Training and education of staff for triage purposes

Initial training and education of staff on the new triage processes cost $500.

Researching best practices

Researching the best practice processes and the development of the new processes and systems cost $500.

13.3.3 Ongoing costs to Canterbury DHB

Ongoing costs and benefits are considered on a per referral basis. Only costs that have increased due to the pilot are included. We use referrals, rather than patients receiving the service, on the basis that it is assumed that the same patients referred for the pilot would also have been referred under the counterfactual.

In this pilot, none of the referrals received were rejected by the service. However, of the 41 referrals received, 7 did not result in a diagnostic test, and did not complete the pathway.

- 1 patient was admitted acutely with pancreatitis
- 1 patient received their scan privately
- 4 patients cancelled their own test
- 1 patient was DNA

There is insufficient information on the counterfactual to determine if these results are unusual. None of these patients received a diagnostic test or specialist appointments.

The total ongoing cost of the pilot per referral received was $292, which was made up of the following costs.

Purchase of additional scans

During the pilot, 10 CT abdomen scans, 6 CT liver/pancreas scans and 18 ultrasound soft tissue scans were purchased. All of the scans provided through the pilot pathway were additional purchases above the standard number provided by the DHB. The DHB has continued to purchase additional scans since the pilot ended.

Cost of the post test assessment

During the pilot, after patients received a diagnostic test a GPL reviewed the results and triaged the patient to receive either an FSA or to return to their GP for primary care management. This is estimated to have cost $4 per referral received by the service.

13.4 Avoided costs by Canterbury DHB

Ongoing costs and benefits are considered on a per referral basis. Costs avoided are calculated by comparing the difference between the cost of referrals that went through the pilot pathway compared to the cost of the referrals if they had gone through the counterfactual pathway.

Specialist appointments avoided

We look at the cost of specialist appointments during the counterfactual and pathway, described below:

Specialist appointments before diagnostic test

Prior to the pilot, all patients received a specialist appointment before receiving a diagnostic test. The

pilot removed this step in the patient pathway, and all patients referred went straight to a diagnostic test. Therefore, for every patient referred a specialist appointment before receiving a diagnostic test was saved. The total saving in terms of specialist time saved through appointments avoided before a diagnostic test estimated as $221 per referral received by the service.

Specialist appointments after diagnostic test
Under the counterfactual, all patients received a specialist follow up appointment. During the pilot, only patients assessed as requiring a follow up received one. The total saving in terms of specialist time saved is estimated at an average of $60 per referral to the service.

Administrative costs avoided
Canterbury DHB estimates that the pilot saved a total of $1000, through reduced administration due to the reduction in specialist appointments. The total saving in administration cost per referral received by the service is $24.

13.4.1 Benefits to Canterbury DHB

Benefits of early intervention
The volume of patients that went through the pilot pathway was very small. This makes quantifying the benefits of early intervention difficult, and we do not attempt to do so here. GPs consulted had differing views on the benefits of earlier intervention, mainly due to the wide variety of conditions that these tests are used to diagnose.

Freeing up specialist time
A substantial number of specialist appointments were averted due to the pilot. This means that specialists have more time to see other patients, improving access to specialist appointments, and the service provided by the DHB.

13.5 Costs and benefits for patients

13.5.1 Benefits

Reduced wait times
During the counterfactual patients were waiting 5 months from the time the General Surgery Department received a referral to the time the patient received a diagnostic tests. At the end of the pilot, this reduced to 22 days for CT Abdomen and 18 days for CT Liver/Pancreas and Ultrasound soft tissue.

Similarly, during the counterfactual patients were waiting 2 months (or 60 days) between their diagnostic test to their follow up appointment. At the end of the pilot, this reduced to 52 days for CT abdomen, 31 days for CT Liver/ Pancreas and 23 days for Ultrasound soft tissue.

These decreases in waiting times can reduce anxiety for patients while waiting for diagnosis.

Fewer visits at CDHB
All of the patients in the pilot received at least one less appointment at the CDHB, through attending a decreased number of FSAs and FUs. This benefits patients through saved time and decreased transport costs.

13.5.2 Costs

Increased GP visits

During the pilot, patients visit their GP to receive their follow up results as they don't receive a follow up appointment with a specialist. This is an additional cost for the patient as they are charged for GP appointments and not for specialist appointments.

13.6 Costs and benefits for GPs

13.6.1 Benefits

Informal feedback from GPs suggests that they are happy with the pilot.

13.6.2 Costs

There are no additional costs to GPs from the pilot

13.7 Costs and benefits to the wider health sector

There are no costs and benefits from the pilot that are specifically attributed to the wider health sector.

3. Whanganui DHB – Improved access for primary care physicians to general ultrasound

	Pilot Coverage GP referrals for abdominal ultrasounds in the Whanganui District Health Board Region
Key components of the pilot: 1. Introduction of referral guidelines 2. Provision of GP education on guidelines and new pathways and processes 3. Purchase of additional ultrasound scans	**Was there a good counterfactual?** 1. **Yes**
Key conclusions to take from this pilot 1. GPs provided with referral guidelines and education referred appropriately, despite the audit to determine if the referral is appropriate occurring after the patient receives a diagnostic.	**Level of confidence in the conclusion** **High**
2. The new referral guidelines (based on the Australasian and Royal Radiology College guidelines) were found to be inappropriate for determining if a patient should receive a diagnostic test	**High**
3. Increasing the number of diagnostics provided without appropriate measures to control demand for the service is unlikely to result in long term benefits for the service.	**Meduim**
Is the pilot now the standard pathway?	**Yes** Whanganui DHB continues to provide additional ultrasounds. This pilot has resulted in a number of initiatives, including development of new referral guidelines, return of all referrals older than 6 months to GPs and reprioritisation of the remaining referrals.
Comment on health benefit	Waiting times for patients reduced from 1 month to 2 to 6 days for urgent patients, and from 3 months to 2 to 3 weeks for non urgent patients. This is likely to have resulted in reduced anxiety for patients, however, benefits from earlier intervention are too uncertain to measure or monetise.

13.8 Findings

This pilot demonstrates that providing GPs with referral guidelines can improve the proportion of appropriate referrals sent to a service. In addition, the PHO in Whanganui audits GP ultrasound referrals in retrospect, after the patient receives a diagnostic test, which means that the GPs in the region improved the quality of their referrals despite knowing that all patients referred would receive the diagnostic.

A part of the pilot was the implementation of new referral guidelines, based on the Australasian and Royal Radiology College guidelines. While adherence of GPs to the new referral guidelines improved greatly due to the pilot, the DHB concluded that the referral guidelines were not suitable for determining if a patient should be referred for an ultrasound. However, we still consider that the reduction in inappropriate referrals is a clear benefit of the pilot, given that the number of referrals resulting in a normal test result decreased from 46% before the pilot to 36% at the end of the pilot.

While waiting times reduced from 1 month to 3 to 6 days for urgent patients and from 3 months to 2 to 3 weeks for non-urgent patients, the number of patients on the waiting list for ultrasounds remained constant. This means that despite the reduction in inappropriate referrals, there appears to have been an increase in demand for the service. It is not clear if this increase is attributable to the pilot, or if it would have occurred regardless.

The small number of patients that went through the pilot pathway, and the uncertain health implications of early diagnosis, make the health benefits from earlier diagnosis too uncertain to measure or monetise. There is likely to be patient benefit due to reduced anxiety, although any high level of anxiety prior to the pilot would have been dealt with by a trip to ED or referral to a specialist. Therefore, the main benefit to the health sector from the pilot is short term reduction of pressure on a vulnerable service.

13.8.1 The pilot pathway has become the standard pathway

The pilot pathway has become the standard pathway. There has been further effort to improve the referral guidelines, continued audit, and more active review and management of waiting times. The DHB has continued to provide additional ultrasound volumes through a different private provider.

The pilot project has highlighted a need to address issues related to referral patterns. In relation to the GP-referred component of ultrasounds:

- New referral guidelines were drafted after the completion of the pilot (based upon electronic referral guidelines that have been piloted at Waikato DHB)
- All referrals waiting for more than 6 months are to be returned to the referring GP to ensure the referral is in line with the new guidelines
- Remaining referrals have been examined by the GP leadership group and re-prioritised
- Patient flow processes have been realigned with resourcing

Resource requirements will also be reviewed in the future if it can be demonstrated that the resource provided remains insufficient to close the gap.

13.9 Background

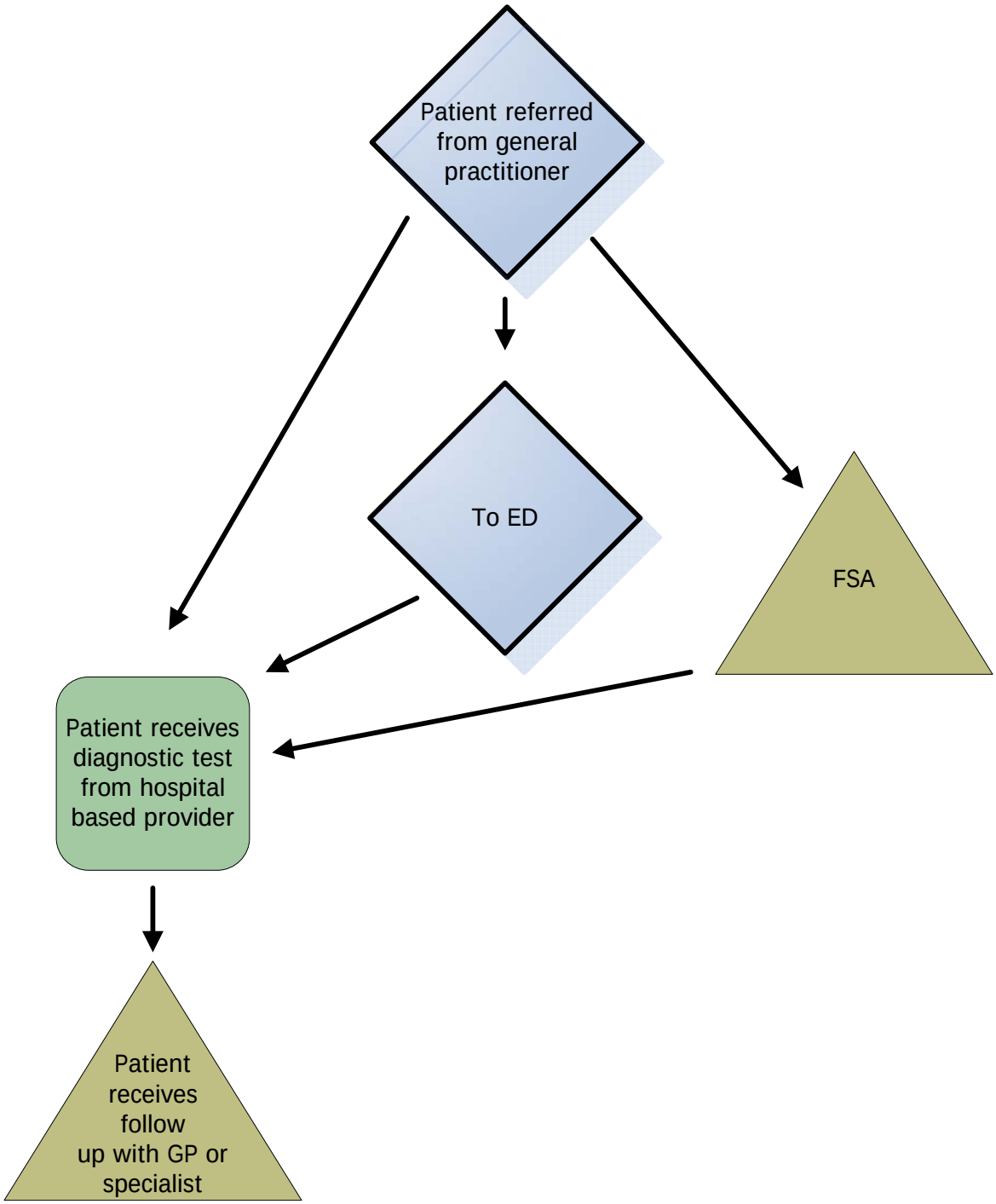
13.9.1 Patient pathway prior to the pilot

Excessive waiting times are seen as the most significant barrier to accessing ultrasound diagnostic procedures in the Whanganui District Health Board region. Prior to the pilot, GPs could refer directly for diagnostic tests, however, anecdotal evidence suggests that excessive waiting times led to increased demand for FSAs, an increase in ED attendances, and an increase in avoidable hospital admissions. GPs in Whanganui were advising patients to use private diagnostic facilities in order to avoid the delay in access, or were referring patients to ED.

An interesting aspect of this pilot is that while all GP referrals result in an ultrasound scan, Whanganui District Health Board audits a sample of GP referrals to assess their clinical appropriateness. These audits, paid for by the PHO, occurred regularly before and during the pilot. GPs that send in inappropriate referrals are contacted and feedback is provided.

Below is a diagram depicting the patient pathway before the pilot:

Whanganui US Counterfactual Pathway



13.9.2 Pilot objectives and components

Key issues sought to be addressed by the pilot were:

- Waiting times of up to one year for non-urgent ultrasounds; at the outset of the pilot 1,640 patients had been waiting for an US for more than 3 months
- An increasing number of referrals, with limited capacity for scans, leading to more patients on ultrasound waiting lists
- Some patients receiving an FSA before a diagnostic test. This meant that the results could not be discussed at the FSA, and that the patient required a further follow up specialist appointment once the test was complete

The programme was intended to:

- Increase the number of ultrasounds delivered to the DHB population. It was intended to move the urgent/routine waiting times for ultrasounds from 1 and 3-36 months respectively, to 2 days and two weeks respectively, over the course of the pilot project
- Explore the feasibility of developing a sustainable ultrasound referral model for use by GPs
- Provide GP continuing medical education sessions on the pilot aims, processes, and use of guidelines

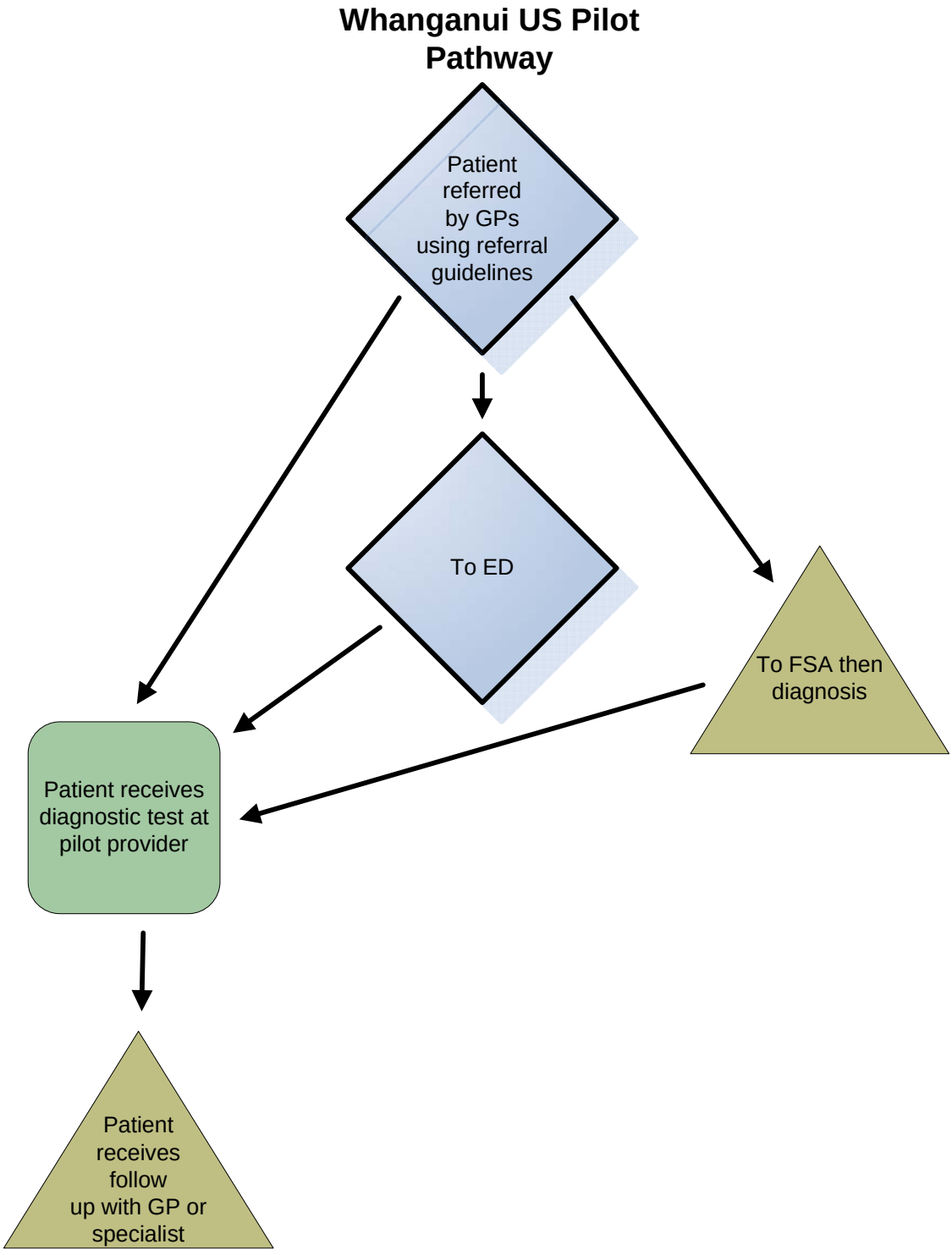
The pilot had three key components:

- Development of referral guidelines for GPs. Referral guidelines were developed (based on Australasian and Royal Radiology College guidelines) and agreed with PHO clinical governance committee. Draft referral guidelines, referral form, and process documents were forwarded to GPs for feedback at the beginning of September 2008
- Provision of education to GPs on use of referral guidelines. An education session for GPs and other interested providers on diagnostic ultrasounds was conducted in September 2008
- Provision of additional ultrasounds through a private provider (instead of the WDHB provider arm). The DHB has now moved to a model whereby patients can choose which provider they will go to for their scan – a choice of either public or private

Delivery of ultrasounds occurred later than planned, mainly due to contracting difficulties with private providers. There was an intention to use multiple providers agreed, but not implemented, during the pilot.

