Data provided could then be used as a basis for reductions, and would provide a marker to compare against when the improvements designed as the result of the Lean events were implemented.

The data collected for the RPIW was extensive, with current state assessments of seven GP practices and one radiology department captured timings for each cycle within the process. The radiology data represented the pathways for fifteen hundred patients and provided a reliable benchmark of current service provision. To oversee the collection of the data, six weekly meetings were necessary to ensure that all tasks were completed. This contrasted with the Kaizen event, where the preparatory work focused on a single practice, already with Lean experience, to provide a template of the process, to which each practice in turn was asked to calculate and add timings for each cycle. Although responsibility for organising this rested with the North East Cancer Network management, work was shared equally and resulted in an event which needed less time commitment overall. Each practice was visited once in the build up to provide initial education and explanation of Lean so that those involved knew what to expect for the event, and reduced the educational component needed during the event.
The choice of which event to offer thus depends in part upon the resources available to provide logistical support within the PCT. It is clear that the preparatory work required for the RPIW was greater, but the knowledge and skill sets needed also need to be readily available. Other healthcare organisations wishing to utilise this approach would require a similar level of expertise in Lean to make the events successful.

**Improvement events within a timeframe**

The Lean events are promoted on the basis that they can make reforms to processes and systems with a defined timeframe, usually within 90 days of the event. The value of this is that the events are time limited, creating pressure for the agreed actions to become reality, and maintaining momentum. The post event management was structured such that progress was monitored on a regular basis to ensure that the 90 day target would be achieved.

**Kaizen Events**

There was early recognition that meeting every 30 days could be difficult for the practices involved. The timing of the events coincided with the submission of data for the quality outcomes framework. The choice of where to hold the feedback sessions was made with this in mind with the initial review within the individual GP practices. The 60 day review was designed as an information sharing event between practices as well as a progress review, and was held in a local football stadium close to all three practices. Even so one practice was unable to attend due to other commitments. The 90 day review was conducted in the same location, with an invitation to all practices within the PCT to attend. Attendance was high, partially due to the recognition for professional development purposes, partially due to it being scheduled for a time traditionally reserved for this activity in the region.

Each task was completed within the timeframe set. The failure of one practice to attend one session did not have a significant impact upon the outcome. What was achieved represented small but meaningful changes within individual practices. Dissemination of findings to a larger audience was done and was a clear endpoint of the Kaizen event. However, there was no collection of data to measure change which could have improved both validity of the findings and provided evidence for wider uptake.

Practice level changes had been made as described, and the areas within the process where reductions in time delays would occur were demonstrated. Repeat measurement of this, through the recalculation of lead times, would have given empirical evidence of the improvement achieved. There were, however, good reasons as to why this might not have been done. Presentation of symptoms suspicious of lung cancer remains uncommon, and a single practice may only have a few patients to observe and measure during a 90 day time period, making improvement difficult evaluate within the timeframe. Original data collected had encompassed patients over a much longer timeframe, with cases which may have been over one year old. The timeframe of the Kaizen approach does not lend itself to the reassessment of rare events. Future events will need to factor in the incidence of clinical presentations to determine the length of evaluation period that would be needed demonstrate change. Ascertaining that change is sustained also deserves consideration, as early enthusiasm may create an initial effect that does not continue indefinitely.
**RPIW**

Problems were soon evident with the approach used in the RPIW, with poor attendance at the initial 30 day report out from the participants. Reasons included the difficulty for GPs to secure time away from practice due to the timing and location of meetings. Loss of motivation or commitment at an early stage, resulting from decisions made within the RPIW which did not match individual agendas was also contributory. Participants became disenfranchised if improvements did not benefit their individual practices. These factors all contribute to GP ownership of the process.

With limited GP input there was little progress at 30 days, and this was recognised with the decision to delay the 60 and 90 day report outs. Problems were encountered with organising and implementing the pilot projects, upon which evaluation of the improvement event as a whole depended. The decision was made to abandon the 90 day structure. This represented a failure of the VMPS Lean method as designed, but also a desire to demonstrate meaningful outcomes given the level of investment that had been made.

