TITLE	**The Use of Telemedicine in ECG interpretation - Evaluation Report**
AUTHOR	**Corrine Ralph**
STATUS	**FINAL VERSION**

VERSION CONTROL		
4 April 2012	**Version 1**	**Initial draft**
12 April 2012	**Version 2**	**Comments from project team**
13 April 2012	**Version 3**	**Part completed individual PCT reports/amended for overall report**
24 June 2012	**Version 4**	**Project team comments**
2 July 2012	**Version 5**	**PJ/RM comments**
12th July	**Version 6**	**Cardiac Network Board**
8th November	**Version 6**	**Signed off by Cardiac Network Board to go to the CCG's**

A. EXECUTIVE SUMMARY

Project set-up

a) This document provides an evaluation of a pilot ECG telemedicine interpretation service piloted in 66 practices between May 2011 and January 2012.

b) The innovation has been endorsed by the SHA – and its introduction supported nationally by the NHS National technology Adoption Hub

c) The network selected this as one of a number of QIPP proposals – supporting the development of effective atrial fibrillation management in primary care

d) All resources required to support the project were provided by the network, allocating an initial £30,500 to support delivery

e) Initial pilot aims to run for a period of 17 weeks or until 2000 ECGs were completed

f) GP practices participating varied from large practices with GPSI and established services to small single handed practices with no local service access

g) ECG device works by the capture of a trace in a hand held device and transmission down a phone line, the expert receives brief history from the nurse, and then provides in immediate verbal report with a written report and a copy of the ECG trace emailed generally within 15 - 20 minutes.

h) Project aimed to ensure:-

- timely access to ECG for cardiac diagnoses
- timely access to ECG services to diagnose AF
- timely access to appropriate pathways of care
- test if innovation has resource releasing potential

- improve the patient experience by providing local services
- secondary care clinicians have confidence in the service and don't repeat ECG
- consistent level of service access across a large geographical area/reduce variation
- standardise approach to interpretation

i) Expected outcomes:- To provide a cost effective alternative for ECG interpretation for primary care by:-

- Reduction of time between ECG and confirmation of results
- Accurate, safe and auditable reporting
- Reduction of time between pulse check and initiation of treatment
- Reduction of referrals into secondary care/conversely, increase in referrals underpinned by sound diagnostics
- Provision of local accuracy
- Earlier identification of patients who require generalist or specialist care

j) Scope did not include routine/screening ECGs and was for people over the age of 16

k) Training policy developed and signed off by all organisations – all nurse trained and assessed as competent in lead placement prior to project launch

l) Shadow board tested the device and constructed questionnaires based on their own views and experiences of the pilot

Outcomes

m) 2305 ECGs completed through the pilot with the most common reason for referral being chest pain

n) Overall, no action was required in 86.01% of cases. There was a significant reduction in the number of referrals to secondary care, and a smaller increase in appropriate referrals. The increase in appropriate referrals is more than offset by the reduction in inappropriate ones.

o) Patients accessed appropriate pathways earlier
    - 78 new cases of atrial fibrillation were identified
    - 25 unpredicted A+E referrals identified
    - 47 unpredicted referrals to cardiology

p) Total referrals avoided equate to 870. 75 A+E, 330 referrals for cardiology OPD, 18 other secondary care speciality, 277 secondary care diagnostics, 170 primary care diagnostics

q) Cost of pilot = £27,500 project management costs not included as already in place prior to the project
Savings generated by pilot = £116,402

Please note that the savings are rough figures and require further analysis.

r) Return on investment ratio of 1:4, with return in year

Evaluation

s) Separate evaluations were completed by nurses and doctors – 89% of nurses and 96% of doctors recommended the ongoing commissioning of the service with the maintenance of the 30 minute time standard.

t) 94.17% of patients reported their experience as either good or very good.

u) 10% of all reports quality assured by consultant cardiologist –the quality and accuracy of the interpretation was judged to be very good.

Achievement of objectives

v) The project team feel that the objectives of the pilot have been achieved

Recommendations

- For clinical commissioning groups to explore the options and the benefits of commissioning this service
- Practices to review there current processes and work to integrate a same day service, releasing follow up slots and further improving the service effectiveness
- For the CCGs to collectively identity a consensus approach and standards of GP competence and role in ECG interpretation in primary care based on evidence including the findings of this pilot and the findings of a BMJ study that audited 49 GP practices in Birmingham (BMJ 2007; 335:380).
- To ensure commitment into the further training of practices nurses to increase competence and confidence in recording the ECG, and reporting findings to patients – knowing when it is appropriate to ask for senior clinical support

A. PROJECT SET UP

1. Introduction

This document provides the evaluation of a pilot of ECG telemedicine services in a sample of GP practices across five PCTs.

It is important to note that when the project commenced, local health economies were organised in PCTs. As this formed the basis of the project organisation, the report will split the findings in this way.

2. Background

2.1 Local context

For some time commissioners working collectively within the network had discussed the variation in provision and competence in ECG services in primary care. Additionally, the network agreed to allocate funds to PCTs to support the development of programmes of work to identify new cases, and to optimise the treatment of patients with atrial fibrillation. As the diagnostic of choice to confirm atrial fibrillation, it was crucial that to enable the work in AF management would require consistent access to ECG interpretation.

2.2 Evidence

The NHS National Technology Adoption Hub for Healthcare has chosen the ECG monitoring service from Broomwell as one of just three advanced health care solutions.

A six month pilot in Lancashire and South Cumbria demonstrated potential savings of 90,000 A+E visits, and 45,000 hospital admissions with an estimated saving to the NHS of £46m per year.

A 12 month pilot across Central Manchester covering 3,732 patients demonstrated a 60% reduction in referrals to secondary care outpatient departments.

Broomwell data demonstrates that of 7,000 calls from GPs in the past 18 months, 897 of symptomatic patients were managed and reassured by their local GP and did not need hospitalisation; without the ECG service at least 50% would have been referred.

Conversely, evidence suggests that specificity of accurate interpretation of ECG varies with cardiology (.56) or GP (.49). This suggests that a number of positive results would be missed, i.e. a number of patients would not be referred at the time of first presentation, or may not be referred onto the most appropriate pathway.

A BMJ audit of 49 practices in Birmingham (BMJ 2007; 335:380) which found high levels of inaccuracy in ECG interpretation in primary care.

3. Project Approach

The network supported a pilot of the use of the Broomwell telemedicine service by providing a range of resources to ensure the effective piloting at no financial cost to the GP.

Specifically:-

- Funding for ECGs
- Project management resources

- Funding for nurse training in ECG recording (as required)
- Quality assurance of the Broomwell system

3.1 Activity

Initial plans identified that the project would run for a period of 17 weeks, or until 2,000 ECGs had been completed. Each PCT was asked initially to identify 15 practices, with a rough allocation of 400 ECGs per PCT.

Informally, PCTs were asked to try to select/invite practices from a range of practice populations – practices with a large population would develop slick processes to significantly improve patient experience, whereby the smaller practices were less likely to have access to a local ECG service and would value access to a service access.

4. Service model

The Broomwell ECG service has several core facets:-

- A hand held device that records the ECG and subsequently transmits the data down a landline
- Direct discussion with expert cardiac physiologists/doctors/nurses to explain the presenting features and past medical treatment
- An immediate verbal report provided to the initial caller
- A written report and a copy of the trace returned by email generally within 20 minutes

NB: Broomwell can also receive ECGs from practices who have their own machines - by e-mail or fax, providing a written interpretation either by fax, or by email - as preferred by the practice.

5. Aims and expected outcomes

5.1 Aim statements

Patients who participate in AF case finding, who are found to have an irregular pulse, will have timely access to ECG that will enable the early identification of AF and the commencement of treatment, or referral for expert advice if an alternative arrhythmia/provisional diagnosis is identified.

Patients who present to their GP with symptoms that may be non-urgent cardiac in origin will have access to timely ECG interpretation, signposting the GP into the most appropriate pathway or management plan.

Local evidence will be generated that will demonstrate the resource releasing potential of this intervention that can be used to support GP consortia commissioning.

Patients will prefer to have their ECG test in their own GP surgery avoiding unnecessary visits to the local hospital, having confidence in the information and the management they receive.

Secondary care clinicians will have confidence in the system and will not feel the need to routinely repeat the ECG.

Patients who use out of hours facilities or walk in centres will have access to a consistent level of service that will underpin effective management out of hours

The project will support the reduction in variation in ECG outcomes by working to develop a standardised approach to ECG recording and interpretation.

5.2 Expected Outcomes

The provision of an external, quality assured system of ECG interpretation and reporting will provide a cost-effective provider alternative for general practice by ensuring:-

- The reduction of time between patient assessment and confirmation of ECG results to signpost on-going referral/management
- Accurate, safe and auditable reporting that can be relied on by general practice and acute trust physicians
- The reduction of time between pulse check and initiation of treatment
- The reduction in the number of referrals into secondary care for ECG, whilst conversely increasing the number of referrals into secondary care underpinned by sound diagnostic interpretation
- The provision of local evidence of GP accuracy/competence of reporting
- The earlier identification of people who require general or specialist intervention to prevent an event

Also:-

- To support the appropriate primary care management of people with CVD symptoms as per map of medicine/best practice
- To improve the patient experience by providing early access to diagnostics and explanation of the results, avoiding unnecessary trips to secondary care
- To illustrate the potential in reducing variation in ECG outcome across the network

6. Project Scope

6.1 Included in the project

- Patients attending GP surgery, where, upon assessment, the GP is keen to rule out a cardiac condition
- The service is accessible for adults only (16+)
- Patients who, upon the recording of opportunistic pulse check, have an irregular pulse indicative of atrial fibrillation
- Patients with newly diagnosed hypertension

6.2 Excluded from the project

- Patients who complain of central chest pain (Despite the quick turnaround Broomwell affords, current clinical pathways for the management of acute chest pain should not be changed)
- Any other diagnostic (24 hour event recording)
- The relatives of patients who have died with symptoms suspicious of cardiac sudden death (referrals should be made to the commissioned cardiac sudden death service at UHBfT)
- Any other local screening programme

7. Project governance/approach

7.1 Project set up and accountability

Representatives were identified to act as project leads for each PCT. A lead GP was identified to act as an adviser in each PCT and was invited to attend all project team meetings, particularly during the planning phases to support the design of the project scope, brief and specification.

An initial mandate for the programme was provided by the Local Collaborative Commissioning Board (LCCB) and network board.

Allocation of finances to support the project was agreed through the network commissioning group until September 2011. After this date the network executive provided the governance for the project.

Project management resources were identified either from the network team or by PCTs, with the network picking up costs incurred.