The main change in the pilot pathway was to ensure that patients received an ultrasound to aid diagnosis before referral to a specialist, or to ensure that the pathway to ED was more carefully moderated. Although the pathway options remained the same, the introduction of the guidelines and the subsequent moderating effect on referrals is an important change.

As is indicated in the diagram below, the pathway essentially remained the same.



13.9.3Description of pilot and counterfactual

The pilot started on the date on which GPs began to refer patients using the new referral guidelines, which was 1 September 2008**.** The pilot ended on the 31 December 2008.

The counterfactual (i.e. what would have happened if the pilot had not happened) is the same period as the counterfactual for the previous year. The counterfactual begins on 1 September 2007, and ends on 31 December 2007. We note, however, that the DHB can provide limited data only for this period.

The total US provided during the pilot, 242, falls well short of the target (and funding) for 900 US over the pilot period. WDHB attributes this shortfall to sonographer resource constraints – an additional sonographer was employed halfway through the pilot to allow those 242 procedures to be delivered.

13.10Costs and benefits for the DHB

The costs and benefits of the pilot for the DHB are split between establishment costs and ongoing costs and benefits. Costs and benefits are summarised in the tables below. The costs, costs avoided, and benefits are relative to what the DHB would have experienced under the counterfactual.

The pilot involved moderate establishment cost of $10,275, incorporating the cost of drawing up guidelines and the cost of GPL time implementing and managing the pilot. Some additional costs of GP education were borne by the PHO.

Summary of establishment costs		
Costs to DHB		**Total cost to DHB**
Cost of developing new referral guidelines	Researching best practice processes	$1,875
	Distributing guidelines to GPs	minimal
Cost of GPL for process redesign		$8,400
Total		**$10,275**

Summary of ongoing costs and benefits – per referral		
Costs to the DHB that would not have been incurred under the counterfactual	**Cost per referral received by the service during the pilot**	
	Low cost estimate	**High cost estimate**
Ongoing Costs		
Costs of additional scans	$64	
Possible increase in demand for the service	Cannot be calculated	
Total	**$64**	
Costs Avoided by DHBs		
Reduction in inappropriate referrals	$27	
Avoided administration cost	$20	
Cost avoided through earlier diagnosis	Cannot be measured	
Benefits to DHBs		
	Not measured but unlikely to be material.	
Total costs avoided and benefits	**$47**	**$370**
Ongoing benefits and costs avoided less ongoing costs	**-$17**	**$306**

13.10.1 Establishment Costs

The total identified establishment costs of the pilot were made up of:

- Cost of developing new referral guidelines
- Cost of GPL for process redesign

In the eyes of the DHB, these establishment costs were not real in that they were incorporated into the work of positions already existing and budgeted for within the DHB, and therefore the overall establishment cost was negligible. There is some foundation to this view; the costs were costs of redirected time from existing resource and therefore are not an additional cost to the DHB. However, from an economic perspective we prefer to acknowledge the opportunity cost of staff time.

Cost of developing new referral guidelines
The cost of developing new referral guidelines is estimated by the DHB as approximately 25 hours of work at an hourly rate of $70. This involved input from the Portfolio Manager, from the GPL (who holds a nursing qualification), and GPs.

Cost of GPL for process redesign
The DHB estimates that the GPL spent approximately 60 hours in total developing and operating the pilot. This cost is calculated using the assumed cost of GPL time for pilots where DHBs have not provided estimates, of $140 per hour.

13.10.2 Ongoing costs to Whanganui DHB

Ongoing costs are considered on a per referral basis. Only those costs that are additional to the costs that would have been incurred under the counterfactual are included. We use referrals, rather than patients receiving the service, on the basis that it is assumed that the same patients referred for the pilot would also have been referred under the counterfactual. There were 567 referrals from GPs for ultrasound scans of the abdomen during the pilot period.

Ongoing costs identified by the DHB are:

- Costs of additional scans purchased

Costs of additional scans purchased
During the pilot, the DHB provided an additional 242 scans at a cost of $64 per referral received by the service.

13.10.3 Costs avoided by Whanganui DHB

Ongoing benefits are considered on a per referral basis. Only those benefits that are additional to the benefits that would have been incurred under the counterfactual are included. We identified the following avoided costs:

- Reduction in inappropriate referrals
- Avoided administrative cost
- Possible increase in demand for the service
- Costs avoided through earlier diagnosis

Reduction in inappropriate referrals
The DHB implemented new referral guidelines as a part of the pilot. The DHB conducted audits of referrals received during the counterfactual and during the pilot. The results of this audit are set out in the table below. Although the numbers are small, there is a definite decrease in referrals deemed unnecessary when measured against the new guidelines, from 22% to 3.5% of referrals. The percentage of scans with normal findings decreased as well.

Referrals deemed inappropriate		
	Counterfactual	Pilot
Number audited	60	100 (two audits)
% of referrals deemed inappropriate	22.0%	3.5%
% of scan results with normal pathology	46.0%	36.0%

The value of a decrease in inappropriate referrals is calculated as follows:

If we assume that the reduction in inappropriate referrals means that GPs were not referring patients that they would otherwise would have, this means that 101 referrals to the service were avoided by the pilot, at a saving of $27 per referral received by the service.

The reduction in inappropriate referrals assists stressed services and avoids material cost in purchase of additional private scans.

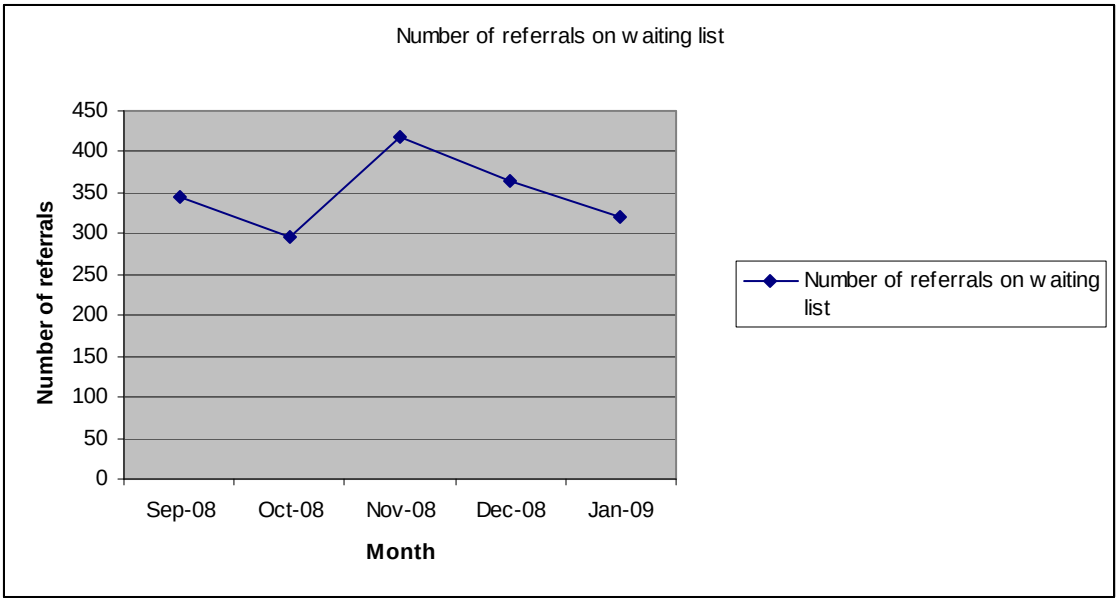
However, it is of note that the DHB considers 36% of scans with normal findings as much too high – they note that local radiologists and GPs have suggested that the percentage of findings with normal pathology should be between 10 to 20% of findings with good guidelines. This means that while introduction of the referral guidelines and education resulted in greatly improved adherence to the referral guidelines, those guidelines are not considred effective in reducing unnecessary referrals to the service. The guidelines were created to triage referrals between CT and US scans, not to determine if any diagnostic test is appropriate at all. Nevertheless, the saving calculated previously may still be valid, given the decrease in the percentage of results showing normal pathology during the pilot.

Avoided DHB administrative cost

If we assume that the reduction in inappropriate referrals means that GPs were not referring patients that they otherwise would have, then reduction in inappropriate referrals from GPs has resulted in an estimated saving of $20 per referral received by the service, based on a DHB estimated reduction in administration costs of $110 per referral avoided.

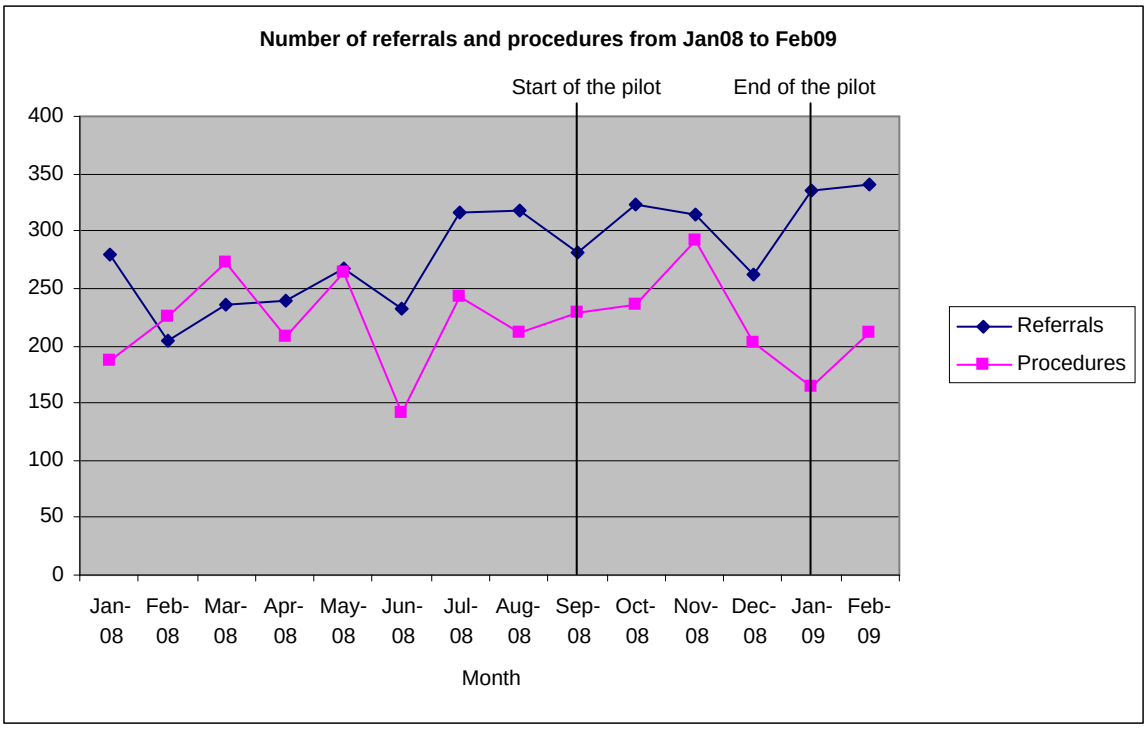
Possible increase in demand for the service

While waiting times for diagnostics decreased during the pilot, the number of referrals on the waiting list remained static. The graph below shows the number of patients waiting during the pilot.



Given the purchase of additional ultrasound, this suggests that there was an increase in demand for the service.

The graph below shows the total number of referrals and procedures provided from January 08 to February 09. The pilot ran from the 1st September 2008 to the 31st December 2008.



From these graphs, it is not clear if the increase in demand would have occurred if the pilot had not taken place, or if the increase in demand was a result of the pilot. There appears to be an increase in the number of referrals received by the service in July 2008, two months before the pilot began, which contributes to an overall increasing trend in the number of referrals received by the service over the year.

Given that it is not clear if the increase in demand would have taken place if the pilot had not happened, we have not attempted to calculate the cost of this demand as a cost of the pilot.

Costs avoided by Whanganui DHB from earlier diagnosis

Benefits in this category are too speculative to provide any estimated costs avoided by DHBs through earlier intervention. GPs consulted cannot provide an estimate of the magnitude of benefits of earlier intervention, as ultrasounds are used to diagnose a large number of conditions.

13.11Costs and benefits for patients

Benefits

The main benefit to patients was the better management of the pool of patients waiting for a scan, and better, earlier, identification of whether a scan was needed. The waiting time impact appears to have been substantial, as set out in the tables below. Patient waiting times decreased from 1 month to 3-6 days following the pilot, for urgent referrals. Waiting times for non-urgent referrals decreased from 3 months to 2-3 weeks.

The consequence of this reduction in waiting time is likely to be, at the very least, a reduction in patient anxiety. We are not able to monetise this potential benefit.

Average waiting time for urgent patients		
	Counterfactual	**Pilot**
September	1 month	1 month
October	1 month	1 month
November	1 month	4 days
December	1 month	6 days
January	1 month	6 days
Average waiting time after counterfactual	**1 month**	**3-6 days**

Average waiting time for non-urgent patients		
	Counterfactual	**Pilot**
September	3 months	3 months
October	3 months	4 weeks
November	3 months	3 weeks
December	3 months	3 weeks
January	3 months	3 weeks
Average waiting time after counterfactual	**3 months**	**2-3 weeks**

13.12Costs and benefits for GPs

13.12.1 Benefits

The DHB reports that the GP satisfaction with the pilot is strong, but that GP satisfaction was not surveyed. The pilot offered some additional training and development opportunities for GPs.

13.12.2 Costs

We note that the costs of implementing the guidelines fell on GPs, through the PHO clinical governance group.