PCT management structures posed further barriers to implementation of change. Making changes to the management of disease, and referral processes, required the involvement of stakeholders who did not attend the RPIW. Proposed changes needed to be reviewed by the clinical governance group and other internal panels. This demonstrated the challenges faced in applying findings within differing contexts, and that despite managerial commitment to Lean approaches the internal PCT structure did not reflect this within its own working practices. This finding is in common with previous research into the implementation of Lean within healthcare and reflects the need to harmonise the processes of how change is implemented within an organisation\(^\text{18}\). Some improvements needed to be discussed with agencies outside of the PCT such as the Cancer Network which created a further layer of communication which led to further delay.

When considering the impact of Lean, it can be seen that the structured method leads to both positive and negative benefits to the organisation and running of an improvement event. The table below shows the benefits as applied to each stage of the process.
<table>
<thead>
<tr>
<th>POSITIVE FINDINGS</th>
<th>LEAN ASPECT</th>
<th>NEGATIVE FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accurate measurement of the current state of primary and secondary care services</td>
<td>Data collection and preparatory work</td>
<td>Large volumes of data collected require time to analyse and collate, which has implications on the staff requirement for the events</td>
</tr>
<tr>
<td>Provides the tools and skills to be involved in a Lean event both for the current event and for future events</td>
<td>Structured teaching on Lean methods</td>
<td>Time is used for education as opposed to improvement, representing 20% of the total time allocated for both the Lean and Kaizen events.</td>
</tr>
<tr>
<td>Maintains the education and awareness of Lean amongst a widening range of professionals in a local region</td>
<td>Provided protected time for participants away from practice</td>
<td>Difficult to achieve in reality if other work commitments are not fully delegated to others. No participant was able to spend the whole week committed to the event for the RPIW</td>
</tr>
<tr>
<td>Removed from normal days work and distractions, placing the focus on the Lean work only</td>
<td>Structured timetable for the Lean events</td>
<td>Resulted in activities done which were requirements of the method of RPIW but added little knowledge or progress to change. Certain steps were not value adding</td>
</tr>
<tr>
<td>Tight control ensures all aspects of the problem is addressed in an order demonstrated previously to be successful</td>
<td>30, 60, 90 Day report outs</td>
<td>The end of RPIW report out to sponsors is time intensive to prepare and uses time which could be spent on the improvement process</td>
</tr>
<tr>
<td>Sets deadlines, allocates responsibility and ensures that improvements will completed swiftly</td>
<td>Lean training ongoing within the PCT</td>
<td>90 days is insufficient to achieve organisation changes within the NHS due to barriers internal to the healthcare system. This results in either failed application of improvements or delays in evaluation of the benefit</td>
</tr>
<tr>
<td>Maintains enthusiasm for those running events and encourages participants to engage with future events</td>
<td></td>
<td>Aspects of Lean methods done due to the necessity to demonstrate compliance as an learning experience</td>
</tr>
</tbody>
</table>
6.5 – Limitations of the Study

The use of realistic evaluation has allowed the authors to break down the application of Lean methods into their component elements. It shows how combinations of organisational and individual influences create a context for Lean implementation, and examines how various aspects of the approach can be seen to be either positive or negative mechanisms for change. Conducting the research without being invested in the VMPS approach to Lean has allowed for an unbiased study of events, generating a wider range of outcomes examining both the positive and the negative aspects.

Constructing a realistic evaluation from a small number of Lean events demonstrates a progressive development of the CMO configurations observed, but does not give a definitive template to which all future events would be expected to follow. The role of organisational adoption of Lean, national cancer priorities and individual agendas as mechanisms have been explored, but achieving data saturation for this and other potential mechanisms has not been possible within this limited number of case studies. Theory has been tested only within the single context of PCT commitment to VMPS; application to other healthcare organisations would further expand the understanding of how this approach functions.