7.2 Relationships with the provider

NHS Birmingham East & North, as the host of the network, hosted the contract for the pilot on behalf of "associate" PCTs. The standard NHS acute trust contract was used. Heart of Birmingham Teaching PCT provided the contractual expertise and led on the formal contract discussions with the provider on behalf of the network.

7.3 Relationship with GPs

Any participating GP practice was asked to read and sign up to a non-financial memorandum of understanding. This set out the scope of the project, confirmed the responsibility/duty of care was retained by the GP and agreed to collection of data. Additionally, GPs were asked to agree to release nurses/practice staff to ensure training and assessment of ECG competence could take place. Sound information governance processes were also confirmed as part of this document/discussion.

7.4 Training/competence

A training strategy was constructed based upon the Society for Cardiological Science & Technology (SCST) clinical guidelines for recording a standard 12-lead electrocardiogram. The training strategy was signed off by the relevant committee in each PCT.

It is important to note that the competence assessment was based on the importance of patient preparation - specifically lead placement and the use of the Broomwell device and the training included ensuring effective patient explanation was given that would enable patient consent to be involved in the pilot.

7.5 Patient involvement

At the outset the Broomwell system was demonstrated to the network shadow board. The board was asked to confirm the core information patients would require to ensure effective consent, review of written information, and the design of a brief survey that captured the core issues/questions that the group felt were central to the patient experience and to the value of the pilot.

7.6 Information Governance

As some personal information would be required as part of the referral process to the provider, sound governance arrangements were put in place with the provider as part of the contractual process to ensure that ECG transmission would only be through nhs.net. In addition, audit data would not contain any patient identifiable data – evaluation of data would be based around the unique ECG number generated by the provider.

7.7 Equality Impact Assessment

An equality impact assessment was commenced – changes in the organisational requirements significantly delayed its completion.

8. Project Resources

Item	Source	Allocated	Used
PCT leads	PCT – core business	Ad hoc	
Broomwell ECG interpretation	Network	£20,000	£20,000

ECG electrodes	Network		£2,382
Project Management	Network	2 days per week (flexible)	
Data collection	Practices	10 minutes per ECG	
GP champion time	Network	£3,000 - Locum costs	
ECG training	Network/project members	£1,000	
Starter packs	Network	£3,000	£3,000
Trips to Broomwell (Demo)	Network	£1,000	£1,000
TOTAL funds		£30,500	£26,382

9. Project duration

The project was formally launched in May 2011, initially with plans to run for a period of 17 weeks. A second phase of the project ran from September 2011 until 24 February 2012 when the contract expired with the provider. When the 2,000 ECGs were in sight, a four week notice period was given to participating practices.

10. Beta test

One of the GP champions piloted the use of the Broomwell device, completing 11 ECGs as part of this process. The data collection form was amended following this period.

11. GP recruitment

At project launch 69 practices expressed an interest in participating in the pilot, with practices going live following completion of nurse training.

19 practices did not complete any ECGs during the first 17 weeks.

At the end of the second phase of the project, 78 practices/services had signed up with ECGs submitted by 55 practices

14 practices that did not participate in stage 1 did not participate in stage 2. All practices that signed up for the pilot in NHS South Birmingham submitted ECGs.

12. Education and training

12.1 Delivery of training

Initially, training was to be delivered by members of the project team that had the appropriate competences. However, it became apparent that in order to deliver the training to enable the rapid commencement on the project additional training resources would need to be commissioned.

Additional training was provided by SWBH and Walsall Hospital NHS Trust, completing 12 sessions in line with the training strategy. (SWBH 3 and WHNHST 9)

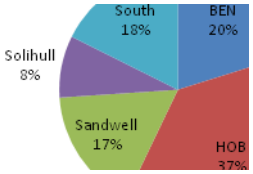
12.2 Summary

Delegates by PCT

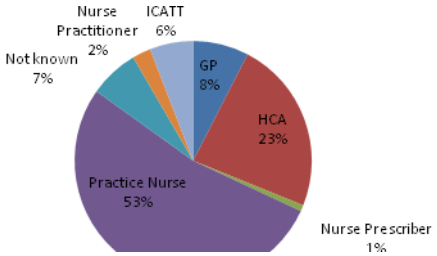
- Training was delivered by cardiac specialist nurses from February to November 2011 to a total of 119 delegates

- The training session involved an introduction to the Broomwell ECG project, training in lead placement and ECG recording, and a demonstration of recording an ECG using the Broomwell device followed by a competence assessment using a mannequin

- Of those who were assessed as competent in using the Broomwell device, more than 60% scored 95-100% in the MCQ



Delegate by profession



Data demonstrated that the majority of participants in the training were from a nursing background (79%)

72 feedback forms were received (60%) generally well distributed across the professional groups.

Overall, the training programme was mainly rated very good (92%) with 89% saying that they thought the course had largely achieved what it set out to do in terms of helping health care practitioners feel confident in using the Broomwell ECG machine.

In terms of the training components, the information regarding the ECG telemedicine pilot was the most well received, with 100% of respondents saying they had a good understanding of the background and purpose of the pilot.

The other components scored very well with at least 94% of respondents agreeing to each statement, indicating they were equipped to take part in the ECG telemedicine pilot.

12.3 Comments

Respondents were generally very positive in their qualitative feedback with a sample of comments as follows:

- *Equipment well explained and demonstrated; session non-threatening - felt comfortable within group*
- *Very good 1:1 training*
- *Thought it was very interesting, very clear and easy to understand; enjoyed myself and feel confident to perform an ECG in the surgery*
- *Excellent afternoon, interaction very good, felt very comfortable*

There were a couple of requests for the training to include the opportunity to practice using the machine with a real person, rather than a mannequin.

Interestingly, while some training sessions had been arranged at the practice on request, feedback suggested that this had not been successful on at least one occasion due to the number of interruptions.

Finally, some requested that more time be allowed for delivering the course to ensure all the components were covered in sufficient detail and there was plenty of time to practise using the machine.

In terms of additional training needs that were identified following this course, a couple of respondents suggested using the Broomwell reports to help them practise interpreting ECGs, with one suggestion that interpretation might be touched upon in the training.

12.4 Conclusions

Overall, the training was well received and very effective in terms of equipping staff to take part in the ECG telemedicine pilot.

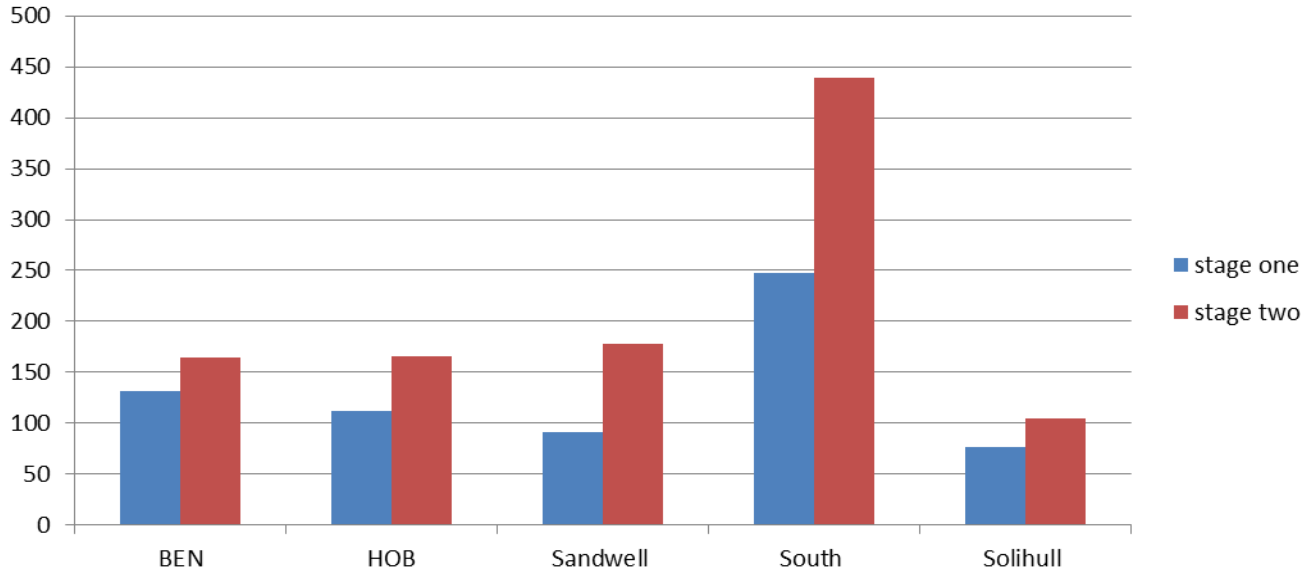
If this training were to be delivered again in the future, there are some minor changes that could be made to make it even more helpful (e.g. real person on whom to perform an ECG and assess competence), but essentially the core components are more than satisfactory.

B. CLINICAL OUTCOMES

13. Pilot results

13.1 Activity and demographics

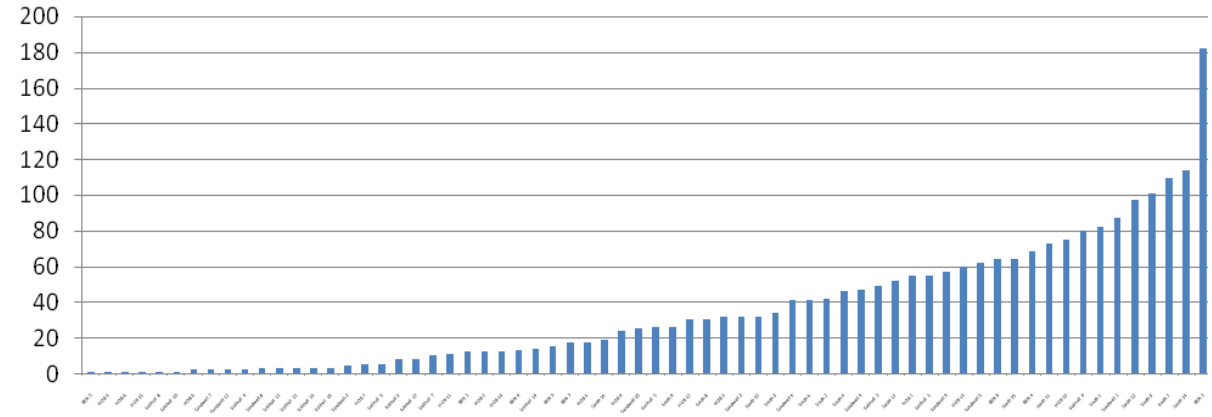
The table below shows the split of ECGs recorded across the two stages of the project by PCT.



South contributed the largest number of ECGs to the pilot, completing 41.69% with the other PCTs completing between 11.76% (Solihull) and 16.1% (BEN).