13.13Costs and benefits for the PHO

The PHO provided GPs with education on the new referral guidelines as a part of their regular CME sessions. GPs are paid to attend these meetings, and assuming an estimated 25 GPs attended, and GP time cost of $140 per hour, this provides a total cost of GP education for this pilot of $3,500. This cost is not over and above what GPs would normally receive for attending CME meetings, and represents an opportunity cost for activities that could have been undertaken at the meeting if the GP education for the pilot had not taken place. It is not clear if these costs are likely to be ongoing.

14 Waitemata District Health Board – Speedier access to diagnostics for breast patients through streamlining records

Waitemata District Health Board – Speedier access to diagnostics for breast patients through streamlining records	**Pilot Coverage** GP referrals for Diagnostic Breast Imaging in Waitemata District Health Board
Key components of the pilot: 1. Development and distribution of an electronic referral template, which cannot be sent by GPs without all sections complete 2. GP education and training on new pathway and electronic template	**Was there a good counterfactual?** **1. Yes** Good information available for both the pilot and counterfactual. However, the pilot period is only 3 months long.
Key conclusions to take from this pilot: 1. Increased GP education and awareness of changing pathways can increase appropriate demand for a diagnostic test in the short term	**Level of confidence in the conclusions** **High**
2. Increased GP education and training is more likely to have improved information provided in referrals, rather than electronic referrals that cannot be sent without all sections complete	**Medium**
Is the pilot now the standard pathway?	**Yes** This pilot has not been implemented in its entirety, and full roll out of the pilot is planned for March 2010.
Comment on health benefit	This pilot is unlikely to have resulted in reduced wait times for patients. Due to the short period of the pilot, this is not investigated further.

14.1 Findings

This pilot is due to be rolled out in it's entirety in March 2010. However, some aspects of the pilot have already been introduced, primarily the change from GPs using a paper referral template that can be sent with partial information, to GPs using an identical electronic template that must have all required sections completed before being sent to the DHB. The use of the electronic referral form was optional during the period being evaluated.

The demand for diagnostic breast imaging increased between the counterfactual and the pilot. There was a 6% increase in referrals received by the service. This could be attributable to the education provided to GPs on the new service, and the new template stimulating demand. This demand appears to have been appropriate, as over the same period referrals returned to GPs as unnecessary decreased. This pilot suggests that publicity of changes to a service, and improved ease of access may result in an increase in appropriate demand for the service.

Most interestingly, this pilot showed a significant improvement in the completeness of information provided in referrals, despite only a small uptake of the electronic referral form, between 12 and 13% of referrals received during the pilot period. This suggests that GP training on the new referral template and the education provided to GPs on the new pathway may have had more impact on the information provided in referral forms than the electronic template itself.

The time period for the counterfactual for this pilot is the 3 months period between when the paper template became available to GPs, and the time the electronic template became available. Because of the short time frames and ongoing change being experienced in the service, conclusions for this pilot must be treated with extreme caution.

14.1.1 The pilot pathway has become the standard pathway

The use of the electronic referral template continues in Waitemata, and the full pilot is expected to roll out in March 2010, at which point use of the electronic referral template will be expected to be the norm.

14.2 Background

This pilot has not been implemented in its entirety, due to unforeseen delays. Full roll out of the final changes is planned for March 2010. However, some aspects of the pilot have been implemented, and this evaluation examines only those limited aspects of the pilot. The next 3 sections describe the patient pathway before any changes occurred, the intended changes in their entirety, and then the focus of this evaluation.

14.2.1 Patient pathway prior to the pilot

Before the Ministry of Health instigated the 14 diagnostic pilots, Waitemata DHB were already planning improvements to patient pathways for diagnostics for GP breast referrals.

Before these improvements started, GPs referred patients directly for breast diagnostics using a standard referral template, which was used for all referrals for secondary care services in Waitemata DHB. Referrals were received by the DHB through up to three pathways; Surgical, Radiology and the Central Referral Office. Use of these different routes resulted in inconsistent prioritisation and difficulty in record keeping. In particular, GPs and Specialists would often refer patients for both a diagnostic test and surgical opinion, resulting in duplicate referrals making record keeping even more difficult. In some cases, GPs sent referrals for the same patient to each of the Central Referral Office,

Radiology and Breast Clinic. This caused confusion and made it difficult to track patients through the system.

Three key issues were identified with the pathway, and were to be addressed by the changes:

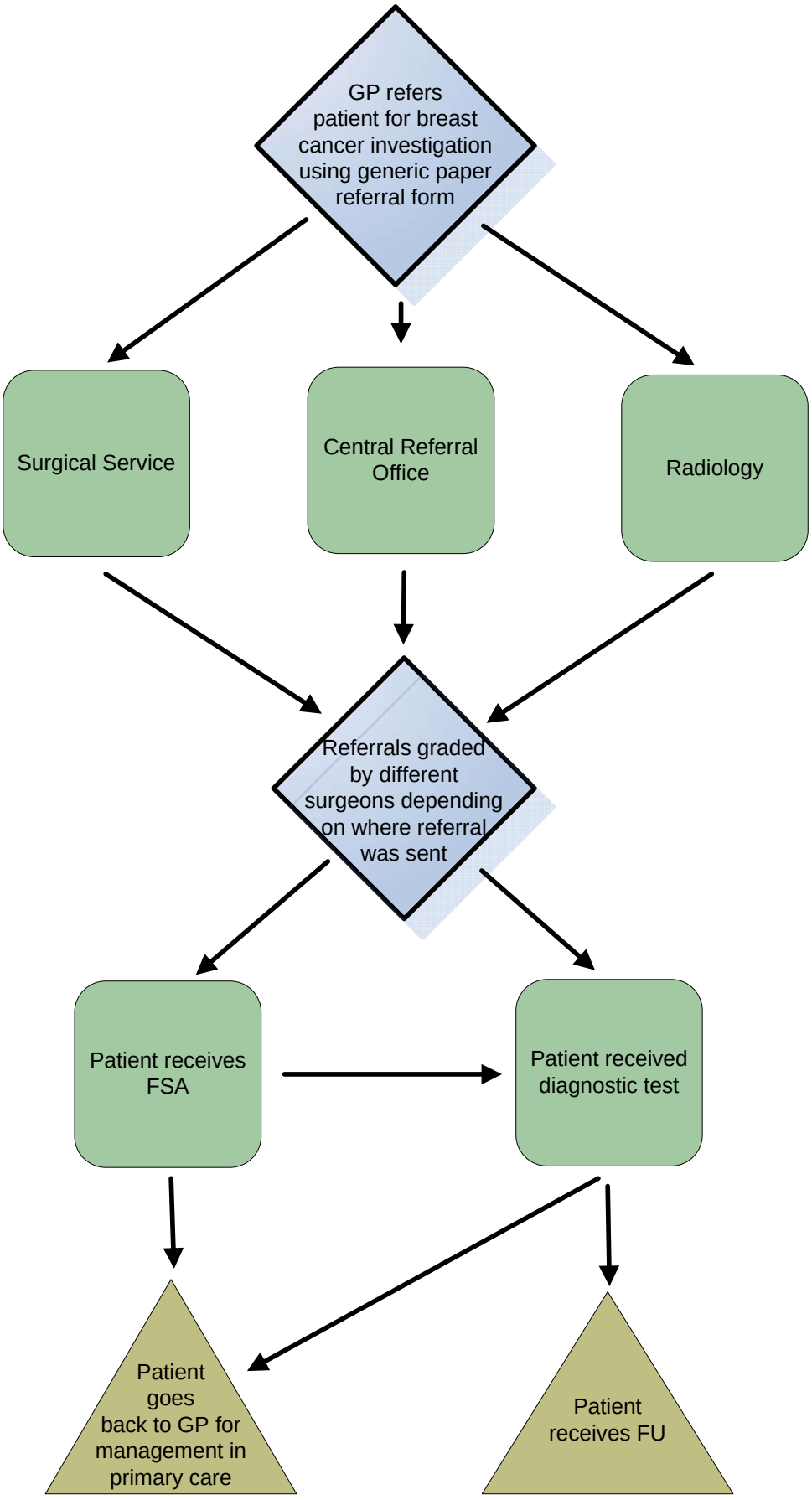
1. The quality of referrals. Anecdotal evidence suggested that a high proportion of referrals had inadequate information to determine the appropriateness of the referral, or to assign a suitable priority status.

2. Clinically appropriate referrals. Some of the referrals received were not clinically appropriate, leading some patients to receive unnecessary diagnostic procedures, and resulting in diagnostic time slots being occupied by non-priority patients.

3. Monitoring of referral progress. The progress of referrals through the system was difficult to track. All GPs still used a paper based referral system.

The diagram below depicts patient pathways prior to any improvements to the pathway:

Waitemata Breast Patients Counterfactual Pathway



14.2.2 The complete pilot plan

The original plan was to develop three tools to improve breast patient pathways:

1. Develop a Referral Standardiser. Taking the recently developed paper referral guidelines and translating them into a single, standard, electronic referral template for the WDHB Breast Service.

2. Develop a Referral Validator. Develop a system which automatically:

   i. Receives all breast referrals in an "Inbox"

   ii. Validates that all required clinical information has been provided through the use of compulsory fields located in the form. If the compulsory fields are not completed, the form cannot be sent.

   iii. Acknowledges referral and generates a referral summary.

   iv. Sends "referral received" notification to the GP.

3. Develop a Referral Tracker. Develop a system that tracks referrals through the system from the receipt of the referral through to an FSA to ensure accurate reporting on any particular patient at any given time.

14.2.3 The pilot delay

Initially, all three of these changes were to occur at the same time. However, there have been several problems in developing and rolling out the pilot:

1. Unforeseen IT problems arose early in the project. It was discovered that the installation of an internal Referral Validator, Standardiser and Tracker, would require the installation of a new software package, MedTech32, in booking and scheduling. Because of the time and ongoing expense of this, it was decided that MedTech could not be used for the project, and alternatives were investigated. The option chosen was to use Healthlink, which does not require changes to hospital systems as the forms are hosted offsite and accessed through a web portal.

2. After the decision to use Healthlink had been finalised, the Breast referral pilot organisers were informed that the Regional e-Referrals project had suddenly made significant progress in a short space of time, and announced that they were to release their RFP for a vendor to provide IT services to the project. It was feared that there could be issues between vendors applying for Regional e-Referrals project and some felt that the pilot gave unfair advantage to HealthLink, who were to provide IT support to the Breast pilot project.

These two issues resulted in the suspension of a large portion of the pilot. Waitemata DHB plans to complete the pilot as a part of the regional e-referrals project, starting in 2010. The work done by WDHB has been given to the Regional project to be incorporated into their Breast Referral Templates.

Organisers continued with aspects of the pilot that could be put in place despite the issues above. This included the release of the new referral template in different forms over a staged period. The timeline below describes the course of events.

- April 2009 - The new referral template, designed specifically for breast referrals, was released to GPs in paper form and published on Health Point. This meant that all referrals could be filled out in a standard format. At the same time, one pathway for referrals was created

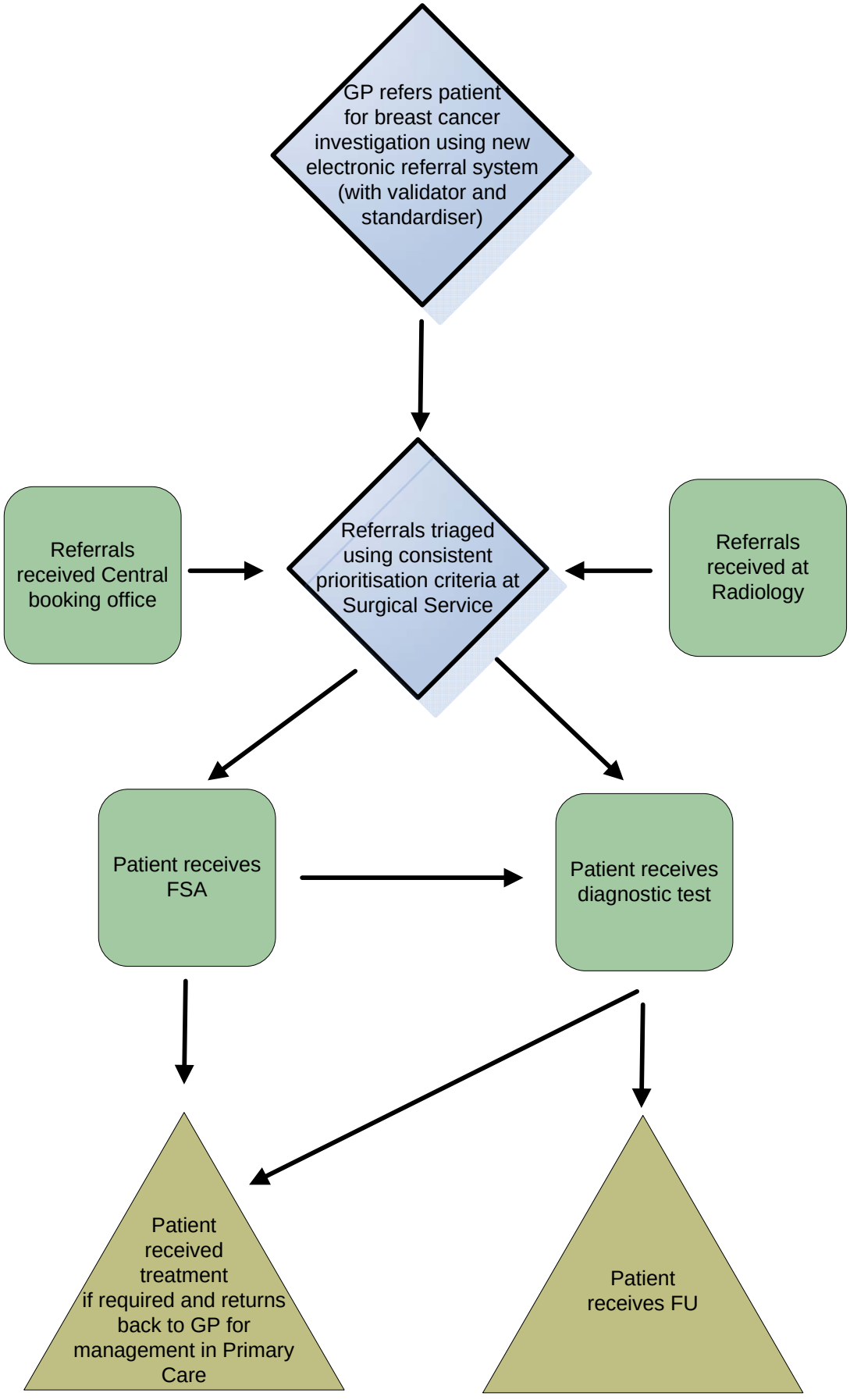
internally, with all referrals arriving in other locations being sent to the Booking and Scheduling Office for consistent triage.

- July 2009 - The new referral template was released in electronic form to Harbour PHOs and then other PHOs running MedTech patient management systems in the District. While the referrals are printed by the fax and handled manually when they arrive in the Surgical Service, GPs using MedTech could now fill them out and fax them electronically. Importantly, the electronic referrals cannot be sent without compulsory components of the form filled out.

- March 2010 (Depending on Regional Project Progress) – Full roll out of the system is planned, with referrals handled electronically both by GPs and within the DHB. This system is being applied to all referrals from Primary Care (GPs) to Secondary Care (WDHB) in the Waitemata district.

The diagram below shows the final planned patient pathway, after the roll out in March 2010.

Waitemata Breast Patients Pilot Pathway



14.2.4 This evaluation

As parts of the pilot are not in place, this evaluation is focused on the change from paper to electronic referrals. Therefore, the start of the counterfactual is from the time GPs had access to a paper referral template. The end of the counterfactual, and the start of the pilot, is the time when GPs began to use the electronic referral form.

This evaluation looks at a very simple change, a comparison between a referral template that can be sent without all of the sections completed (counterfactual), and a referral template that cannot be sent without all sections complete (pilot), and the education associated with implementing this change.

14.2.5 Description of pilot and counterfactual

The counterfactual is from the time GPs began to use the new paper referral template, 1April 2009, to the time GPs began to use the new electronic referral template, 30 June 2009. The pilot began on the 1 July 2009 and ended on the 30 September 2009.