Particular mechanism and outcome combinations may relate to the behaviour of the individuals involved. Opportunity to explore these further through structured interviews would have provided a greater detail on why problems occurred with staff engagement. The recommendations based upon the findings of this study represent proposals which have not been tested within other healthcare organisations, and the transferability of the results requires further evaluation.
7 – Conclusions

In this study, VMPS methods have been used to address areas in which current practice in primary and secondary care is failing to deliver a high quality service for lung cancer diagnosis. The structured approach of the events provides a framework for analysis of problems which currently exist, and adopts an approach of waste reduction and elimination of delay as a method to improve standards of care.

Both the Kaizen and RPIW approaches successfully demonstrated where delays currently exist between patient presenting and receiving results of chest x-rays. Solutions to these delays are often already known by individual stakeholders in the process, but without a forum to explore these solutions they previously had been unable to influence change to improve services. Using VMPS, new ways of working can be designed, and pathways amended to reduce delay and waste.

Difficulties remain in the implementation of the recommendations of the Kaizen and RPIW events. The timeframe for implementing change was unrealistic when redesigning services that involve both primary and secondary care processes. The number of stakeholders and organisations involved was underestimated, and delays in administration and governance reflected organisational structures which had not been aligned with VMPS. Despite the limited timeframe in which these events took place, maintaining enthusiasm and commitment of staff involved was challenging and adversely affected the implementation of findings.

Demonstrating sustained improvement beyond 90 days was not included in the VMPS approach. Long term outcomes can only be hypothesised from the immediate changes that were made.

Kaizen events have demonstrated the ability to make improvements in individual practices who are involved with the process. The limiting factor was the implementation of wider change. Those practices not involved were reluctant to adopt the changes proposed, and were more concerned with the need to reduce delay in secondary care. For those who did participate, the mechanism of developing ideas as a practice motivated them to implement changes and maintain the improvements.

The use of VMPS with an RPIW allowed the examination of complex problems requiring service reform. The implementation of changes resulting from the RPIW failed due to poor attendance at both the event and follow up meetings. The structured approach of the VMPS was not sufficiently compatible with organisational structures within general practice, secondary care or the PCT to allow for improvements to be made in the 90 day period.

For the earlier diagnosis of lung cancer within the North East of England, the work done in both the Kaizen and RPIW has shown there is scope to reduce existing delays when investigating symptoms suspicious of lung cancer. Changes have been made at the level of the practice, with the management of investigations and referrals within radiology, and at the interface between primary and secondary care. The strengths of VMPS have been seen in the recognition of current problems and the design of the solution, but implementation of findings within PCTs has encountered obstacles.
8 – Recommendations for Future Use of VMPS and Lean

This study makes the following recommendations for the use of VMPS and Lean in primary care settings.

Primary Care
- Working with individual practices can result in tailor made solutions, but may lack transferability to other practices.
- Barriers exist at partnership level if all practice stakeholders are not engaged with the process and do not have shared ownership of potential improvements.
- Approaching practices as a group identifies variation in service provided, can address inequalities in service provision, and can be used to devise the standards expected.
- Dissemination of findings should be incorporated into the design of any improvement event, using multiple methods to achieve greater uptake.
- The level of individual ownership a practice has for the problem influences the level of resources in terms of staff time that they are willing to commit.
- Improvement events have the potential to inform future commissioning but would require the attendance of service commissioners.

Secondary Care
- Improvement events involving only primary care representatives generate views on problems within secondary care which need commitment and defined mechanisms so they can be addressed.
- Offering opportunities for primary and secondary care to examine each others procedures generates a shared understanding which can result in successful and mutually beneficial negotiations for service change.
- Success in implementing improvements requires representation from senior management at a decision making level.