80 practices originally signed up to participate in the pilot study, with ECGs being submitted by 66 practices.

There was significant variation across practices in terms of the number of ECGs completed. Some practices performed ad hoc ECGs, and others developing/amending their internal processes to develop a comprehensive service model. The variation can be seen in the chart below. A list of participating practices and the number of ECGs completed can be seen in the appendices.



13.2 Demographics

ETHNICITY

Data was recorded on ethnicity through the primary care audit from. Whilst response rates were not complete, this data provides an indication of the ethnic mix of service usage.

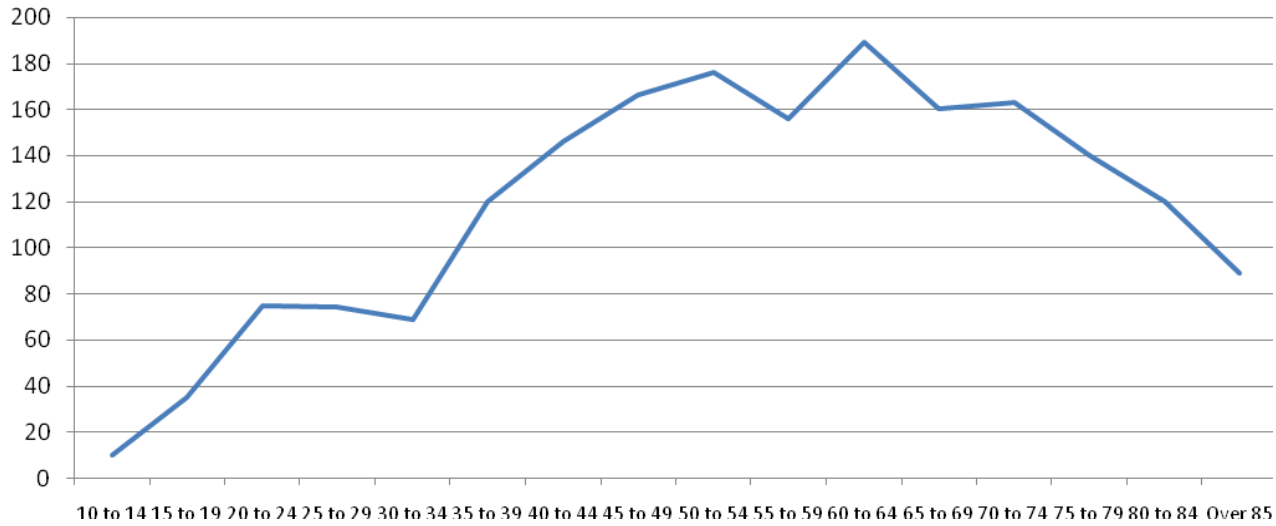
Ethnicity was collected in 82.60% of returned data forms.

British, white and other white backgrounds accounted for 73.37%.

White mixed backgrounds were specified in 4.51% of the cohort, with 12.66% from back African and Caribbean backgrounds

AGE

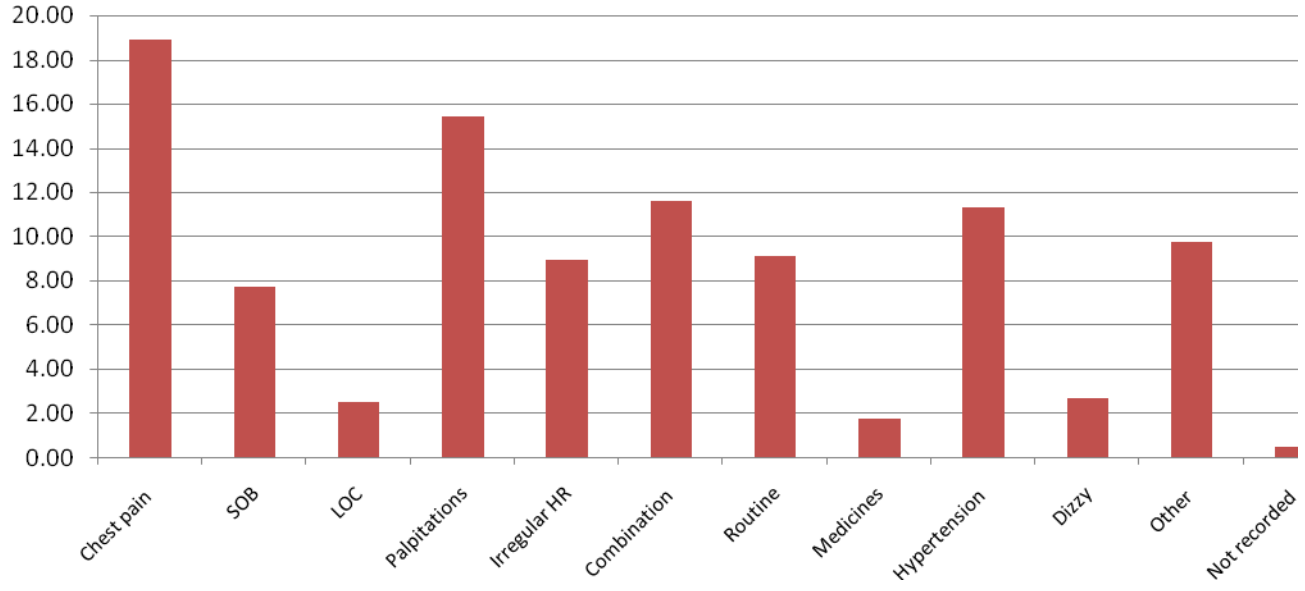
Age was collected in 81.90% (n 1888) of ECGs. The table below captures the distribution of age in five year age bands. Data shows that a small number of ECGs were completed on at least ten cases between the age of 10-14, which was outside the scope of the project. Overall, the age range appears to be normal distribution.



13.3 Clinical symptoms

The table below captures the clinical reason for referral. Whilst this data was also collected by the primary care audit form, this data is selected from the returns provided by Broomwell and enables more accurate analysis.

The table below captures the percentage of referrals received by reported clinical symptoms.



During the pilot 2,305 ECGs were performed with the reason for referral identified in 2,294 cases.

The 11 cases without the cause identified were the ECGs completed as part of the beta test, (the outcomes of these ECGs are included).

The most common reason for referral was chest pain that occurred in 18.87% of cases (n 435), closely followed by palpitations with 15.40% (n 355) cases.

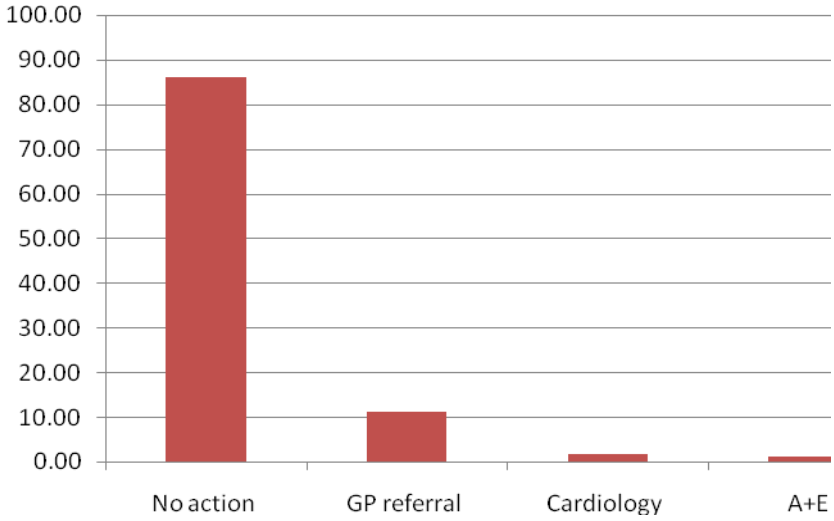
The category identified as combination was the third most popular recording 11.58% (n 267). This category captured referrals where combinations of chest pain, shortness of breath, loss of consciousness and palpitations were identified.

13.4 Recommendations

Broomwell categorise the ECG recommendation in four categories:-

- No action required
- Immediate referral back to GP
- Cardiology referral
- A+E referral

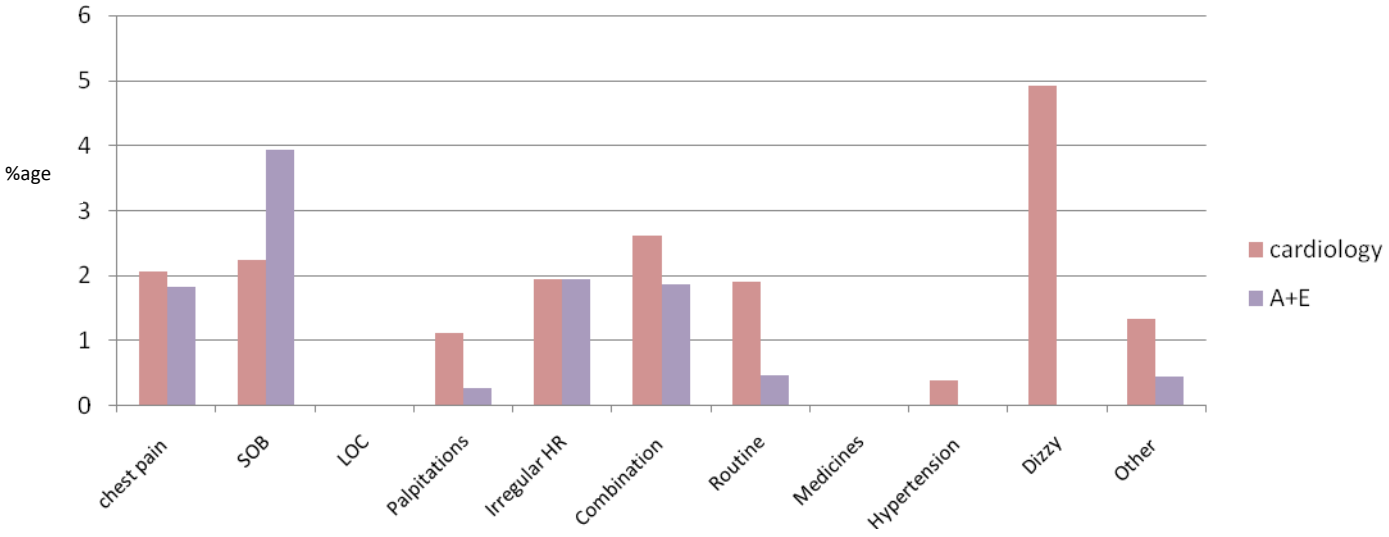
The immediate referral to GP section is generally used to convey advice and guidance to the GP in the future management of the patient. This can be feedback on a diagnosis, for example the identification of atrial fibrillation, or advice on blood tests that may be required.