The pilot includes all referrals into the WDHB Breast Service, which are referrals for breast diagnostics, Mammogram, Ultrasound and Biopsy.

14.3 Costs and benefits for the DHB

The costs and benefits of the pilot for the DHB are split between establishment costs, and ongoing costs and benefits. These are summarised in the tables below. The costs, costs avoided and benefits are relative to what the DHB would have experienced under the counterfactual.

The establishment costs of the pilot are difficult to determine, as the budget for the component considered in this evaluation is included in the budget for the whole project. Therefore, establishment costs provided need to be treated with caution, but are estimated at $19,800.

Summary of establishment costs	
Costs to DHB	**Total cost**
Establishment Costs	
GP training for using new electronic template	$15,000
Development of referral template	$4,800
Total	**$19,800**

Summary of ongoing costs and benefits – per referral	
Costs to the DHB that would not have been incurred under the counterfactual	**Cost per referral received by the DHB**
Ongoing Costs	
There are no ongoing costs associated with the pilot	0
Total	**0**
Costs Avoided by DHBs	
Cost of seeking further information for triage	$1
Cost avoided of DBI	$-33
Cost avoided of FSA	-$6
Benefits to DHBs	
Benefits of early intervention	Cannot be calculated
Total costs avoided and benefits	-$38
Ongoing benefits and costs avoided less ongoing costs	**$-38**

14.3.1 Establishment Costs

The total establishment costs of the pilot were $19,000 which was made up of the following

- Initial training given to GPs before electronic referral roll out
- Development of referral template

Initial training given to GPs before electronic referral roll out

It is unclear how much of this cost is attributable to the small change that we are evaluating in this pilot , as opposed to the cost of the full pilot, due to be completed in March 2010. The cost of $15,000 used as the cost of the GP training is described in the project budget as the cost of 70 nurse days spent liaising with GP practices and assisting with deployment.

Training provided to GPs included the provision of materials describing the new service to all organisers of GP Peer Group Meetings. Documents on the new system were distributed to individual GPs when they attended their peer group meetings.

Development of referral template

The electronic referral template cost $4,800, attributable to IT development for the electronic referral template.

14.3.2 Changes in costs experienced by Waitemata DHB

Ongoing costs and benefits are considered on a per referral basis. Only those costs that change relative to the counterfactual are included.

There are no additional categories of costs associated with the pilot, because the handling and management of the referrals within the DHB has not changed. However, changes in the number of referrals and the appropriateness of those referrals has implications for the DHB.

Between the counterfactual and the pilot there was a substantial change in the number of referrals travelling through the pilot pathway. Between the counterfactual and the pilot:

- Referrals received by the service increased
- Referrals returned to GPs decreased

Consequently:

- The number of bookings for Diagnostic Breast Imaging increased
- The number of patients booked for FSAs increased

Identified costs avoided by the DHB include:

- Cost of seeking information for triage
- Cost of additional follow up appointments

Increase in referrals received

The number of referrals received by the service increased, from 676 to 719, an increase of 6% from the counterfactual to the pilot. The cause of the increase is unclear. The increase may be attributable to GPs preferring the electronic referral form, finding it easier and faster to use, and therefore are more likely to refer patients. Other possible explanations include that improved GP education resulted in GPs referring more, that having improved processes means that fewer referrals are lost, or the increase may have occurred even if the pilot had not taken place.

Decrease in referrals returned to GPs

Information on the number of referrals returned to GPs is collected for all referrals across general surgery in Waitemata, of which approximately a third are breast referrals. Information specific to breast referrals is not available. Rejected referrals across general surgery decreased by 30%, from 18.5% during the counterfactual to 12.2% during the pilot. The DHB attributes this to an improvement in the information received for breast referrals, and suggests that the increase shown by the number available is actually smaller than the true increase, due to the inclusion of other general surgery referrals in these numbers. However, it is unclear if referrals that should have been accepted by the service were being rejected during the counterfactual due to incomplete referral forms.

Increase in demand for Diagnostic Breast Imaging

Bookings for DBI increased from 393 patients booked during the counterfactual to 502 patients booked during the pilot. The DHB is unable to account for this increase, which is substantial. We do not know how many of these patients were booked for Mammograms, Biopsies and Ultrasounds during the pilot. Therefore, we have averaged the cost of the three diagnostics to estimate the cost of the increase in bookings. The increased demand for DBI cost $33 per referral received by the service.

Increase in demand for FSAs

By using the number of referrals received, the number of referrals returned to GPs and the number of DBIs booked during the pilot, we estimate that demand for FSAs increased from 159 FSAs during the counterfactual to 172 FSAs during the pilot, at a cost of $6 per referral received by the service.

Cost of seeking information for triage

Booking clerks contact GPs for further information to enable triage of referrals received by the service, at a cost to the DHB. Prior to the pilot, 10% of referrals received did not have sufficient information for triage. During the first two months of the pilot, this number dropped to 5% of referrals, and in the last month of the pilot, and the following month, all referrals, both electronic and paper, received had sufficient information for triage. This suggests that the requirement for GPs to complete the entire referral template before sending had a substantial impact on the proportion of referrals with sufficient information for triage.

The new system saved $1 per referral received by the service. This calculation includes the cost of the increased number of referrals received by the service during the pilot.

Cost of additional follow up appointments

The increase in bookings for DBI are likely to mean that more patients are referred on to a follow up appointment after their diagnostic test. However, we do not have numbers indicating the number of patients who required follow up appointments during the counterfactual or pilot, and so we do not attempt to quantify this additional cost.

14.3.3 Benefits to Waitemata DHB

Benefits of early intervention

As the pilot period for this evaluation is only 3 months, we do not attempt to quantify the benefits of earlier intervention from faster access to diagnostics. In addition, it is unlikely that this pilot resulted in reduced waiting times for patients. The reasons for this are explained in the next section. For more information on the benefits of earlier intervention for patients referred for Diagnostic Breast Imaging, refer to *Nelson Marlborough- Allowing GPs to refer directly for diagnostic tests: diagnostic breast imaging* pilot.

14.4 Costs and benefits for patients

This pilot was ‘invisible’ to patients, as the only change was the way in which referrals were completed by GPs. The table below provides the wait times during the counterfactual and the pilot.

Wait times

Waiting times			
Counterfactual	**Medium waiting time for FSAs (days)**	**Medium Waiting time for Mammograms (days)**	**Medium Waiting times for Ultrasounds (days)**
April 2009	48	68	68
May 2009	47	56	56
June 2009	83	79	79
Average for counterfactual	**59**	**68**	**68**
July 2009	48	68	68
August 2009	55	61	61
September 2009	58	49	49
Average for pilot	**53**	**59**	**59**

Waiting times for Biopsies are not available.

The above table suggests that there has been a slight decrease in wait times for patients, despite the increase in demand for the service. However, these numbers are likely to be misleading, as these number are the medium wait time for patients on the list. If a large number of patients entered the list in a short period of time, as happened with this pilot, we would expect the average numbers to decrease, as the new referrals would each have been waiting a short period of time, skewing the distribution of patient waiting times. This means that the medium waiting time does not reflect the true waiting time, and we would expect the medium waiting time to increase over the next few months.

Costs

There are no additional costs to patients associated with the pilot.

14.5 Costs and benefits for GPs

14.5.1 Benefits

The DHB has said that GPs report greater satisfaction with the service, and increased belief that the service will prioritise all patients consistently, due to the new template.

14.5.2 Costs

The electronic referrals take slightly longer to complete relative to sending in an incomplete paper based referral, but take less time to complete than a paper based referral that was completed properly. This is because it is easier to select ‘yes’ ‘no’ from electronic drop down boxes, rather than write out full sentences in answer to some questions.

15 Whanganui District Health Board – Improved access for primary care clinicians to computed tomography colonography

	Pilot Coverage
Key components of the pilot: 1. Introduction of a new diagnostic – computed tomography colonography (CTC) 2. Specialist triage for referrals received by the service to determine if CTC or a traditional colonoscopy is more appropriate	**Was there a good counterfactual?** 1. **No** The counterfactual is modelled based on the assumption that the same patients would have been referred if the pilot had not taken place, and these patients would have received a traditional colonoscopy instead of a CTC
Key conclusions to take from this pilot 1. Introduction of the new diagnostic resulted in cost savings for the DHB	**Level of confidence in the conclusion** **High**
Is the pilot now the standard pathway?	**Yes** The ongoing purchase of CTC is now a part of WDHB electives programme.
Comment on health benefit	The findings from the patients who received CTC and traditional colonoscopies before and during the pilot is unknown. We do not attempt to calculate the benefit through earlier intervention. Waiting times for colonoscopies decreased from 120 weeks to 52 weeks at the end of the pilot. Waiting times have continued to decrease to 4 weeks at the time of writing (November 2009). However, the DHB purchased additional traditional colonoscopies at the start of the pilot, as a separate initiative, which means the reduction in wait times is larger than would otherwise have been.

15.1 Findings

This pilot involved introduction of a new diagnostic test to Whanganui DHB. Computed tomography colonography was previously not available at the DHB. Whanganui DHB considers computed tomography colonography (CTC) is a very cost effective tool in dealing with a large waiting list of patients for surveillance scopes.

CTC is less costly than traditional colonoscopies, and both diagnostics have advantages and disadvantages. In this evaluation, we assess the costs and benefits of the pilot as it occurred in Whanganui however, a technological evaluation of CTC is outside the scope of this work.

Patients who receive CTC sometimes have to receive a traditional colonoscopy afterward. Reasons for this are numerous, but include, for example, to enable biopsy or tumour removal. In this pilot, only 4 out of 52 patients receiving CTC were referred on for a further traditional colonoscopy. There were also some patients who received a traditional colonoscopy, who then received a CTC as well, however information for numbers of these patients is not available.

This pilot resulted in an estimated average saving of $91 per referral received by the service. We do not have information on the number of findings from CTCs and traditional colonoscopies due to the pilot, so we do not attempt to estimate the benefit from earlier intervention.

Wait times for colonosopies decreased from 120 weeks at the end of the counterfactual, to 52 weeks at the end of the pilot. Wait times have continued to reduce, and wait times are currently 4 weeks long (November 2009).

15.1.1 The pilot pathway has been modified and become a standard pathway

After the pilot ended, the referral guidelines were rewritten based on Royal College of Surgeons guidelines and Clinical Director input. After feedback that patients felt badly informed about the procedures, a better patient information sheet was also prepared. A support person is now recommended to drive the patient home after the CTC.

The ongoing purchasing of CTCs is from the Whanganui DHB elective programme; 137 CTCs have now been completed (by November 2009) and the programme now receives more widespread support from within the DHB. The technology used for the pilot, and CTCs provided since its completion, is considered by the DHB to be the best CT equipment currently available, the DHB considers false negatives and positives to be less of an issue than is suggested by some published studies of CTCs.

15.2 Background

15.2.1 Patient pathway prior to the pilot

Colonoscopy is the endoscopic examination of the colon and the distal part of the small bowel with a CCD camera or a fiber optic camera on a flexible tube passed through the anus. It may provide a visual diagnosis (e.g. ulceration, polyps) and grants the opportunity for biopsy or removal of suspected lesions.

Virtual colonoscopy, which uses 2D and 3D imagery reconstructed from CT scans or from nuclear magnetic resonance scans, is a largely non-invasive medical test, although it is not standard and still under investigation regarding its diagnostic abilities. Virtual colonoscopy does not allow for therapeutic maneuvers such as polyp/tumour removal or biopsy, nor visualisation of lesions smaller than 5 millimetres. If a growth or polyp is detected using CT colonography a standard colonoscopy would still need to be performed.

Before this pilot began, Whanganui DHB did not provide CTC services. Rather, traditional colonoscopies were provided for all patients requiring investigation or surveillance. This pilot introduced the CT colonography as an additional diagnostic investigation that is suitable for some patients who would otherwise have received a traditional colonoscopy.

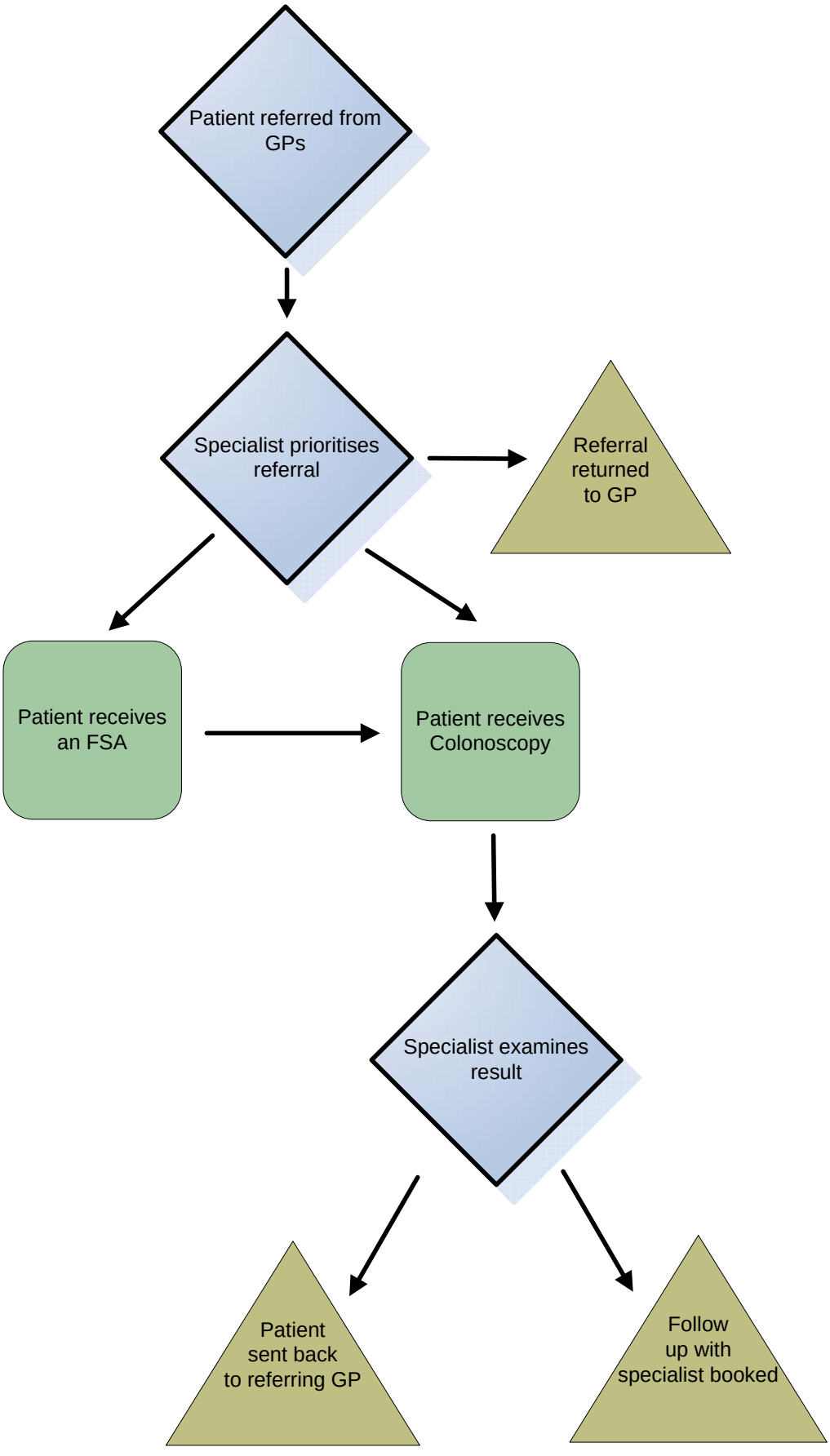
Before the new diagnostic was introduced, several issues with the provision of colonoscopy services in the Whanganui DHB region were identified:

1. Numbers of FSA's required were increasing. Referrals received from GPs often did not contain enough information for effective triage, and an FSA was booked. These FSAs were unproductive because patients were receiving FSAs before they received a diagnostic test, and the results could not be discussed at the FSA. If the diagnostic test was able to be completed prior to the FSA, this FSA event may have been avoided.