Engagement of Participants
- Practices chosen for pilot studies often represent the enthusiastic end of the spectrum and may not be representative of all practices.
- Financial compensation for lost consulting time may act as a positive influence on GP attendance. Compensation for nursing and administration time lost was not utilised as there were no locum staff available for this role in the locality.
- Requiring a commitment to attend for five successive days may be too demanding for practices and secondary care who have to provide their regular service in parallel to the improvement event.
- Maintaining enthusiasm and achieving attendance at meetings following the improvement event is challenging, but can be facilitated by considering the needs to fit the process around the working schedules of those involved.

Practicalities of Lean
- Data collection before improvement events contributes accurate current information on the process and allows the time to be focused on designing improvements.
- Staff time and resources need to be in place to ensure high quality data is collected.
Having a single method for data collection provides a standardised structure that is replicable across multiple events.

- The level of data required should be tailored to suit the needs of the improvement event; there is no single approach that will be ideal for all.

- Having a defined timeframe for implementing improvement is important, but this needs to be realistic and include sufficient time to measure the impact of the innovations.

- 90 days is insufficient time to make changes in complex processes such as cancer diagnosis pathways, and does not reflect the current barriers which currently exist within general practice, secondary care and the PCT.

- Using Lean can result in facilitators slavishly following the methodology without adding value to the improvement process.

**Lung Cancer Improvements**

- The management of x-ray requests needs recognition within practices as a priority, and mechanisms need to be in place to ensure GPs act upon results in a timely manner.

- Tracking of x-ray requests and reports is not commonly done. All practices should have a method of actively tracking all patients referred, and audit this to ensure that results are received and acted upon.

- Radiology services need to agree with primary care providers the timescale in which requests are processed and reporting completed. Commissioning of services should make the expected time from request to report explicit in future contracts.

- Requests can be managed electronically without the need for paper reports, thus reducing delays between primary and secondary care. IT systems need to be in place to develop this nationally.

- Opportunities to increase patient awareness of lung cancer symptoms exist in primary care, and practices should examine their own use of chronic disease management to identify at risk groups that they could target for further education on symptom awareness.
9 – References


16 F Bradley, R Elvey, D Ashcroft, P Noyce. Commissioning services and the new community pharmacy contract: Drivers, barriers and approaches to commissioning. The Pharmaceutical Journal. 2006; 277, 189-192


APPENDIX A

GUIDELINES PROCESS FLOW DIAGRAM

Patient Consultation resulting in CXR referral

Complete electronic CRX request form and enter Read Code onto clinical system

Patient given copy of CXR request form. If near open access provider Patient information leaflet given re. open access times and how to get results at the practice.

Patient informed an appointment letter will be issued if they cannot access open access radiography sessions.

Patient information leaflet given on how to get results at the practice.

Urgent CXR Referral

GP to phone X-Ray Dept. same day to arrange appointment /flag attendance

CXR Request form faxed to Radiography Dept.

Patient attends for appointment the same day and is examined.

CXR results to be reviewed by GP within one working day of their receipt into practice. Read codes checked. Normal Abnormal

Appointment made for patient with GP to receive results within one working day of results received.

Audit against Read codes conducted every 7-10 days.

Non-urgent CXR Referral

Patient attends CXR open access session. Or Patient attends pre-booked appointment.

Patient is examined and informed results will be available between 5-10 working days by contacting their practice.

CXR results to be reviewed by GP within one working day of their receipt into practice. Read codes checked. Normal Abnormal

Patient can phone practice to obtain CXR results for non-urgent referral.
REQUEST FOR URGENT CHEST X-RAY REQUIRING REPORT WITHIN 1 WORKING DAY

ACCESSING SERVICE

UNIVERSITY HOSPITAL NORTH DURHAM, SHOTLEY BRIDGE, CHESTER-LE-STREET COMMUNITY
Contact department direct to arrange the appointment

BISHOP AUCKLAND HOSPITAL AND DARLINGTON MEMORIAL HOSPITAL
Use open access BUT contact department to flag referral

RECEPTION
Request card flagged to alert Radiologist/Radiographer/Secretary To expedite

Patient Examined

URGENT Report Generated

URGENT Transcription

REPORT FAXED
Report received by practice Report reviewed by GP Patient informed of results by GP