Overall, no action was required in 86.01% (n 1973) of cases, with 11.12% (n 255) of cases being referred back to the GP.

Analysis by Broomwell has subsequently identified that 78 new cases of atrial fibrillation were reported in this second category.

The table below captures the recommendation of cardiology and A+E by referring symptoms.



During the project, Broomwell recommended 39 referrals to cardiology, equating to 1.69% of ECGs completed. Urgent referral to A+E was recommended in 27 cases (1.17%)

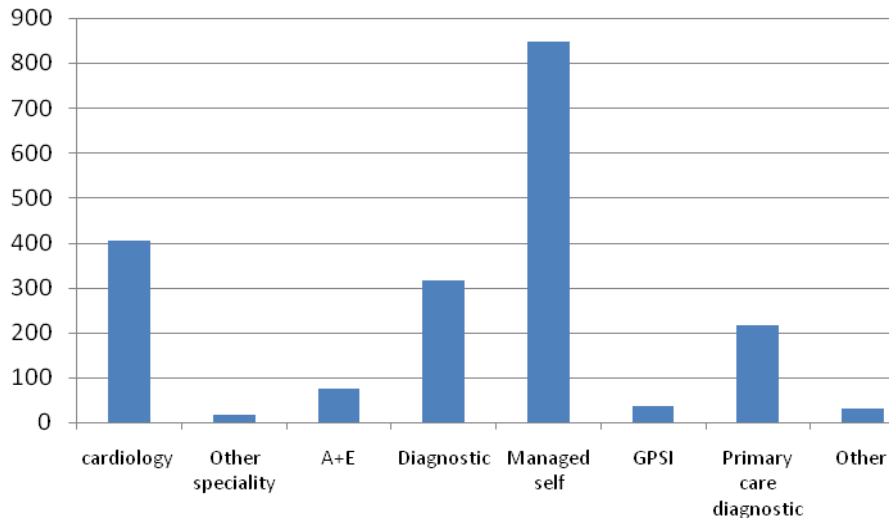
Whilst the category of dizziness included only 2.65% (n 61) of total ECGs, this category produced the highest percentage of cardiology referrals of 4.92% (n 3)

Shortness of breath resulted in the highest percentage of recommendations requiring secondary care interventions (n 11)

13.5 Improved outcomes

The audit forms were designed to capture how the GP would have managed the patient if the Broomwell service was not available (n 1934).

The table below identifies the GP initial management plan:



SECONDARY CARE DIAGNOSTIC

In 16.26%, (n 316) the GP reported that he would have referred for secondary care diagnostic, whilst the outcome of the ECG reported no action in 87.74% (n 290), referral for cardiology was recommended in 13 cases.

ACCIDENT AND EMERGENCY

Of the 75 patients where the GP would have referred to A+E, the ECG recommended this in 13 cases; 13 unpredicted referrals to A+E were generated.

The GP would have managed these 13 cases in the following way:-

- Six referred to cardiology
- Three managed self

Two primary care diagnostic There were an additional 10 cases where more than one potential method of management was identified (n 1944).

MANAGED SELF

Of the 43.07% of patient cases (n 847) that the GP suggested he would manage himself, the following recommendations were received:-

- Three patients referred to A+E
- Five patients referred to cardiology
- 41 immediate review by GP

PRIMARY CARE DIAGNOSTIC

Of the 216 patients that the GP would have referred to a primary care diagnostic, in 190 cases no further action was required.

However, the following recommendations were received:-

- 13 immediate reviews by the GP
- Five cardiology referrals
- Two referrals to A+E
-
- Two other

CARDIOLOGY

Of the 405 patients the GP would have referred to cardiology, the ECG recommended this in 44 cases. 31 unpredicted referrals to cardiology were generated.

The GP would have managed these 31 cases in the following way:-

- One referred to another secondary care speciality
- Seven referred to A+E
- Five managed self
- Five primary care diagnostic

13.6 Resource savings

The following table draws assumptions of cost savings from data provided by GPs.

	Number of slots	Price	Savings
Accident and emergency visits prevented	75	£183	£13,725
Referrals to secondary care (cardiology) prevented	330	£214	£70,620
Referrals to secondary care (other speciality) prevented	18	£214	£3,852
Secondary care diagnostics prevented	277	£25	£6,925
Primary care diagnostic prevented	170	£15	£2,550
Total slots saved	870		£97,672

Savings per returned audit form: $\frac{97,672}{1,934}$ = £50.50

Modelled for all ECGs completed as part of the project: 2,305 ECGs x 50.50 = £116,402.50

13.7 Return on investment

Resource plan identified earlier an estimated resource plan of £30,500.
At time of completion actual spend equates to £26,382.

Crudely, a ratio of investment to return = 1:4, with resources being released in year.

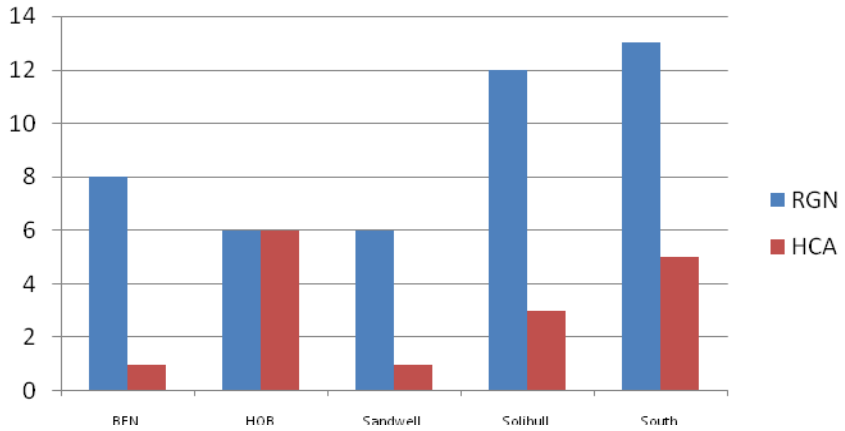
C. STAKEHOLDER EVALUATION

14. Stakeholder experience - nurse

All practice nurses involved in the pilot were asked to participate in the evaluation. A questionnaire was developed where scores were requested based upon a scale of 1-5, varying from strongly disagree to strongly agree. Responses were generally made through the use of semi-structured interviews that enabled more detailed comments to be included.

14.1 Responses

61 nurses completed the evaluation, 73% (n 45) were registered nurses with the remaining being HCAs.
91.8% (n 56) of nurses used the device, with five nurses using the interpretation service only.



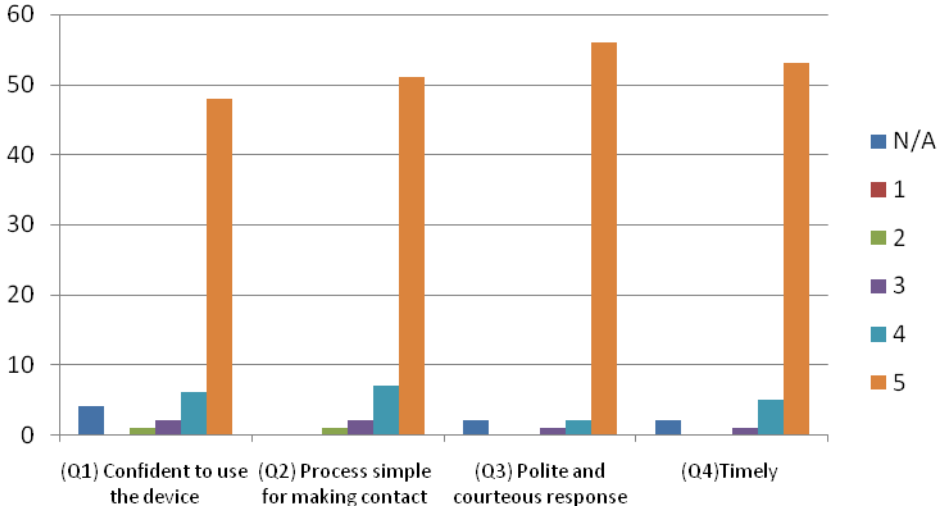
14.2 Using the device (Questions 1-4)

(Q1) 94% of nurses agreed/strongly agreed that they felt confident to use the Broomwell device

(Q2) 95% of nurses agreed/strongly agreed that the process for making contact with Broomwell was simple

(Q3) 98% of nurses agreed/strongly agreed that the Broomwell staff were polite and courteous when receiving their referral/call

(Q4) 98% also agreed/strongly agreed that the telephone was answered in a timely manner.

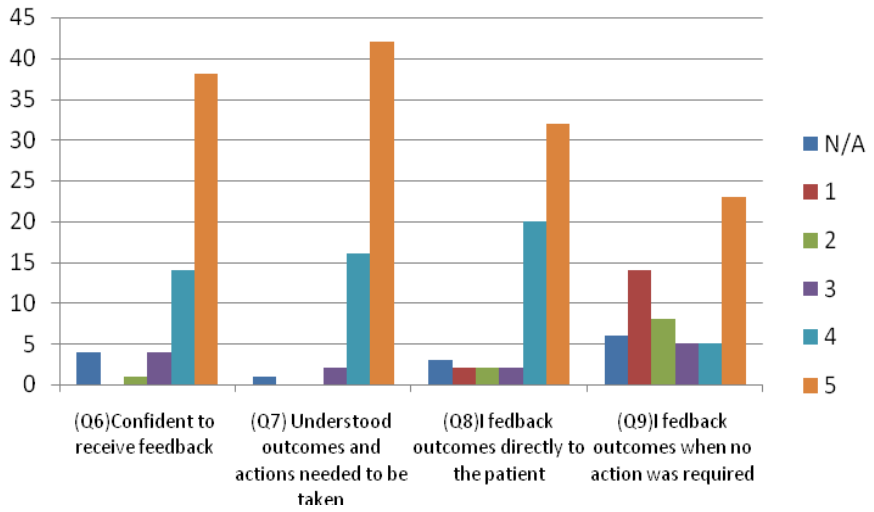


(Q5) 80% of nurses agreed/strongly agreed that the audit form (completed for the pilot) helped to collect data that could be used in the referral process. Of the 11 remaining respondents who did not have a preference or did not find it useful, nine of them where trained nurses.