2. Waiting lists for non-urgent colonoscopies were long. At the start of the pilot there were 222 non-urgent patients on the waiting list for a colonoscopy. Of these, 78 were diagnostic colonoscopies requested from FSAs, of which 7 had been waiting for more than six months. 77 surveillance colonoscopies were 12 months overdue. Inflows for colonoscopies were approximately 91 per month, and the service capacity for procedures was 64 per month.

Below is a diagram depicting the patient pathway before the pilot:

Whanganui Colonoscopy Counterfactual Pathway



15.2.2 Pilot objectives

The programme was intended to:

- Introduce CT colonography as another diagnostic available for patients in the Whanganui DHB region.
- Purchase CTC in addition to the traditional colonoscopies already provided, thereby increasing service capacity and reducing the wait list.
- Provide GPs with continuing medical education session on the pilot aims, processes and use of the existing guidelines.

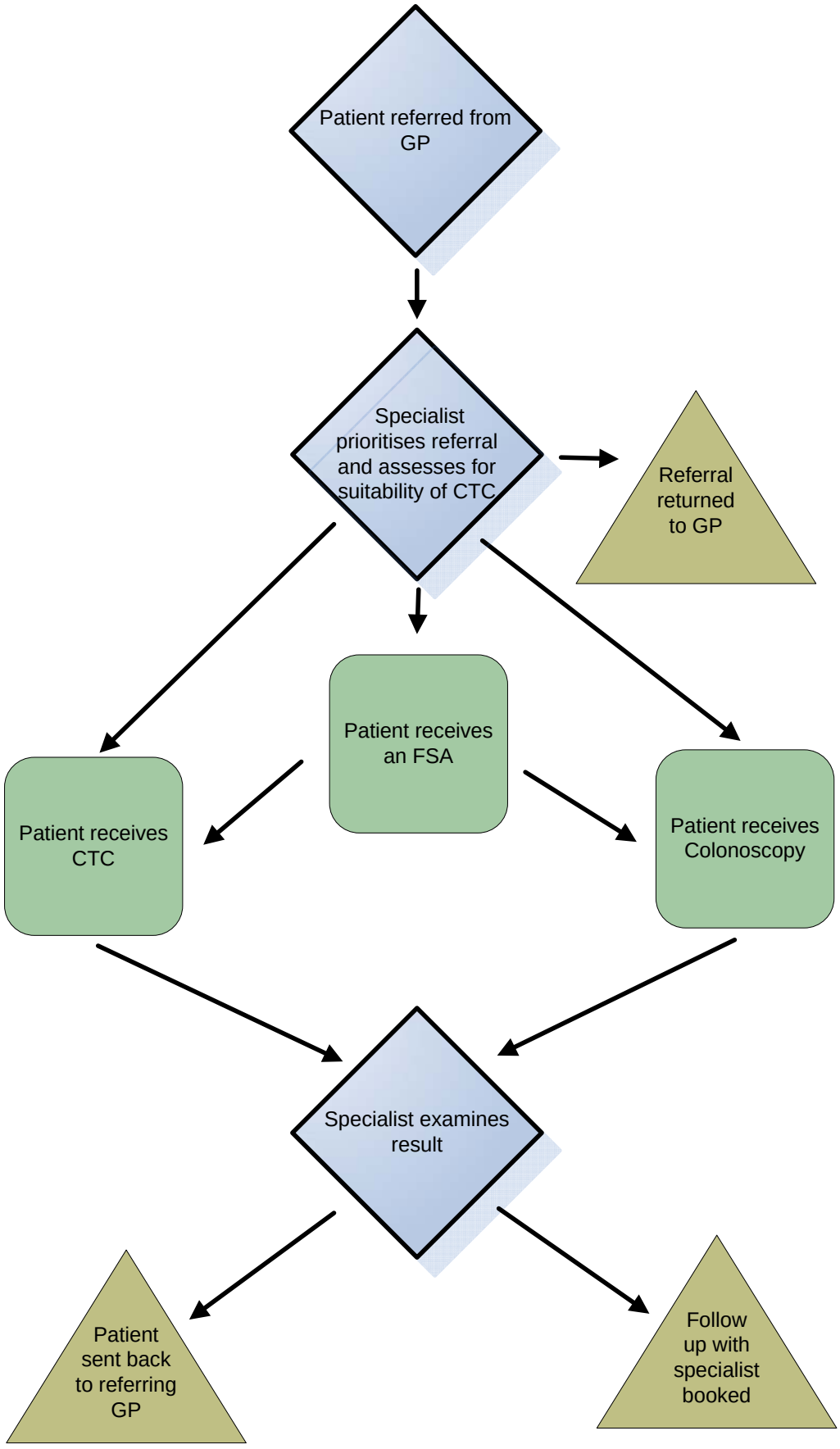
It was originally intended that CTC would be delivered by Pacific Radiology Wellington and Fulford Radiology New Plymouth. However, travel times were identified as a significant issue after the first two procedures (the travel time was too long as patients were first prepped in Wanganui) so a decision was made to delay the project for four weeks to allow for a planned CT to be installed at Broadway Radiology in Palmerston North.

15.2.3 The pilot pathway and service

The only change between the pathways is that under the pilot a decision was taken as to whether a patient who would otherwise have received a colonoscopy was suitable for a CTC instead.

Below is a diagram depicting the patient pathway during the pilot:

Whanganui Colonoscopy Pilot Pathway



15.2.4 Description of pilot and counterfactual

The pilot covered:

1. All patients referred for colonoscopy diagnostic investigations to Whanganui DHB.

2. All patients in the Whanganui District Health Board region.

The pilot started in October 2008, when the first patient received a CTC at Broadway radiology, and the last CTC invoiced to the Ministry occurred on the 28th of January 2009.

Therefore, the span of the pilot is from 1st October to the 31st January 2009. The counterfactual for this pilot begins on the 1st of October 2007 and ends on the 31st of January 2008.

15.3 Costs and benefits for the DHB

The costs and benefits of the pilot for the DHB are split between establishment costs and ongoing costs and benefits, and are summarised in the tables below. The costs, costs avoided, and benefits are relative to what the DHB would have experienced under the counterfactual.

The DHB has not identified any costs involved with the establishment of the pilot project. The DHB has not provided an estimate of the cost of managing the pilot, however, we understand that the DHB considers these to be negligible.

Ongoing costs, and costs avoided and benefits are calculated using the cost per referral received by the DHB. However, for this pilot we do not have this number, only the total number of CTC and traditional colonoscopies provided, and the number of patients who received more than one colonoscopy. Therefore, we use the number of patients receiving at least one colonoscopy as the number of referrals received by the service, which is 251 patients.[42] The difference is likely to be very small as the DHB reports that very few referrals did not result in a colonoscopy both during the counterfactual and pilot.

The ongoing costs of the pilot are provided in the table below:

[42] See Whanganui CT Colonoscopy appendix for how this was calculated

Summary of ongoing costs and benefits – per referral	
Costs to the DHB that would not have been incurred under the counterfactual	**Cost per referral received by the DHB**
Ongoing Costs	
Cost of CTCs purchased	$117
Total	**$117**
Costs Avoided by DHBs	
Reduction in traditional colonoscopies	$208
Benefits to DHBs	None identified
Total costs avoided and benefits	**$208**
Ongoing benefits and costs avoided less ongoing costs	**$91**

15.3.1 Establishment Costs

The DHB has not identified any costs involved with the establishment of the pilot project. Potential costs identified and discussed with the DHB include:

- Provision of GP education on new referral guidelines and pathway processes. However, patients under the pilot were still referred for colonoscopies by GPs and a specialist decided if a CTC or traditional colonoscopy was the best route for patients. Therefore, there was no training or education provided to GPs on referral guidelines or on the new pathway.
- GP Liaison work administering the pilot. Likewise, the DHB considers any extra time spent by the GP liaison managing the pilot to be negligible.
- Developing existing referral guidelines for use by the triaging specialist. However, existing referral guidelines for triage to CTC or traditional colonoscopies were adopted without further consultation so there were no establishment costs for this aspect of the pilot project.

15.3.2 Ongoing costs

Ongoing costs and benefits are considered on a per referral basis. Only those costs that are additional to the costs that would have been incurred under the counterfactual are included. We use referrals, rather than patients receiving the service, on the basis that it is assumed that the same patients referred for the pilot would also have been referred under the counterfactual.

The total ongoing cost of the pilot per referral received was $117, which was made up of the following costs:

- Purchase of CT Colonoscopies

An additional potential cost identified is the time spent assessing and prioritising colonoscopy referrals. The DHB reports that this has remained constant, despite the same triaging process now including a decision for whether a patient receives a CTC or a traditional colonoscopy.

Purchase of CT Colonoscopies

The primary cost involved with the pilot project was for the provision of CTCs by a private provider. During the pilot, 52 CTCs were purchased, at a total cost of $117 per referral received by the service.

15.3.3 Costs avoided by WDHB

Ongoing costs and benefits are considered on a per referral basis. Only those benefits that are additional to the benefits that would have been incurred under the counterfactual are included.

All patients who received a CTC would otherwise have (eventually) received a traditional colonoscopy.

We identified the following avoided costs:

- Traditional colonoscopies avoided
- Costs avoided through earlier diagnosis

Traditional colonoscopies avoided

For every patient receiving a CT Colonoscopy, who did not then receive a traditional colonoscopy, the cost of a traditional colonoscopy was saved. The cost of the CT Colonoscopy has been included in the ongoing costs of the pilot. The following table shows the number of CT Colonoscopies performed and the number of patients referred on for a CT colonoscopy.

CTCs referred to traditional colonoscopy		
Month	**Number of CTCs performed**	**Referred for traditional colonoscopy**
October 2008	15	1
November- December 2008	20	2
January 2009	17	1
Total	**52**	**4**

Therefore, 48 traditional colonoscopies were saved due to the pilot, which is a saving of $208 per referral received during the pilot.

This saving to the DHB depends crucially on the number of patients referred on to a traditional colonoscopy after receiving a CTC colonoscopy. During the pilot, this number was surprisingly low, with only 8% of patients receiving both diagnostic tests.

An unknown number of patients were referred for a CTC after receiving a traditional colonoscopy. The cost of this is captured in the cost of purchasing additional CT colonoscopies.

Costs avoided by earlier diagnosis

We have not attempted to estimate the costs avoided through earlier diagnosis for this pilot.

15.4 Costs and benefits for patients

15.4.1 Benefits

Benefits for patients identified include:

- Lower risk of adverse effect from the procedure, for example, perforated bowel
- Faster recovery from CTC
- Reduced waiting lists

The CTC procedure is minimally invasive, but cannot provide interventions (such as the removal of polyps). There are altered risks, both positive and negative, in relation to possible harm to the patient as a result of the procedure when compared to traditional colonoscopies. A patient who receives a CTC also incurs less loss of productive time than a patient who receives a traditional colonoscopy (the latter cannot drive for a day, and may receive a general or local anaesthetic).

At the start of the pilot Whanganui DHB purchased additional traditional colonoscopies. This was separate from the pilot and is a change that would have happened even if the pilot had not taken place. The additional purchases contributed to the decrease in waiting times and accessibility of the service, making reductions in waiting times for this pilot greater than they would otherwise have been.

The table below shows the number of traditional colonoscopies performed during the pilot and counterfactual.

Traditional colonoscopies (TC) performed			
Counterfactual	**Number of TCs performed**	**Pilot**	**Number of TCs performed**
October 2007	39	October 2008	44
November 2007	61	November 2008	57
December 2007	47	December 2008	63
January 2008	33	January 2009	39
Total	**180**	**Total**	**203**

The tables below provide the colonoscopy waiting list before the pilot.

Colonoscopy waiting list at commencement of pilot		
From FSAs	**'Current' referrals with no appointment**	**Overdue surveillance scopes**
78 (7 had been on the list over 6 months, the rest were considered unlikely to be completed within 6 months)	67	77 (all 12 months overdue)

There were 222 patients waiting for colonoscopies at the beginning of the pilot.

Colonoscopy waiting times for surveillance scopes (non-urgent)		
End of counter-factual (September 2008)	**End of pilot (February 2009)**	**Current (November 2009)**
120 weeks	52 weeks	4 weeks

By the end of the pilot project in January 2009, no patients referred or due for scopes in 2007 were still waiting for their procedure. Only 15 patients referred or due for a scope in 2008 were still waiting, but all were scheduled or in the process of being booked for a procedure. Benefits to patients from reduced waiting times are through reduced anxiety while waiting for a diagnosis.

15.4.2 Costs

Costs to patients identified by the pilot include:

- Increased travel costs (for 2 patients)
- Increased number of procedures for some patients

An additional cost, incurred by two patients before the pilot provider was changed, has been excluded from separate consideration and discussion, as they are outliers not reflective of the final structure of the pilot. (These costs included increased travel cost from $25 to $60 per procedure and the discomfort of increased travel to and from an outpatient procedure provided in another region).

16 Canterbury District Health Board – Pelvic ultrasound

	Pilot Coverage The pilot included all patients referred by GPs in the CDHB region, for non-obstetrics pelvic ultrasounds for gynae related conditions undertaken outside of CDHB (patients not referred for an FSA).
	Was there a good counterfactual? 1. **No** Information on the number of referrals received by the service either before or during the pilot is not available.
Key conclusions to take from this pilot 1. Information on the pilot is insufficient to draw conclusions.	**Level of confidence in the conclusion** **N/A**
Is the pilot now the standard pathway?	**Yes** Canterbury DHB continues to purchase additional scans, and they have been added into the Community Radiology Contract.
Comment on health benefit	Information on the pilot and counterfactual pathways is extremely limited. The main benefit from this pilot is that, due to the purchase of additional scans, patients received a diagnostic test who would not have otherwise. The potential benefits of this are not clear, however it is of note that patients who received diagnostics through the pilot were patients with a lower priority triage than those who received services under the counterfactual.

17 Western Bay of Plenty Primary Health Organisation – Direct access to computed tomography (CT) head scan for headaches

Western Bay of Plenty Primary Health Organisation Direct access to computed tomography (CT) head scan for headaches	**Pilot Coverage** GP rerrals for contrast and non-contrast CT scans of the head for patients with at least three symptoms indicating intracranial disease. Patients were referred by a GP within the Bay of Plenty region. During the pilot GPs were able to choose whether to refer through the direct pathway (the pilot group), or the previous existing pathway (the counterfactual group).
	Was there a good counterfactual? 1. **No**
Key conclusions to take from this pilot 1. Information on the pilot is insufficient to draw conclusions.	**Level of confidence in the conclusion** **N/A**

Is the pilot now the standard pathway?	**No**
Comment on health benefit	Health benefits are not clear

17.1 Findings

Inconsistency of information from a range of sources means that we do not have sufficient confidence of information to apply a cost benefit analysis to this pilot. Instead, the background information on the pilot is shown, without inclusion of quantified costs and benefits.

The key area of uncertainty relates to whether the patients receiving scans under the direct referral pathway would have received treatment under the alternative pathways or not. The DHB and PHO have very different views on the level of GP access to the service outside the pilot pathway.

If the patients who received diagnostics as part of the pilot pathway would have been seen via the counterfactual pathway anyway, any benefit to the DHB stems from them having been seen earlier and any additional health costs associated with further deterioration avoided. This benefit needs to be balanced against the health related cost for other patients who the DHB believes were delayed in receiving their head scans because the pilot group had preference.

If these patients are additional and would not have been seen via the counterfactual pathway, the question to be answered is whether or not the cost of providing the scans is offset by the savings from detection of problems that would otherwise have deteriorated.