14.3 Receiving and conveying results (Questions 6-9)

(Q6) A significant number (67%) of nurses strongly agreed to feeling confident in receiving the verbal report from Broomwell, with 26% commenting at level 4 (somewhat agreeing)

Of the five nurses that did not agree to being confident two were RGNs and three were HCAs

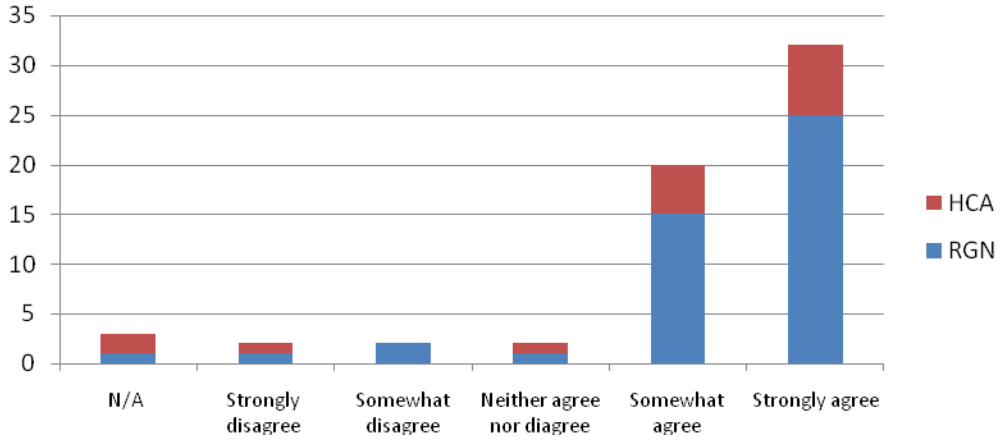


Understanding

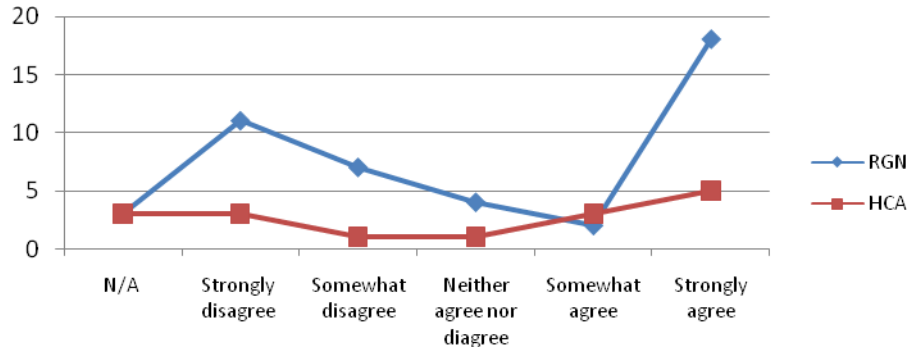
(Q7) 98% of respondents in categories four and five understood the outcomes of the ECG and actions required. The two respondents that neither agreed/disagreed with understanding the outcomes were both HCAs.

Feeding back outcomes to patients

(Q8) 55% of nurses strongly agreed to reporting back outcomes of the ECG to patients – of this cohort, 78% were RGNs. 35% of nurses somewhat agreed, with 75% of this cohort being RGNs.



Of the three nurses that identified this question as not applicable, two were using the Broomwell device, with one being an RGN.



Feeding back - no further action was required.

(Q9) 42% of nurses strongly agreed that they only fed back outcomes where no action was required with 25% strongly disagreeing.

Of the six nurses who responded as not applicable, five were using the broomwell device, with three RGNs in this cohort.

RGN Comments (selection)

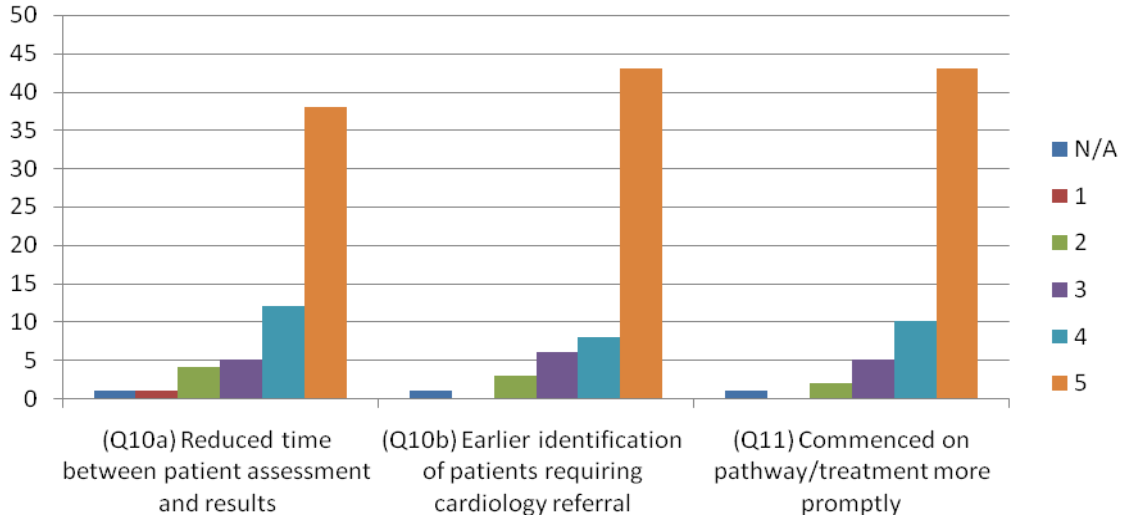
- Sometimes waited more than 30mins for response from Broomwell, although in agreement audit form helped collect data used in referral process felt this was time consuming
- Initially I found it very difficult to ascertain the quality of the ECG as there is no visual ECG but I became proficient in defining the sound of a good ECG when performed and transmitted down the phone
- Excellent machine and was able to obtain a result quite quickly
- I was very impressed with the system and found it worked very well for both patient and clinician
- Would give feedback on some abnormal ECG's but not all
- Have only done one ECG with colleague who had had more recent training, confidence would have improved with further practice
- I found the process of receiving results and relaying the patient the initial findings and then informing the GP very straight forward
- I referred to GP if any concerns, GP checked results & discussed with patients
- Having verbal feedback helped support me in further management of the patient, it also allowed for appropriate referral and gave me confidence to act on results of ECG

HCA Comments (selection)

- If ECG was with normal range I'd tell of it normal & if it was abnormal then tell patient to make routine appointment
- Did feedback regardless of result
- I always tell the patient whether or not they need to see a GP urgently or just routine or even a hospital referral

14.4 <u>Achieving the aims of the pilot (Questions 10a – 11)</u>

(Q10a) 83% of nurses agreed/strongly agreed that the time between patient assessment and results had been reduced.



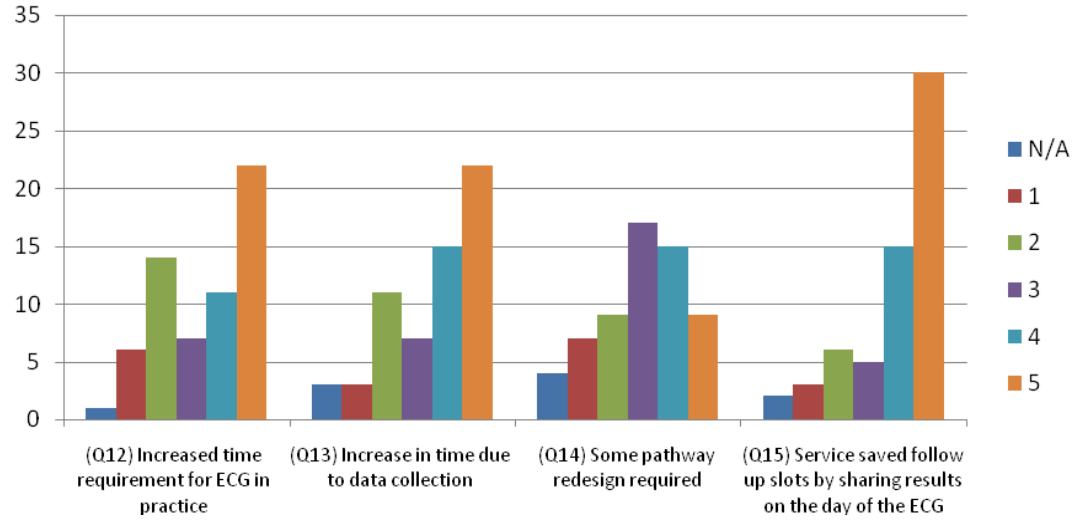
(Q10b) 85% agreed/strongly agreed that the ECG service had resulted in the earlier identification of patients requiring cardiology referral.

(Q11) 88% agreed/strongly agreed that the service had enabled more patients to be commenced on pathway/treatment more promptly.

Comments

- Not bothered about continuing to use Broomwell services as the practice did not make use of it that often, GP happy with being able to interpret themselves
- Q9 - feels it has sped up the process rather than identified patients earlier
- This service has enabled the GP to act upon the ECG with the appropriate advice from Broomwell therefore reducing waiting time and anxiety for the patient
- Only two ECGs done so difficult to comment
- Strongly agree with the above
- The system prevented - hospital intervention in many cases - also not prolonging patients concerns if all was normal with results
- Great support for team - to know that the right & appropriate action was being given
- But only did 3 & have a good system of our own GPS, doesn't need further advice very often
- Prior to this service we had to refer to another GP surgery, we then had to wait 3 weeks for a result, a most unsatisfactory service and definitely not up to the standard of Broomwell
- From a nurse aspect it definitely supported us in time appropriate ref (to Dr) but unsure how promptly doctors assessed pathways/treatment
- Having an ECG of our own in practice enables us to make decisions on the spot
- Also has increased my confidence in the service the practice provides both in terms of specialist knowledge & speed of results & consequently action or reassurance to the patient
- The patients were relieved to have ECG service and not having to wait for results

14.5 Service organisation (Questions 12-15)

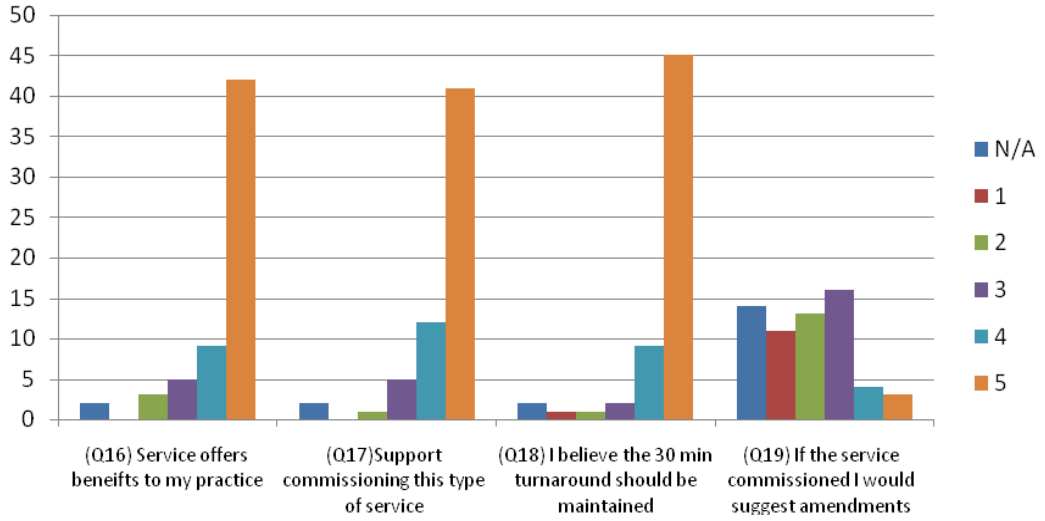


(Q12) 55% of nurses agreed/strongly agreed that the service had increased the time required in nursing slots – with 33% disagreeing or strongly disagreeing
(Q13) 64% believed that the increase in slot time was due to date collection
(Q14) 84% of nurses did not express an opinion, or disagreed that pathway re-organisation had been required
(Q15) 76% of nurses agreed/strongly agreed that he service has saved GP follow up slots

Comments

- Definitely more time consuming
- It has avoided the delay in follow up by giving the quicker response
- Appointments were prolonged - time allocated longer slot to complete the ECG
- Did not do ECGs prior to this service so yes increase needed in nurse time
- N/A, previously ECGs only performed in hospital so yes more time have been required to use service
- Not using ECG in GP practice, using in people's homes, does save time when looked at as a whole, previously had to do ECG & then find someone to interpret results or speak to GP
- Working in community we would continue visiting & reviewing the patient as management plan
- Q13 - increased time as having to fax which wouldn't be case normally, no data collection done as only have 15 minutes per ECG appointment
- Very useful to have a cardiologist give results which could be relied upon when seen by a GP but appointments to see a GP not always available on the same day unless urgent
- Data collection for the pilot scheme has caused us many problems, incorrectly filled forms has taken up a lot of nurse time and getting doctors to fully complete forms has been very difficult and time consuming
- The ECG pilot service was slightly more time consuming on waiting for fax results to be given with the audit form to GP did sometimes take longer than we usually did with
- Much more efficient decision from time of decision to ECG to gain of results
- GPSI in CHD in practice
- Quite time consuming - more so than taking ECG in to doctor (normal 12 lead)
- Time for ECG itself is reduced, the data collection has been more problematic
- ECG appointments were allotted the same amount of time as appointments before the trial commenced

14.6 <u>The potential future of an ECG telemedicine service (Questions 16-19)</u>



(Q16) 86% of nurses agree/strongly agree that the service benefits patients. All of the three nurses who disagreed were RGNs, with two using the device and one using the interpretation service.

(Q17) 89% of nurses agree/strongly agree that this service should be commissioned. 8% of nurses neither agreed or disagreed. The one nurse who disagreed to the service being commissioned was a registered nurse using the Broomwell device.

(Q18) 92% of nurses believe that the 30 minute turnaround should be maintained.

(Q19) 62% of nurses either responded as not applicable orstrongly disagreed/disagreed that the service would need to be changed if commissioned. 11% agreed/strongly agreed that the service would require amendments. Of the seven nurses in this cohort, five offered suggested amendments.

- Time turnaround - this needs to be quicker, probably better to use email rather than fax as reports appeared distorted when received and so this made it harder to interpret at times
- Drs felt that we needed access or Broomwell needed access to previous ECGs to compare past ECG readings if patient had any taken before
- Forms to be easy & completed appropriately, form too detailed - should be electronic, cardiac nurse should phone direct to GP to give results of patient, when busy - email takes time to get back to the surgery
- Turnaround time should be quicker since the patient has to keep returning for the results of the ECG thus possible treatment plan being instigated early
- Nurses to be allowed more time

14.7 Summary of comments

23 nurses provided a summary comment on the questionnaire – with the majority providing favourable comments. Nine evaluation forms used the term “excellent” when describing the service. One nurse noted that the service had identified three cases of atrial fibrillation and one silent myocardial infarction.

Several nurses noted the favourable feedback received from patients
Several nurses noted the benefits to practices that do not have their own ECG machines/services and how it had increased their confidence.

15. Stakeholder experience – doctor

Of the 56 practices that participated in the project, evaluation forms were completed by 47 practices. Generally, this was through a semi-structured interview approach.

15.1 Before the pilot (Questions 1-3)

Of the 47 respondents, 64% (n 30) reported to having ECG services in their practices. There were a variety of methods used to interpret ECGs:-

Of the total cohort, 6% (n 3) had GPSI in the practice.

- One used a GPSI in the practice
- One used a combination of the GPSI, non GPSI and the reporting module on the ECG machine
- One used GPSI and fax to cardiology for review

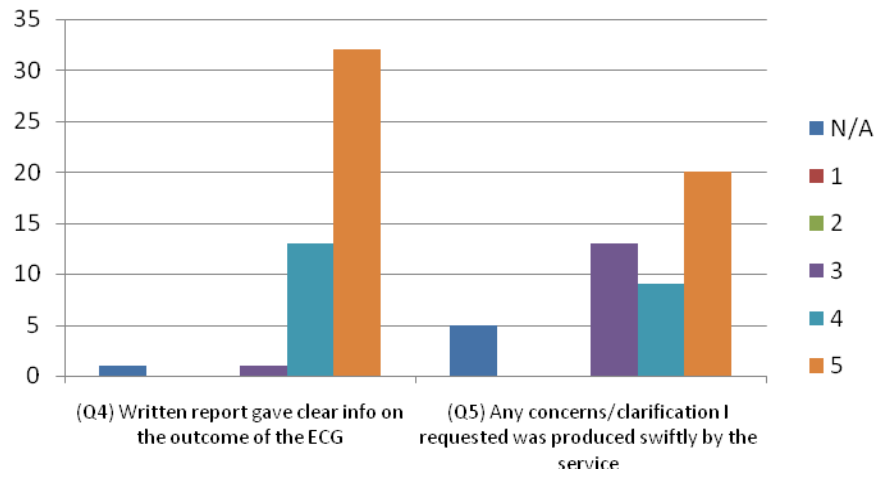
Of the practices without GPSI, 89% (n 24) reported to use GP (non-GPSI) interpretation

- 63% (n 15) use GP interpretation alone
- 25% (n 6) use GP interpretation and the interpretation module on the ECG machine
- 1 used GP interpretation, module on the ECG machine and occasional fax to secondary care
- 2 used GP interpretation and occasional fax to secondary care

Two practices reported using the ECG module on the ECG machine in isolation
One practice reported faxing ECGs to secondary care in isolation
One practice commented that he/she used informal links with a local cardiologist to support interpretation

Of the total cohort, 36%(n 17) did not have ECG services in their practices, 12% (n 6) of practices accessed a primary care diagnostic service, with 23% (n 11) referring to secondary care.

15.2 The quality of the report (Questions 4-5)



(Q4) 98% of GPs agreed/strongly agreed that the report gave clear and succinct information on the outcome of the ECG.

The one respondent who neither agreed nor disagreed had not seen a report for the duration of the pilot.

(Q5) 61% of GPs agreed/strongly agreed that Broomwell swiftly provided clarification to concerns.

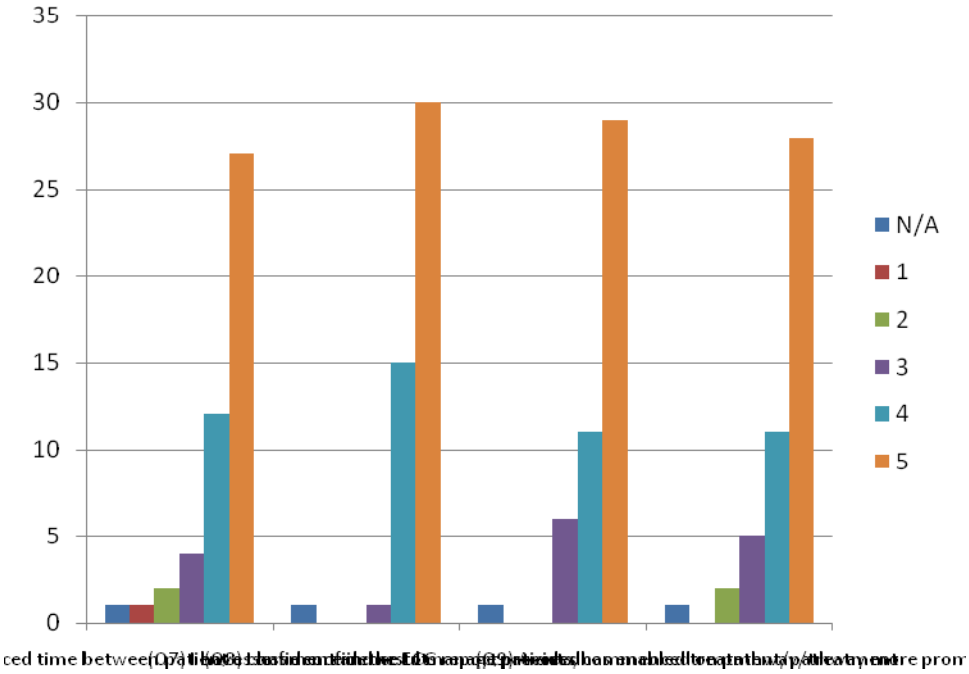
Comments:

- Not needed to contact re concerns or clarification
- Did a couple of ECG where sent to cardiologist for advice & guidance
- There were no concerns raised
- Didn't need any clarification

- It would have been better if Cisco phones were acceptable
- Q5 - never had to ask for clarification, the service did the job - very useful to have something you can rely on, interpretation software on own ECG machine not always sufficient enough in comparison
- Fast efficient service with clear outcome & recommendations
- No clarification requested
- Excellent service

15.3 Achieving the aims of the pilot (Questions 6-9)

(Q6) 85% (n 39) of GPs strongly agreed/agreed that the service reduced the time between patient assessment and confirmation of results. The seven GPs that recorded a level 1, 2 or 3 response all had ECG services in their practices.



The three GPs that disagreed/strongly disagreed (1+2) all had GP based reporting in their practices.
The four GPs that neither agreed nor disagreed had a combination of interpretation systems in place.