It is possible that GPs see CT head scans more helpful for confirming a broader range of suspected diagnosis than usually allowed for by the triaging undertaken by the DHB through counterfactual pathways. We note that a larger proportion of those patients referred via the pilot pathway had abnormal scan results than in the counterfactual pathway. It is unclear why those who might normally not get access would have more abnormalities. It is possible that during the pilot GPS referred some patients to the pilot, rather than to the normal referral pathway. However, there was no evidence of decrease in the number of patients receiving scans via the counterfactual pathway.

17.1.1 Background

The Western BOP CT brain scan pilot provided all BOP GPs with ability to refer patients directly for CT brain scans (both contrast and non-contrast scans).

CT brain scans are used to look at the structures within the brain to look for such conditions as tumours, signs of stroke, bleeding, and blood vessel abnormality.

Before the pilot, GPs in the Western Bay of Plenty considered that their patients had poor access to neurology diagnostics and clinics, largely due to a local and nationwide shortage of Neurologists. GPs believed that they could provide patients with adequate care if they were allowed to refer directly for diagnostic services, without radiologist triage. The Clinical Committee of the Western Bay of Plenty Primary Health Organisation (WBoP PHO) had identified poor access to diagnostics including CT brain scans as a key concern that it would like to see addressed. Concerns also existed regarding equity of access for patients in different parts of the DHB, with those in the Eastern Bay of Plenty appearing to have more ready access to CT brain scans.

Nature of the access problem

Having spoken to both the PHO and the DHB, the nature of the original access problem is unclear to us. As will be discussed later, the issue of access is important for determining the appropriate costs to be included in the CBA.

For a GP to get direct access outside of the pilot period they needed to phone a radiologist, explain why they consider the scan is needed. They may refer if the radiologist agrees for them to do so (the radiologists name must be included on the referral). Alternatively, we understand that referral to a specialist or, for acute cases, ED, were options.

The PHO reported that GPs had difficulty getting access to CT head scans for their patients. The indication is that GPs had very limited access and when access was achieved there would be a significant delay before the scan was performed. The PHO suggested that GPs had generally given up trying to refer patients to the service.

In contrast, a radiologist who was asked said that if a GP is concerned enough to ring him directly, he will usually agree to do the scan. A radiology staff member spoken with believed that all patients who were referred through the pilot would have received a CT scan eventually, had they been referred through one of the existing pathways.

17.1.2 Patient pathway prior to the pilot

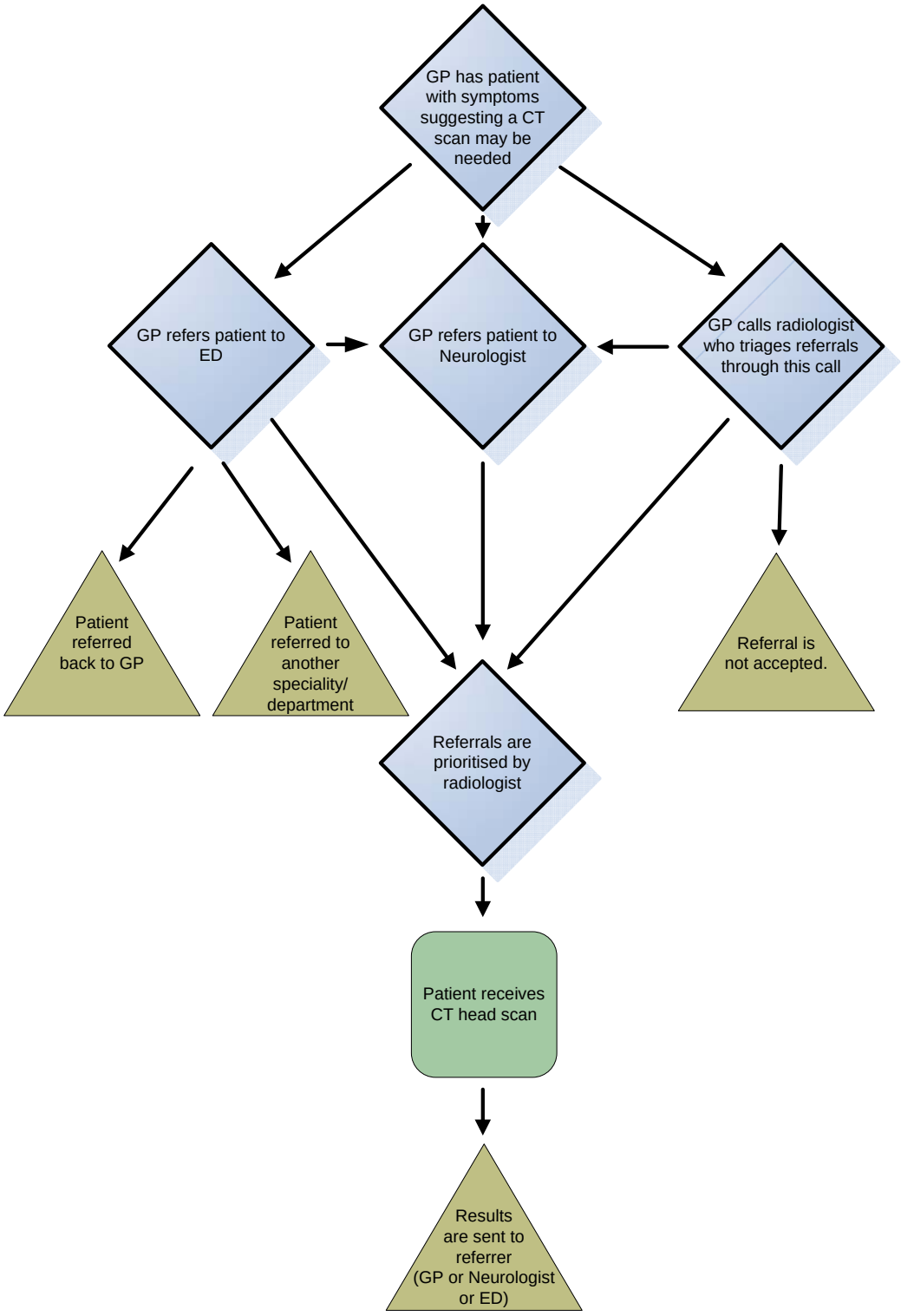
Prior to the pilot GPs had three options for obtaining a CT brain scan for a patient:

- Referral to a neurologist,
- Referral to the radiologist
- Referral to the Emergency Department

In each case the immediate receiver of the referral could potentially decline the referral on the grounds of the symptoms not being suitable for a CT brain scan, or refer to a different department. All referrals that were accepted were prioritised to determine the order of patients receiving scans.

The diagram below depicts the patient pathway prior to the pilot.

WBoP POH Brain Scan Counterfactual Pathway



17.1.3 Pilot pathway and service

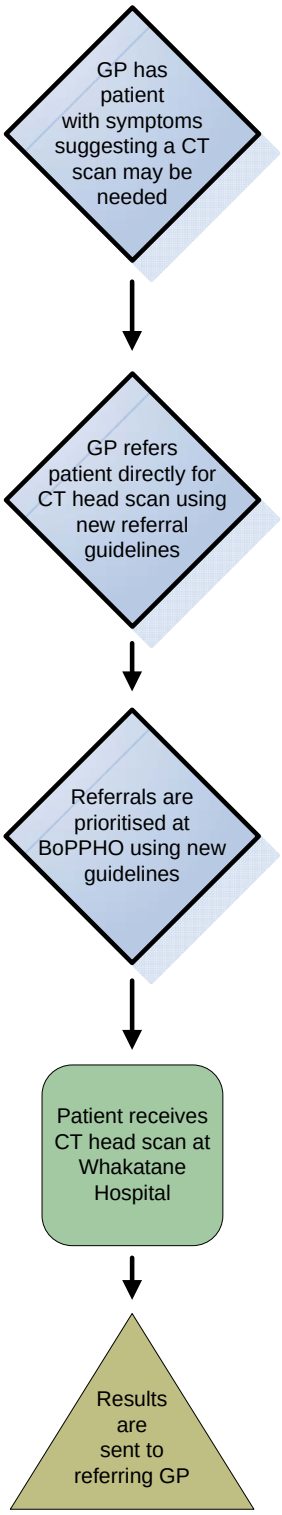
The pilot introduced an additional referral channel for GPs – direct to the CT brain scan service.

The pilot pathway included the following components:

- Appointment of a suitably qualified GPL to manage the project
- GPs were given CME sessions to provide education on headache management and appropriate referral protocols
- A PHO was assigned (WBoPPHO) to manage and provide the clinical ‘gatekeeper’ system. Referrals were triaged by the PHO using a ‘Co-ordinated Primary Options’ type system. Patients referred through needed to have at least three specific symptoms indicating intracranial disease to meet referral criteria.
- Most additional CT scans were purchased and provided at Whakatane Hospital. A few were also provided through Tauranga Hospital.

The diagram below depicts the additional pathway available to GPs during the pilot.

WBoP PHO Brain Scan Pilot Pathway



17.1.4Description of the pilot and counterfactual

The pilot covered referrals for contrast and non-contrast CT scans of the head for patients with at least three symptoms indicating intracranial disease. Patients were referred by a GP within the Bay of Plenty region. During the pilot GPs were able to choose whether to refer through the direct pathway

(the pilot group), or the previous existing pathway (the counterfactual group). Referrals through the direct pathway usually required patients to receive the service in Whakatane.

The pilot began in July 2008, and the last referrals were accepted in mid January 2009.

17.2 Costs and benefits for the DHB and PHO

The DHB effectively contracted the PHO to manage the pilot for the DHB. This section considers costs regardless of whether the cost was incurred by the DHB or the PHO.

The types of establishment costs that were incurred by the PHO and DHB included:

- Development of referral guidelines
- GP education through the CME programme (where GPs are paid to attend the CME)

The types of ongoing costs that were likely to be incurred by the DHB and PHO related to

- Provision of any additional CT head scans to patients who would not normally have received these
- Review of referrals received and the ongoing costs of managing the referral pathway

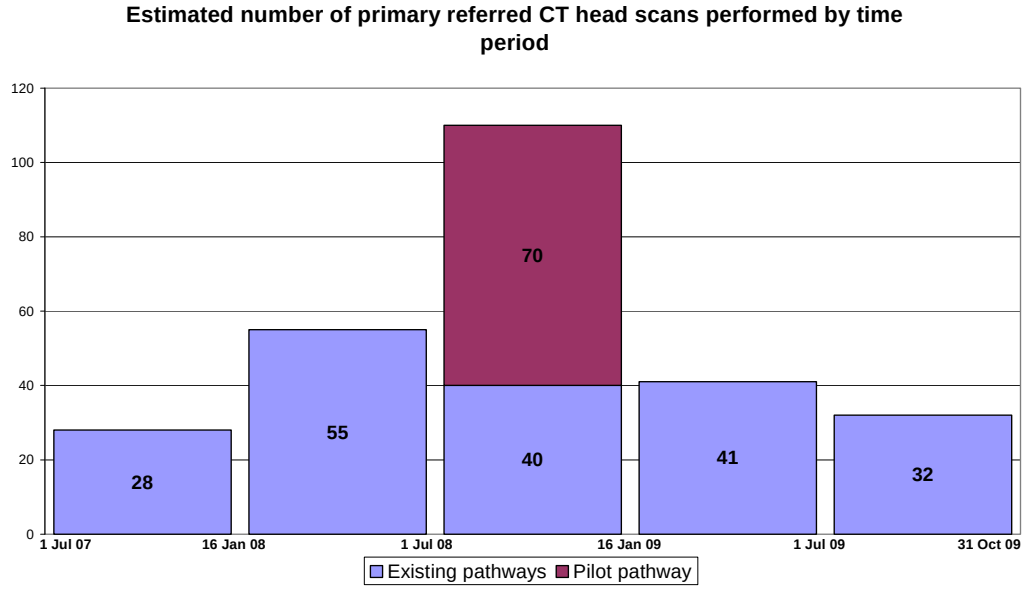
Provision of additional CT head scans

During the pilot period GPs were offered an alternative pathway along which they could refer patients (direct referral) that did not require acceptance of the referral by the neurologist, radiologist or ED.

The cost of these CT head scans depends upon the number that would have occurred regardless of the pilot, although they may have occurred at a later date. Only those that are additional to what would have been provided by the DHB should be included as having caused an additional cost relative to the counterfactual.

Based on information provided by the DHB, the total number of CT head scans performed on primary referred patients is estimated to have increased during the period of the pilot. The change in number of scans performed is shown in the graph below.

It should also be noted that the time periods in the graph below are uneven.



While we can say that the number of primary referred CT head scans performed by the DHB increased during the pilot, we do not know whether these scans are additional or would have eventually been completed anyway at a later date. In order to determine whether additional CT head scans resulted from the pilot, information on the number of referrals, rather than number of scans performed should be used. However, the DHB does not appear able to provide this information.[43]

A question of access

The question of whether these scans were additional or not appears to come back to the different views around access. The DHB would appear to consider that the scans were not additional, the PHO would appear to consider that these patients would have been unlikely to have received the scan within a reasonable time period, if they could gain access.

17.2.1Costs avoided by the DHB

The DHB may have experienced a reduction in other costs if the direct referral pathway led to:

- A reduction in the number of patients being referred to ED
- A reduction in the number of patients being referred to specialist services, who received an FSA prior to receiving the CT head scan. The DHB estimates that very few patients received FSAs prior to receiving a CT head scan under the counterfactual pathways.
- Health treatment costs avoided, if patients received a CT head scan earlier than would normally be the case and earlier diagnosis of an abnormality led to a lower cost of treatment.

In general, there appears to be relatively weak evidence of costs avoided by the DHB.

[43] The DHB provided some information on number of referrals during the pilot period, but this information appears to assume that the number of referrals is equal to the number of scans performed. There is no comparable information provided for the counterfactual period.

The DHB does not appear to consider that there were any patients whose clinical conditions made prompt access to a scan important who would not have received appropriate priority under the existing pathways. If this is accepted, then there are unlikely to be any significant costs avoided in terms of the cost of care to be provided by the DHB through earlier diagnosis.

Number of significant test results

The number of significant test results compared between the 70 patients who received treatment via the direct referral pathway and a sample of the primary referred patients who received scans via the counterfactual pathway provides an interesting if complex story. The following information was provided by the PHO and DHB.

Test results		
	Counterfactual group	**Direct referral group**
Neoplasms	11%	4%
Other diagnosis	4%	31%
Normal scan results	86%	64%

Note that all results are shown, difference from 100 is due to rounding error

Management outcomes		
	Counterfactual group	**Direct referral group**
Specialist referral	1%	24%
Managed in primary care only	86%	69%
Admitted to hospital	11%	7%
Outcomes yet to be received		7%

Note that all results are shown, difference from 100 is due to rounding error

What we can see from this data is that there were different test results and management outcomes for the two groups of patients. For instance:

- A greater proportion of those in the counterfactual were identified as having neoplasms, but a much greater proportion of the direct referral group had some other form of diagnosis resulting from the scan.
- A greater proportion of those in the direct referral group required a specialist referral or were admitted to hospital, whereas those in the counterfactual were more likely to be managed in primary care.

We note that the two patient groups were probably not the same to begin with. Those receiving direct referral may have been persons that GPs thought would be declined, or receive delayed access if referred through the radiolologist, neurologist or ED.

17.3 Costs and benefits for patients

The key benefits from the pilot appear to be for those patients who were referred via the direct referral pathway. These patients would have received CT scans on the same or a quicker time frame than if referred through other pathways. In some cases these patients may not have usually received a CT

head scan. For these patients, the reduction in wait time is likely to have decreased anxiety and may have allowed for them to receive informed management more quickly.

The DHB has expressed concern that the additional CT head scans performed during the period of the pilot crowded out the provision of other types of CT scans – that this group of patients were jumped ahead of the wait list, without necessarily good reason. The consequence of this would be an increase in waiting times for other patients, and potentially corresponding increases in anxiety and delays in receiving treatment.

17.3.1 Waiting times

The PHO reported that waiting times for patients who were part of the direct referral group was an average of 8 days, with a minimum of 1 day and maximum of 35 days (for a patient with poor availability).

The DHB reported that for those patients who were referred by GPs for a CT head scan during the pilot period through an alternative pathway (radiologist, neurologist or ED) the wait time was an average of 21 days, with a minimum of 1 day and a maximum of 159 days.

The DHB reports that prior to the pilot the average wait time for all patients referred by a GP for a CT head scan was 13 days, and that the wait time for those patients who were not part of the direct referral pathway increased by 8 days because the direct referral pathway was introduced.

Thus, the DHB is suggesting that for GP referrals for CT head scans, only a patient who would be referred through the direct referral pathway would expect to have a shorter wait time under the pilot compared to the counterfactual.

It is unclear why the wait time for patients not referred through the direct referral pathway rose, given that the majority of patients who were part of the direct referral group were Western BOP patients who had their scans at Whakatane, where as before the pilot most of these patients would have their scans in Tauranga.

17.3.2 Travel costs

Patients referred via the direct referral pathway usually had to travel from Tauranga to Whakatane to receive the scan, rather than having the scan in Tauranga. The travel would have imposed additional costs on the individual, including, where relevant, time off work. Patients clearly considered the value of receiving the referral several days earlier sufficient to offset to the cost of the travel.

17.4 Costs and benefits for GPs

GPs reported the improved patient management efficiency over the time of the pilot. Examples included the following.

- Reduced time and effort involved in referring a patient for a scan (e.g. did not have to make their case to a radiologist)
- Reductions in the number of patient visits once the CT scan was completed and the results known (with the exception of positive scans that required additional management).

The PHO has indicated significant GP frustration at the overall level of access experienced by GPs before and after the pilot pathway. It is clear that a further benefit for GPs related to their own satisfaction regarding ability to access secondary services for their patients.

17.4.1 Use of CT brain scans for purposes other than diagnosing neoplasms

The results of the tests for the counterfactual group suggest that the focus of the use of CT brain scans through existing pathways may have been focused on identification of neoplasms. By contrast, the patients under the direct referral pathway had a range of other diagnoses.

Speaking to the PHO, and based on its questionnaire response, it appears that GPs may have used the CT scans in order to confirm a suspected diagnosis, such as for stroke, or to rule out the possibility of a physical problem with the brain in order for patients to accept the validity of alternative diagnoses. The latter was considered important for getting patients to take appropriate steps to manage those alternative conditions.

Speculatively, we would suggest that this broader use of CT brain scans held significant benefits for the GPs, in terms of being able to help patients and possibly reduce the intensity of patient management required. Thus, while there is little evidence of costs avoided or benefits for the DHB from this pilot, there may have been significant costs avoided for GPs and primary care.

17.5 A health sector perspective

The overall impact of the pilot from a health sector perspective is unclear. Unlike in other pilots where referral guidelines and triage were introduced, there is no evidence of reduction in inappropriate referrals – but at the same time it is not clear that any additional referrals were inappropriate given the consistency with the new guidelines and the increased level of abnormalities found. Similarly, there appears to be no significant change in non-attendance rates by patients.

GP referred CT head scans appear to make up a very small proportion of the total head scans undertaken. For the pilot period the DHB indicated that 1616 scans were undertaken, with just 110 of these being GP referred. We do not have information on the total number of scans undertaken in other periods. What we may have seen during the pilot was movement of patients between different referral pathways and changes in speed at which certain patients received scans. The DHB expressed concern that some of those in most need of CT scans may have not received them as promptly as would usually have been the case due to the direct referral pathway, reflecting the need for triage and prioritisation to occur across the entire set of referrals, not just those from a particular group of referrers.

Survey information also suggests that the reason for referrals by GPs may have varied between the counterfactual and the pool of patients referred via the direct referral pathway.

18 Appendix

18.1.1 Auckland District Health Board – Community radiology project

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Cost of referral triage	The DHB estimates that the GPL spent approximately 30 to 60 minutes per week during the pilot triaging referrals. For this calculation we use 45 minutes per referral triaged, or .75 hours.	$1,440.00 / 150 **=$9.60**	80 x .75 x 24 **=$1,440.00**
Cost of providing GPs with feedback	Inappropriate referrals received by the service were returned to GPs and feedback provided. During the pilot 2 referrals were returned to GPs. It took 15 minutes of GPL time to return referrals to the GPs, or .25 hours.	$40.00 / 150 =**$0.27**	80 x 2 x .25 =**$40.00**
Cost of additional abdominal US scans	43 scans at $153.54 per scan.		43 x $153.54 =**$6,602.22**
Costs of additional pelvic US scans	34 scans at $153.54 per scan.	$5,220.36 / 150 =**$34.80**	34 x $153.54 =**$5,220.36**

		Total per referral received by the service	Total for pilot
Cost of additional abdominal and pelvic US scans	20 scans at $193.17 per scan	=$3,863.40 / 150 **=$25.76**	20 x $193.17 **=$3,863.40**
Cost of additional renal US scans	31 scans at $153.54 per scan	$4,759.74 / 150 =**$31.73**	31 x $153.54 **=$4,759.74**
Total ongoing cost to DHB		**$146.17**	**$21,925.72**

Costs avoided by Auckland DHB

Costs avoided to DHB calculations

			Cost avoided per referral received by the service		Total cost avoided
Reduction in inappropriate referrals	145 of the referrals received through the counterfactual pathway were reviewed. Of these, 8 referrals did not contain sufficient information for effective triage.37 referrals had sufficient information to determine that they were not clinically appropriate. Therefore 145 = 37 = 108 referrals received during the counterfactual were considered appropriate. Therefore, the number of inappropriate referrals received compared to inappropriate ones can be used to determine how many additional referrals would have been expected through the pilot pathway, if GPs had continued to refer inappropriate patients. (145 – 108) / 108 = .34259 During the pilot, of the 150 referrals received 150 x 1.342.59 = 51.389 Therefore, if GPs had continued to refer inappropriate patients, an additional 51.389 referrals would have been received during the pilot, all of which would have been inappropriate. During the counterfactual, 38 out of the 145 received referrals DNAd. If we assume that the same number of additional inappropriate referrals resulted in a DNA, then 38/143, or 26% of those referrals would not have resulted in a diagnostic test. 26% x 51.389 = 13.656 Therefore, the total number of diagnostic tests avoided through a reduction in inappropriate referrals is 51.389 – 13.656 = 37.73 The cost of DNAs can be either attributed as a cost to the DHB, or would have no impact on the costs of the service (see Auckland Community Radiology section for a complete explanation.) Therefore, the 13.656 referrals that would have resulted in DNAs are either a cost to the DHB, or would have had no impact The average cost of the four ultrasound scans is $163.45.		=	Low cost estimate 37.73 – 13.656 =24.074 24.074 x $163.45 = **$3,934.90** High cost estimate: 37.73 x $163.45 = **$6,198.17**

		Cost avoided per referral received by the service	Total cost avoided
Reduction in DNAs	=	$3,157.04/ 150 **=$21.05 (increased cost to DHB)**	$163.45 x 19.315 = $3,157.04 **$3,157.04 (Increased cost to DHB)**

18.1.2West Coast District Health Board – Nurse co-ordinated sleep study

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Cost of RNS time	The DHB estimates that the RNs spend an average of 10 minutes per referral. The total cost of RN time per discussion is $6.19	$6.19 x 38 discussions during the pilot , /41 referrals received during the pilot = $6.19	$5.133 x 38 sleep studies provided during the pilot =$235.22
Cost of respiratory physician time	The DHB estimates that the respiratory physician spends an average of 10 minutes per discussion, costing $35.11 per discussion.	$35.11x38 discussions during the pilot, /41 referrals received during the pilot =$32.54	$35.11 x 38 sleep studies provided during the pilot =$1,334.18
Total		**$34.25**	**$1,404.20**
	Approximately 28% of cases require courier. 28%x38=10.64 cases during the pilot period. Each courier cost $10	$10.64 / 41 referrals received during the pilot = $2.60	$10 x 10.64 = $100.64

	Total per referral received by the service	Total for pilot
Total	**$2.32**	**$95.20**
Total Ongoing Cost	**$40.87**	**$1,675.80**

Costs avoided for West Coast DHB

Costs avoided to DHB calculations				
	Counterfactual	**Pilot**	**Cost avoided per referral received by the service**	**Total cost avoided**
Avoiding duplication of sleep studies	47.9% of patients received more than one study. 47.9% x 34 =16.286 repeated sleep studies Two costings:	None of the sleep studies were repeated during the pilot	Two costings 1. (464x16.286)/41 = **$184.30** 2. (116x16.286)/41 =	Two costings: 1. $464x16.286 = **$$7,556.37** 2. $116x16.286 **= $1,889.09**
Shifting responsibility for assessing referrals to the RNS	The DHB estimates that the visiting respiratory physician spent 10 minutes triaging per referral, costing $35.11per referral triaged	The DHB estimates that the nurses spend an average of 10 minutes triaging per referral, costing $6.19 per referral	$35.11 - $6.19 **=$28.92 saved**	$28.92x34 **=$1,185.72**

	Counterfactual	Pilot	Cost avoided per referral received by the service	Total cost avoided
Specialist appointments avoided (before sleep studies)	53% of patients receive a specialist appointment prior to a sleep study 53%x34 referrals accepted during the pilot = 18.02 referrals resulted in an FSA. FSA costs $424.14 Therefore, the total cost of FSAs is $424.14 x 18.02 = $7,691.07	None of the patients received an FSA before their sleep study	$7,691.07 / 41 **=$187.59**	**$7,691.07**
Specialist appointments avoided (after sleep studies)	26.67% of referrals resulted in a specialist appointment after a sleep study 26.62% x 34 referrals accepted during the pilot = 9.05 referrals resulted in a FU appointment FU costs $383.81 Therefore, the total cost of FUs is 9.05x$383.81 = $3,470.81 The cost per referral received by the service is $3,478.81 /41 = $84.65		$84.66 - $103.45 **= ($18.79)**	$4,241.40 - $3,470.81 **= ($770.59)**

	Counterfactual	Pilot	Cost avoided per referral received by the service	Total cost avoided
Improvements in referral quality and returned referrals	7 referrals would have been accepted. For each referral returned: • A sleep study was saved and duplicated sleep studies were saved: 49.7% of sleep studies were duplicated before the pilot. Therefore, 3.479 additional studies would also have been done under the counterfactual. A total of 3.479 + 7 = 10.479 studies would have occurred under the counterfactual. Two costings for sleep studies: 1. 10.749 x $464.14 = $4,989.04 2. 10.749 x $115.95 = $1,246.35 • Specialist appointments avoided 53% of 7 is 3.73 FSAs and 26.67% of 7 is 1.87 FUs. 3.71x$424.14 = $1,583.46 1.87 x $382.81 = $714.58		• Sleep studies saved Two costings 1. $4,989.04 /41 = $117.13 2. $1,246.35 / 41 = $29.28 • Specialist appointments avoided FSAs. $1,583.46 /41 = $38.62 FUs. $714.58 / 41 = $17.43 $38.62 + $17.43 = $56.05 Therefore, the savings per referral received by the service is: Two costings: 1. $117.13 + $56.05 = **$173.18** 2. $29.65 + $55.20 = **$85.33**	• Sleep studies saved Two costings 1. $4,989.04 2. $1,246.35 • Specialist appointments avoided FSAs. $1,583.46 FUs. $714.58 Therefore, the total saving during the pilot period is: Two costings 1. $1583.46 + $714.58 + $4,989.04 = **$7,100.48** 2. $1583.46 + $714.58 + $1,246.35 = **$3,498.65**

18.1.3 Northland District Health Board – Improved primary care access to ultrasound scans

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Cost of triage	Ultrasonographers spent 2.5 hours per week triaging referrals. The pilot ran for 34 weeks. Therefore, Ultrasonographers spent a total of 85 hours triaging referrals during the pilot. The Ministry of Health provided estimates of the cost of Ultraosonographer time based on	$3,692.40 / 1010 referrals received by the service **= $3.66**	$43.44 x 85 **=$3,692.40**
	The GPL spent 1.5 hour per week triaging referrals. The pilot ran for 34 weeks. Therefore, the GPL spent a total of 51 hours triaging referrals during the pilot. GPL time costs $90 per hour, provided by the DHB.		$90 x 51 **=$4,490.00**
	The specialist spent 1 hour per week triaging referrals. The pilot ran for 34 weeks. Therefore, the specialist spent a total of 34 hours triaging referrals during the pilot. The majority of referrals seen by specialists were seen by a Gynaecologist. The Ministry of		$92.92 x 34 **=$3,159.51**
Total cost of triage		**=$ 11.33**	**$11,441.91**

		Total per referral received by the service	Total for pilot
Purchase of additional scans	During the pilot 238 scans were purchased, excluding those necessary to clear the patient backlog at a cost of $153.54 per scan	$ 36,542.52 / 1010 referrals received by the service =**36.18**	$153.54 x 238 **=$ 36,542.52**
Total ongoing cost to DHB		**$48.32**	**$48,802.92**

Costs avoided by Northland DHB

Costs avoided to DHB calculations				
	Counterfactual	**Pilot**	**Cost avoided per referral received by the service**	**Total cost avoided**
Cost avoided through triaging referrals	If the 1010 referrals had gone through the counterfactual pathway, all of them would have resulted in a diagnostic test $153.54 x 1010 = $155,075.40	During the pilot approximately 25% (as estimated by the DHB) of referrals were returned to GPs. .75 x 1010 x $153.54 = $116,306.55	$38,768.85 / 1010 **= $ 38.39**	$155,075.40 - $116,306.55 **= $38,768.85**
Reduction in inappropriate referrals	10,69 referrals were received by the service during the counterfactual. This decreased to 1010 during the pilot. Therefore, we assume that this decrease was a result of the pilot. The number of US scans needed reduced by 59.		$9,058.86 / 1010 = **$8.97**	59 x $153.54 = **$9,058.86**

18.1.4 Northland District Health Board – Single point access for patients with large bowel symptoms

Timeline

8 April- First of peer group meetings

11 July 2008 – Face to face meetings of GP design group, CNS and Healthlink

7 October 2008 – Release of draft form for pilot GP feedback

24 October 2008 – sign off of the contract between NPHOs and Healthlink

3 November 2008 – signing off of colorectal form

5 December 2008 – User acceptance release colorectal from print only

18 December 2008 – Release of colorectal template to pilot practices print mode only

25 February 2009 – Launch of colorectal tool and pathway to Dargaville and Whanagerei GPs (CME session)

26 Feb 2009 – User acceptance release full solution

3 March 2009 – Launch of colorectal tool and pathway open to all mid-north GPs (CME session)

12 March 2009 – Full solution released to pilot group -Colorectal, breast specialist forms

Costs avoided by Northland DHB

Calculation of costs avoided			
		Total per referral received by the service	**Total since introduction of pilot pathway**
	DHB has stated that 23/272 (8.5%) of referrals received via electronic referral were directed to Ba enema. Assume that same split of the 4% of referrals that were inappropriate would have occurred if ordered under counterfactual Price of colonoscopy taken from national schedule as a general surgery colonoscopy at $957.26 each. RVU price of $49.53 Two types of Ba enema can be performed – small bowel enema (17.10 RVUs) or contrast enema (10.20 RVUs) These estimates assume the same proportion of Ba enemas to colonoscopies under the pilot and counterfactual	Average cost of a procedure is 8.5% cost of Ba enema + (1- 8.5%)*cost of colonoscopy. Due to the two types of Ba enema, and lack of information on which type was being used, the average price of treating a patient is estimated to range between $919 and $948 depending on type of enema used. If 4% of referrals are declined, then this is a saving of 4% on the average cost of each referral. So saving per average referral under the pilot ranges between $37 and $38.	11 referrals declined. Saving between $10,109 and $10,427 relative to the cost that would have been incurred under the counterfactual

		Total per referral received by the service	Total since introduction of pilot pathway
Reduction in costs stemming from poor referral information		If one in a hundred referrals required an FSA before procedure, then the saving to the DHB on a per referral basis was 1/100*$579=$5.79	On average since introduction of the new pathway would expect 2.72 FSAs to be avoided at a saving of $1,575
Total costs avoided		**$42.80 - $43.80 per referral**	**$11,684 - $12,002**