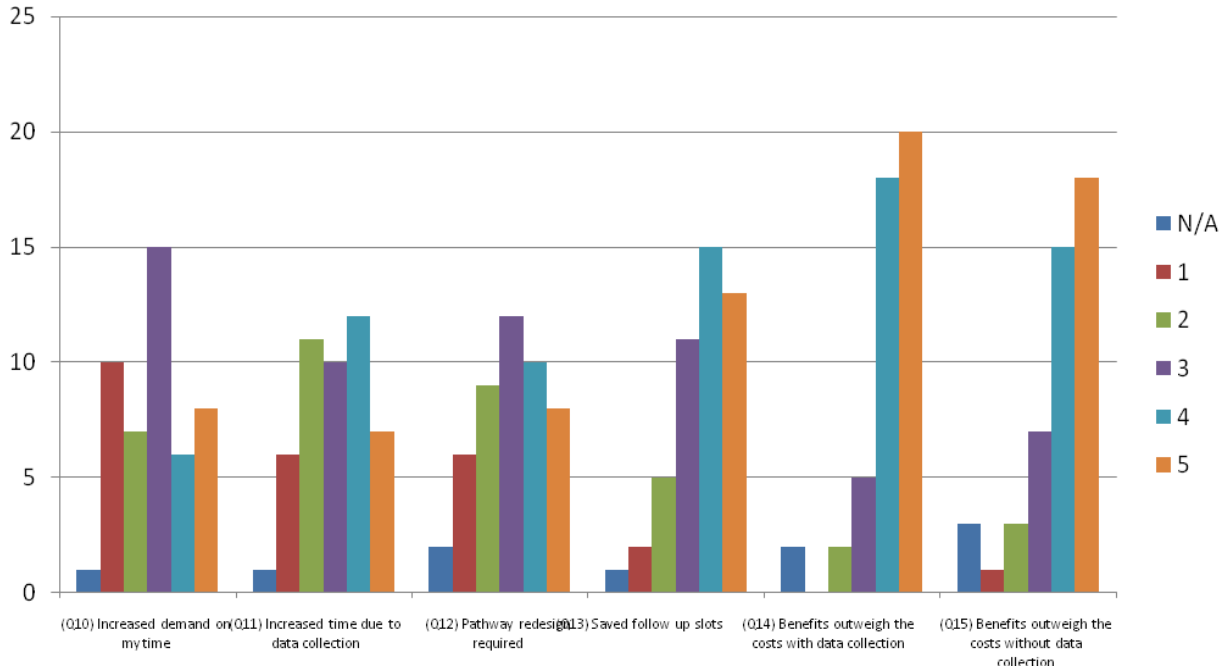
(Q7) 98% (n 45) of GPs had confidence in the ECG report provided.

(Q8) 87% (n 40) had confidence to commence patient on appropriate treatment/pathway. Of the six GPs that did neither agreed nor disagreed all had GP based reporting, with some using the interpretation on the machine.

(Q9) 85% (n 39) of GPs reported that the service had enabled more prompt access to treatment/pathway. Of the seven GPs who responded with level 2 or 3, two GPs did not have ECG based services.

Comments:
- Fantastic service
- Quick turnaround
- It has been beneficial for the nurses doing the ECGs to get an instant interpretation rather than waiting for the doctor requesting the ECG to look at it
- An excellent way of managing patients

15.4 Service organisation (Question 10-15)



(Q10) The majority of GPs 33% (n 15) neither agreed nor disagreed that the service increased demands on their time. Of the 30% (n 14) of GPs that felt the service did increase time demands, nine had established practice based ECG services. However, of the 17 GPs that did not report increased time, all had practice based ECGs.

(Q11) 11% of GPs felt that the increase in time was due to the data collection required for the project.

(Q12) 39% felt the pilot had required pathway redesign. Of the 17 practices that had no prior practice based ECG service, seven disagreed/strongly disagreed that the service had not required pathway redesign. Conversely, six agreed/strongly agreed that this had been required.

(Q13) 61% of respondents agreed/strongly agreed that slots had been saved during the pilot.

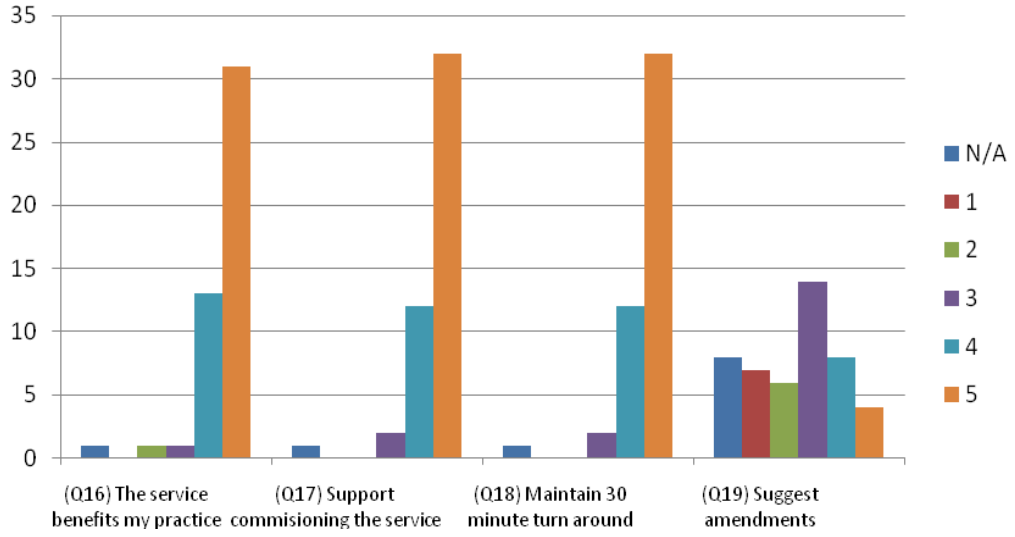
(Q14) 83% of GPs agreed/strongly agreed that the benefits of the project outweighed the time costs of data collection. Minimal difference was noted if the data collection was not required. (Q15)

Comments:

- Patients waiting longer for results so came back for another appointment, I would send patients away & invite back for results unless clinically unfit
- Time problems mainly for the nurses and not the doctors
- I believe it was a useful service even to support GPs who are confident at reading ECGs
- Any data collection should be done by the nurse rather than GPs as this makes it much easier
- GP felt there was no extra demand on her time, as the nurse collected the data
- The data collection has been a real pain when time is a constantly an issue, in an addition the form was not particularly well worded

15.5 The potential future of an ECG telemedicine service (questions 16-19)

(Q16, 17 and 18) 96% of GPs agreed/strongly agreed that the service benefited their practice and would support the on-going commissioning of the service – maintaining the 30 minute turnaround time.



(Q19) 32.5% (n 12) of GPs agreed/strongly agreed that there should be some amendments to the service, with 34% (n 13) offering the converse view.

37% of respondents neither agreed nor disagreed.

Of the GPs who suggested amendments to the service would be required (n 12), five did not comment on how this should be done. Comments of those who did suggest amendments are as follows:

- Two of the seven comments suggested not completing audit forms
- If hypertension a reason for ECG to comment on LVH if present or not present
- Some results took a long time so patients went home or ECG was left in trays if Drs weren't there - potential pit falls!
- Pilot appeared to work well – needs to be evaluated further regarding cost benefits, etc
- More involvement of GPs in pathway
- Pay for the clinical time of the HCA to do the ECG

Other comments:

- The turnaround time for the reports was actually quicker than 30 minutes and so if it can be more rapid then this would be really helpful
- Criteria seem tight, staff find existing equipment easier, only a few done – our practice did a lot of routine ECGs diabetics and hypertension which did not fail into criteria
- Dependant on further evaluation
- Excellent service no changes necessary

Eight GPs completed this questionnaire as not applicable.

15.6 Overall comments

42% (n 20) of GPs submitted a final comment, with 13 being in support of the device/service.

A number of GPs noted the clinical benefits to the practice in terms of diagnosis of cases of AF and the improvement of competence and confidence in primary care. Several comments were made on the promptness of the turnaround, noted often at quicker than 30 minutes. It was noted that this aligned well to the QIPP agenda by reducing A+E visits and inappropriate referrals as well as increasing appropriate referrals.

One comment suggested a similar service for 24 hour tapes and one suggested benefits if worked with alternative phone providers.

One practice suggested that the costs to the practice had not been considered (increased time) with a further comment suggesting that nurses should be commissioned to record ECGs in the practices.

One practice noted problems with the device initially, a replacement device was provided that worked well. One practice was unclear as to how the ECG could be attached to the patients notes.

All GP final comments can be found in appendix three.

16. General summary

Overall, GPs and nurses reported that the service had benefited their local practice – this was an observation in both practices that had previous ECG services and those who had not.

Nurses generally seemed to adapt well, developing the confidence to use the device, and reporting a positive experience accessing and using the referral service. Greater satisfaction generally was seen in practices that used the whole system – practices using the interpretation service only or faxing traces did not have the benefit of the immediate verbal report.

Confidence levels were also high when receiving the verbal report, with exceptional levels of understanding of the actions required. Nurses generally felt relatively confident to feedback results to patients. It was expected that a significant number of nurses would not feel confident in conveying the results to patients when further action was required; whilst this was apparent, it was not to the level expected. There did not appear to be any distinction between RGN and HCA views.

Both nurses and GPs reported that the service had reduced the time between the initial assessment and results. Both groups reported high levels of agreement that the service had also ensured earlier commencement of treatment or appropriate pathways.

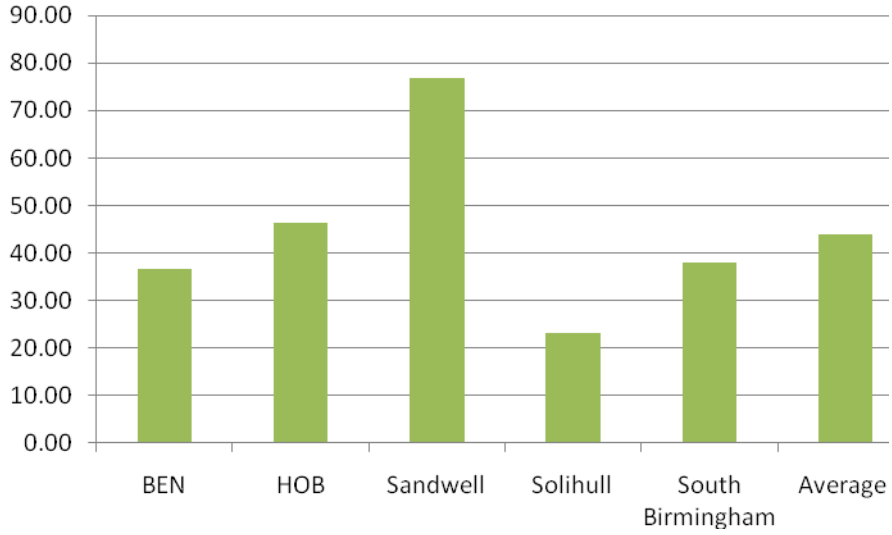
In terms of time demands, there was a wide distribution of views regarding the increase in time the service had caused. It is without doubt that the collection of data was burdensome for practices, although surprisingly the benefits of collecting the data to inform the referral process was recognised. It was at this point that a slight variation between RGNs and HCAs was seen with HCAs seeing a greater benefit in the use of the form.