18.1.5 Southland District Health Board – Single access gastrointestinal endoscopy service

Benefit of audit of exiting referrals

Benefit of auditing existing referrals			
		Total per number of referrals audited (all patients 1270)	**Total for pilot**
Avoided colonoscopies for surveillance patients		$43,031.25/ 1270 = **$33.88**	45 x $956.25 = **$43,031.25**
Avoided colonoscopies for other patients	31 non surveillance referrals also did not meet criteria for referral.	$29,643.75 / 1270 = **$23.34**	31 x $956.25 = **$29,643.75**
Total ongoing cost to DHB			

Cost to PHO			
		Low cost estimate	**High cost estimate**
Cost of GP education meetings	The DHB estimates that the PHO provided between 20 and 30 GP education sessions during the pilot, at an estimated cost between $200 and $300 per meeting.	20 x $200 = **$4,000**	30 x $300 = **$9,000**

18.1.6 Nelson Marlborough – Allowing GPs to refer directly for diagnostic tests: CT Urograms

Costs avoided for Nelson Marlborough DHB

Costs avoided to DHB calculations			
		Cost avoided per referral received by the service	**Total cost avoided**
	If all 45 CT Urograms provided by GPs would not have happened in the future, then there is an additional cost to the DHB. The DHB provides $564.64 as the cost of a CT Urogram.	$-564.64	$564.64 x 45 = **-$25,408.80**

		Cost avoided per referral received by the service	Total cost avoided
	FSAs avoided There were 45 referrals from GPs during the pilot. If half of these would have occurred in the future, then there are savings from the changed pathway for those future referrals. Under the counterfactual, all patients received a specialist appointment or ED appointment prior to their CT Urogram, and this system would have continued in the future if the pilot had not occurred. The cost of a Urology-1st attendance specialist appointment is $280.28. We use this value for both specialist appointments and ED assessments avoided. *FUs avoided* During the counterfactual, all patients received a FU appointment with a Urology specialist of with the ED. The cost of a Urology – Subsequent attendance is $185.00. Of the referrals received during the pilot, 15% resulted in a FU appointment. This means that for the 22.5 referrals that would have occurred in the future: 22.5 – (15% x 22.5) = 19.125 FU appointments that would have occurred in the future if the pilot had not taken place. *Cost of additional CT Urograms* The 22.5 CT Urograms that would not have occurred in the future are an additional cost for the DHB.	*FSAs avoided* $6,306.30 / 45 **= $140.14** *FUs avoided* $3,538.13 / 45 = **$78.63** *Cost of additional CT Urograms* $12,704.40 / 45 = **$-282.32**	*FSAs avoided* $280.28 x 22.5 = **$6,306.30** *FUs avoided* 19.125 x $185.00 = **$3,538.13** *Cost of additional CT Urograms* 22.5 x $564.64 = **$-12,704.40**

		Cost avoided per referral received by the service	Total cost avoided
3. All of the patients referred by GPs would have received services in the future		*FSAs avoided* $12,612.6 / 45 = **$280.28** *FUs avoided* $7,076.25 / 45 **$157.25** Cost of additional CT Urograms **$0**	*FSAs avoided* 45 x $280.28 = **$12,612.6** *FUs avoided* 38.25 x $185.00 = **$7,076.25** Cost of additional CT Urograms **$0**

18.1.7 Nelson Marlborough- Allowing GPs to refer directly for diagnostic tests: diagnostic breast imaging

Costs and costs avoided for NMDHB – Wairau Hospital

Costs avoided to DHB calculations			
		Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	**Total cost avoided**
1. None of the patients referred by GPs would have received services in the future, and all patients receiving DBI during the pilot were the result of new referrals by GPs	*Cost of additional DBI* If all additional DBI resulting from GP referrals would not have occurred if the pilot had not taken place, then all 237 DBI provided are an additional cost to the DHB. The Ministry of health funded DBI at $351.66 per DBI *FUs avoided* If all referrals would not have occurred if the pilot had not taken place then there are no savings from follow ups avoided. *Cost of specialist triage* Prior to the pilot, a specialist triaged referrals to Wairau Hospital. If none of the patients referred during the pilot would have been referred if the pilot had not taken place, then there are no savings through patients who would have required triage if the pilot had not taken place.	*Cost of additional DBI* $83,343.42 / 439 =**$189.85** *FUs avoided* **$0** *Cost of specialist triage* **$0**	*Cost of additional DBI* 237 x $351.66 =**$83,343.42** *FUs avoided* **$0** *Cost of specialist triage* **$0**

		Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	**Total cost avoided**
2. Half of the patients referred by GPs would have received services in the future, or were the result of reducing numbers of patients on the waiting lists for FSA or DBI		*Cost of additional DBI* $41,67.71 / 439 =**$94.92** *FUs avoided* $25,166.30 / 439 =**$57.32** *Cost of specialist triage* $592.50 / 439 = **$1.35**	*Cost of additional DBI* 11.85 x $351.66 =**$41,67.71** *FUs avoided* 94.5 x $266.31 =**$25,166.30** *Cost of specialist triage* 118.5 x $5 =**$592.50**

		Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	**Total cost avoided**
3. All of the patients referred by GPs would have received services in the future, or were the result of reduced numbers of patients on waiting lists for FSA or DBI	*Cost of additional DBI* If all of the DBI provided in the pilot would have occurred in the future if the pilot had not taken place then there are no additional costs to the DHB from purchasing additional DBI. *FUs avoided* If all patients would have received services in the future then the DHB saved 237 – 48 = 189 follow up appointments. *Cost of specialist triage* If all referrals to the service would have been received in the future, then the pilot saved triaging 237 referrals.	*Cost of additional DBI* **$0** *FUs avoided* $50,33.59 / 439 =**$114.65** *Cost of specialist triage* $1,185 / 439 =**$2.69**	*Cost of additional DBI* **$0** *FUs avoided* 189 x $266.31 =**$50,33.59** *Cost of specialist triage* 237 x $5 =**$1,185**

Costs and costs avoided for NMDHB – Nelson Hospital

Costs avoided to DHB calculations			
		Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	**Total cost avoided**
1. None of the patients referred by GPs would have received services in the future, and all patients receiving DBI during the pilot were the result of new referrals by GPs	*Cost of additional DBI* If all additional DBI resulting from GP referrals would not have occurred if the pilot had not taken place, then all 202 DBI provided are an additional cost to the DHB. The Ministry of health funded DBI at $351.66 per DBI FSA avoided If none of the referrals would have occurred if the pilot had not taken place then there are no savings from FSAs avoided. *FUs avoided* If all referrals would not have occurred if the pilot had not taken place then there are no savings from follow ups avoided. .	*Cost of additional DBI* $71,035.32 / 439 =**$161.81** *FSAs avoided* **$0** *FUs avoided* **$0**	*Cost of additional DBI* 202 x $351.66 =**$71,035.32** *FSAs avoided* **$0** *FUs avoided* **$0**

			Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	**Total cost avoided**
2. Half of the patients referred by GPs would have received services in the future, or were the result of reducing numbers of patients on the waiting lists for FSA or DBI			=	*Cost of additional DBI* 101 x $351.66 =**$35,516.66** *FSAs avoided* 101 x $266.31 =**$26,897.31** *FUs avoided* 77 x $220.57 =**$16,983.89**

		Cost avoided per referral received by the service (total received by both Wairau and Nelson = 439)	Total cost avoided
3. All of the patients referred by GPs would have received services in the future, or were the result of reduced numbers of patients on waiting lists for FSA or DBI	*Cost of additional DBI* If all of the DBI provided in the pilot would have occurred in the future if the pilot had not taken place then there are no additional costs to the DHB from purchasing additional DBI. *FSA avoided* IF all patients would have received services in the future, then 202 FSAs were averted due to the pilot. *FUs avoided* If all patients would have received services in the future then the DHB saved 202 – 48 = 154 follow up appointments.	*Cost of additional DBI* **$0** *FSAs avoided* $53,794.62 / 439 =**$122.54** *FUs avoided* $33,967.78 / 439 **=$77.38**	*Cost of additional DBI* **$0** *FSAs avoided* 202 x $266.31 =**$53,794.62** *FUs avoided* 154 x $220.57 =**$33,967.78**

18.1.8 Canterbury District Health Board – General surgery pilot

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Purchase of additional CT Liver/Pancreas scans		$3,387.84 / 41 = **$82.63**	6 x $563.64 = $3,387.84 **$3,387.84**
Purchase of additional CT abdomen scans	18 x $153.54 = $2,772.00	$2,772.00 / 41 = **$67.61**	18 scans cost $153.54 per scan. **$2,772.00**
Purchase of additional US soft tissue scans	10 x $564.64 = $5,650.00	$5,650.00 / 41 = **$137.80**	10 scans cost $564.64 per scan. **$5,650.00**
Cost of post test assessment		($5.21 x 34) / 41 = $4.32	34 post test assessments at $5.08 per assessment **$177.08**
Total ongoing cost		**$292.19**	**$11,809.84**

Costs avoided for Canterbury DHB

Costs avoided to DHB calculations				
	Counterfactual	**Pilot**	**Cost avoided per referral received by the service**	**Total cost avoided**
Specialist appointments avoided (before diagnostic test)	The cost of an FSA, provided in the Ministry of Health FSA pricing schedule, is $266.31 Every patient that went through the pilot would have received a FSA if they had gone through the counterfactual pathway.	No one in the pilot received a FSA before a diagnostic test.	$9,054.54 / 41 = **$220.84**	34 patients x $266.31 = **$9,054.54**
Specialist appointments avoided (after diagnostic test)	The cost of a Follow up appointment, provided in the Ministry of Health FSA pricing schedule is $220.57 During the counterfactual, all referrals resulted in a FU appointment. $220.57 x 34 = $7,499.38	During the pilot 14 out of 25 referrals assessed resulted in a FU appointment. Therefore, 19/34 = 56% of patients received a FU appointment during the pilot. 56% x 34 = 19 FUs averted. Because all of the specialist appointments after the diagnostic were the first the patients received in the pathway, we use the FSA price to cost them. 19 x $266.31 = $5,059.89	$2,439.49 / 41 = **$59.50**	$7,499.38 - $5,059.89 = **$2,439.49**
Administrative costs avoided			$1000 / 41 = **$24.39**	The total amount estimated by the DHB saved through fewer FSA appointment bookings due to the pilot is **$1000**

18.1.9 Whanganui District Health Board – Improved access for primary care clinicians to general ultrasound

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Purchase of additional US scans	242 scans at $150 per scan	$36,300 / 567 **= $64.02**	242 x 150 = **$36,300**
Total ongoing cost		**$64.02**	**$36,300**

Costs avoided by Whanganui DHB

Costs avoided to DHB calculations

		Cost avoided per referral received by the service	Total cost avoided
Reduction in inappropriate referrals	During the pilot, 567 referrals were received by the service. Of these, 100 were audited, and 3.5% were considered inappropriate. Therefore, we can calculated the number of referrals received that were appropriate: 567-(3.5%x 567)= 547.16 appropriate referrals received by the service. During the counterfactual, out of an audit of 60 referrals 22% were considered inappropriate. Therefore, if we assume that those 22% would not have been referred if the changes implemented due to the pilot had occurred during the counterfactual, and as the inappropriate referrals received during the pilot have already been removed from the number of appropriate referrals received during the pilot, then we can calculate: 547.155 x 1.22 = 667.53 is the total number of referrals that would have been received during the pilot period, if the pilot had not taken place. Therefore, the reduction in inappropriate referrals due to the pilot is: 667.5291 – 567 = 100.53	$15,079 / 567 **=$26.59**	100.53 x $150 **=$15,079**

		Cost avoided per referral received by the service	Total cost avoided
Reduction in FSAs	The DHB has provided an extremely rough estimate of the number of unnecessary FSA appointments, unnecessary meaning the number of appointments where patients were referred primarily to access an ultrasound scan. It is not clear the actual reduction in FSAs that occurred during the pilot, however it is likely that this saving is substantial. Using the number of 1150 unnecessary FSAs each year provided by the DHB, a cost saving for the DHB can be calculated. The pilot operated for 5 months, therefore: 1150 x 5/12 = 479.17 unnecessary FSAs avoided due to the pilot, during the pilot period. The cost of an FSA, provided by the DHB is on average $320.	$153,333.33 / 567 **=$270.43**	479.17 x $320 **=$153,333.33**
Reduction in ED attendances	The DHB also provided a similarly rough estimate of the number of unnecessary ED presentations for patients requiring ultrasounds, unnecessary meaning the number of appointments where patients were referred primarily to access an ultrasound scan. It is not clear the actual reduction in ED presentations that occurred during the pilot, however it is likely that this saving is substantial. Using the number of 250 unnecessary ED assessments each year provided by the DHB, a cost saving for the DHB can be calculated. The pilot operated for 5 months, therefore: 250 x 5/12 = 104.17 unnecessary FSAs avoided due to the pilot, during the pilot period. The cost of an ED patient examination less than 3 hours long, provided by the DHB is $290.	$30,208.33/ 567 **$53.28**	$290 x 104.17 **=$30,208.33**
Avoided DHB administrative cost	The pilot resulted in 100.52 fewer referrals received by the service. (See ‘Reduction in inappropriate referrals’ above). The DHB estimates that administration costs for each referral received by the service total $110. Therefore, that cost was avoided due to the pilot.		$110 x 100.52 **=$11,058.20**

18.1.10 Waitemata District Health Board – Speedier access to diagnostics for breast patients through streamlining records

Ongoing cost

Ongoing cost calculations
There are no ongoing costs associated with the pilot

Costs avoided for Waitemata DHB

Costs avoided to DHB calculations

	Counterfactual	Pilot	Cost avoided per referral received by the service	Total cost avoided
Cost of seeking information for triage	10% of all referrals received by the service required further information for triage. The cost of the clerk time for seeking further information is $21.60 per hour Each referral is estimated to have taken half an hour to investigate. $21.60 x .5 x .1 x 676 = $258.84	3% of referrals required follow up during the pilot. $21.60 x .5 x .03 x 719 = $730.08	$471.24 / 719 **=$.66**	$730.08 - $258.84 =**$471.24**
Cost of extra DBI	During the counterfactual there were 392 bookings for DBI. We do not know how many of these patients received a Mammogram, Biopsy or Ultrasound. Therefore, we use the average value of these three tests. The price of these tests were provided by the DHB. Mammogram - $205.34 Biopsy - $618.07 Ultrasound - $235.68 These average to $353.03 per DBI 392 x $353.03 = $138,387.76	During the pilot there were 459 bookings for DBI 459 x $353.03 = $162,010.77	- $23,653.01 / 719 =$**-32.90**	$138,387.76 **-** $162,010.77 = - **$23,653.01**

18.1.11 Whanganui District Health Board – Improved access for primary care clinicians to computed tomography colonoscopy

Ongoing cost

Ongoing cost calculations			
		Total per referral received by the service	**Total for pilot**
Purchase of CT Colonoscopies	Each CTC was invoiced to the Ministry of Health for $564.64. The DHB was charged $350 for each procedure, however this cost excluded patient prep. Therefore we use $564.64 as the cost of the additional CT Colonoscopies. 52 scans at $564.64	**$29,361.28 / 251** **=$116.98**	**52 x $564.64=** **$29,361.28**

Costs avoided for Whanganui DHB

Costs avoided to DHB calculations			
		Cost avoided per referral received by the service	**Total cost avoided**
Traditional colonoscopies avoided	There were 52 CTC during the pilot. Of these patients, 4 went on to a traditional colonoscopy. Therefore 52-2 = 48 traditional colonoscopies were avoided because those patients received a CTC instead. The cost of a traditional colonoscopy, provided by the DHB, is $1087.00	**$52,176.00 / 251** **=$207.87**	**48 x $1087.00** **=$52,176.00**