17. Stakeholder experience – the patients perspective

17.1 Response rate

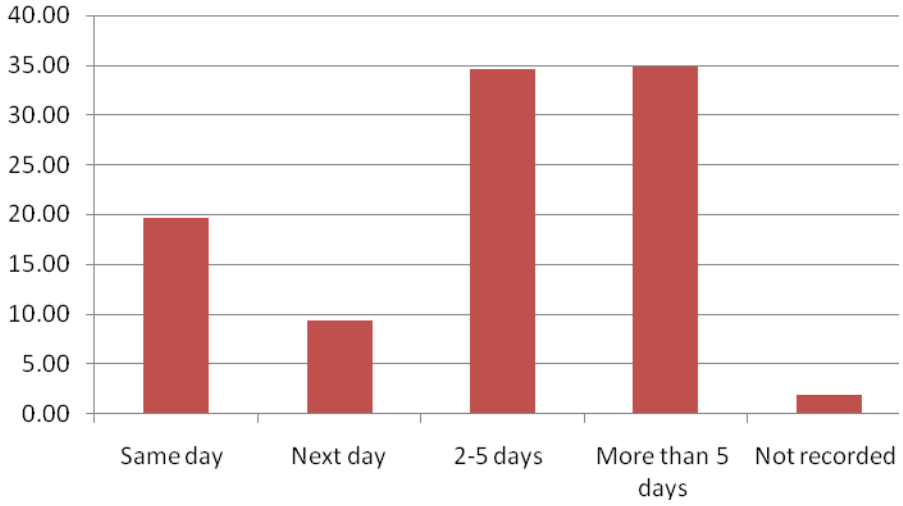
A total of 1,012 satisfaction surveys were returned, generating an overall response rate of 43.90%. In 13 surveys, the PCT was not recorded.

The response rate across PCT varied, this can be seen in the chart below, as a percentage of the number of ECGs completed.

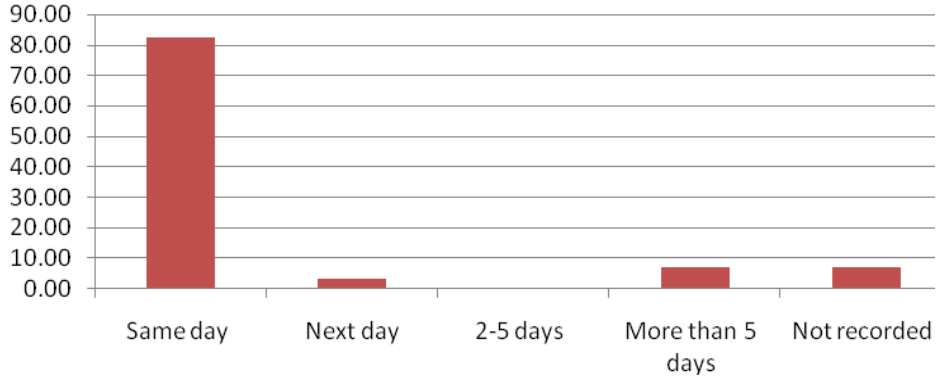


17.2 Length of wait

The table demonstrates that less than 20% of patients have their ECG on the day the decision was made to complete it with 34.78% of patients waiting in excess of 5 days.



It can be seen that 82% of patients receive their results on the same day as the ECG.



29 patients reported to waiting more than five days for the ECG to be recorded, and a further five days for the results.

17.3 Patient satisfaction

- 94.46% (n 956) patients felt happy with the information and advice provided
- 94.17% (n 953) patients reported their experience as either good or very good.
- 89.82% (n 909) were satisfied with the overall experience, with 43 patients suggested improvements to the service could be made.

Examples/comments received are:-

- The provision of a pillow
- It would be nice to have an ECG machine at this surgery all the time
- More explanation on how ECG results obtained via method of putting machine next to phone to hospital. Seemed a bit "trial and error".
- Being advised when I would get results
- I would have liked to see a trace of the heart rhythm myself immediately. Sending data via telephone lines should really be by fibre optic methods not the old technology ASOL method.
- The surface I was sitting/lying on could have been adjusted to be more comfortable so that I could be more relaxed for the test
- Ensure other colleagues don't enter when undressed. This is not acceptable
- See the difference between what a normal ECG result should look like and the result I had. More information for assurance
- Time it takes for an appointment with the GP to be made was two weeks.
- More information. I had two ECGs and nurses did not seem to know what to do.
- The only improvement would be a reduction in the time between the referral and the ECG being carried out. Actual ECG was very good and quick.
- The ECG machine did not record the 1st or 2nd time and the volume on headset was low on the 3rd attempt.
- Waiting time
- Method very good and unfortunately it took three attempts
- Wasn't told that the ECG would take 20-30 minutes to allow results come back.
- Not being able to hear the phone conversation about the results which made me imagine the worst.
- To really explain why ECG is and procedures and what it was needed for
- I felt very uncomfortable taking off the upper half of my clothes
- I would have preferred results before I left the surgery on the day it was taken
- The taking of the ECG was excellent. Time and trouble to get an appointment was very poor
- I have seen 3 GPs and 2 nurses regarding this problem - there is a lack of consistency in terms of information given!
- ECG room was very cold
- The bed was too small

18. Cardiology evaluation

Clinical directors of cardiology units in secondary care all supported the project, with the agreement that any feedback received regarding the pilot would be discussed in the regular clinical advisory group meetings. No negative feedback has been received.

In addition, one of the quality standards put in place involved the audit of 10% of all ECG reports by the clinical director of the network. Whilst there were minor issues identified in several ECGs, the quality and accuracy of reporting was very good.

D. DISCUSSION

19. Project scope

At the outset the scope of the pilot did not include the routine screening of asymptomatic. At the request of GPs, patients with hypertension undergoing review in primary care were included in the pilot. The development of categories of "other" and "routine" demonstrated some scope creep/demand in primary care. In view of the need to enable the development of competence and to ensure the service was integrated into the "real life" of practices this was permitted.

20. Memorandum of understanding

All GPs signing up to the pilot were asked to sign a non-financial memorandum of GPs appeared to accept the offer of a resourced service in exchange for the completion of data to support the pilot. Nurses were readily released to complete training - generally with excellent pass rates.

21. Training

The training was often difficult to co-ordinate and very quickly the experts assigned to the project became overrun and additional capacity was secured through an SLA with Walsall Hospitals NHS Trust. Locally, acute trusts expressed some disquiet as cardiac physiologists felt the training of lead placement without the ability to see the trace was inadequate. The project team felt that in view of the limited experience of practice nurses with ECGs, the commencement of training with lead placement would act as a good foundation for further education.

Nurses generally welcomed the training, although the reports from patients and nurse evaluation did suggest there was some areas for improvement in confidence and dexterity in using the device.

There was little consistency with the nurses assessment of when it was appropriate for the feeding back of results to patients. In some cases the level of complexity of the results did not inhibit feedback – when perhaps it may have been more appropriate for a GP to discuss with the patient. There was no trend seen between HCAs or RGNs.

22. GP interpretation of ECGs

The range of GP views relating to their own competence in reporting was varied. Some GPs readily admitted that their formal training on ECG interpretation was out of date, and they recognised the limitations this would place on their local services. Others however did not feel that this was an issue. The concept of "knowing enough to get by" was often heard. It should be noted that a BMJ audit of 49 practices in Birmingham (BMJ 2007; 335:380) found high levels of inaccuracy in ECG interpretation in practices.

The project team quickly agreed that development of a minimum standard of acceptable competence in primary care was an essential facet in ensuring the reduction of the variation in quality across the network.

Views of senior clinical managers varied – a few felt that the recording of an ECG by a GP was core business, and felt it was unreasonable to "reward" practices for by providing a fully resourced service. This view was exacerbated when the project team agreed to provide electrodes for practices involved in the

pilot. On the other hand, many GPs do not currently record ECGs in practice at all. Whilst the project team felt that issue was of paramount importance, it felt that this issue was outside the scope of the pilot, and was perhaps within the remit of clinical managers to determine if this was a priority and there was sufficient appetite to resolve.

23. Relationship with the provider

The contractual process delayed the initial start of the project considerably. Eventually the contracting team at HOB provided the expert support that enabled a sound contractual relationship to be developed.

24. Data collection

It is without doubt that the audit form was a considerable burden on practices, although the evaluation did demonstrate it helped to organise the nurse to have the mot accurate information to hand when making the referral.

Despite this, the response rate of 83.90% was exceptional.

The collection, data entry and subsequent analysis placed considerable challenge on the network as the information manager left as the project commencement and a replacement post could not be secured. During significant periods of the pilot the network did not have any administrative support which predisposed a considerable bottleneck in data entry at the end of the pilot. Significant errors were noted in the data entry that required considerable amendment.

25. Project management

The allocation of dedicated project resources to each PCT appeared to work well. The project team believe that this supported the excellent response rates and the completeness of data that was received.

26. Lessons learned

- Commission external evaluation capacity at the outset – this would ensure sound systems were put in place

- Documentation – the audit form was a challenge to both the practice and the network. The audit form could have been reduced in its size without loosing its function

E. PROGRESS AGAINST DELIVERY OF OUTCOMES

Expected Outcomes

The provision of an external, quality assured system of ECG interpretation and reporting will provide a cost-effective provider alternative for general practice by ensuring:-

- The reduction of time between patient assessment and confirmation of ECG results to signpost on-going referral/management

Evaluation forms completed by both nurses and doctors report that the time between assessment and results has been improved. Although feedback from patients suggest that there are occasions were the patient has to wait for both the ECG and the results

- Accurate, safe and auditable reporting that can be relied on by general practice and acute trust physicians

GPs have reported satisfaction and confidence in the reports

- The reduction of time between pulse check and initiation of treatment

Not directly demonstrated

- The reduction in the number of referrals into secondary care for ECG, whilst conversely increasing the number of referrals into secondary care underpinned by sound diagnostic interpretation

Demonstrated by primary care audit forms – the increase of appropriate referrals is significantly offset by the reduction of inappropriate ones.

- The provision of local evidence of GP accuracy/competence of reporting

Not demonstrated – although evidence does point towards some inaccuracies

- The earlier identification of people who require general or specialist intervention to prevent an event

Demonstrated

Also:-

- To support the appropriate primary care management of people with CVD symptoms as per map of medicine/best practice

Indirectly achieved. Not formally assessed.

- To improve the patient experience by providing early access to diagnostics and explanation of the results, avoiding unnecessary trips to secondary care

Achieved – demonstrated by patient feedback

- To illustrate the potential in reducing variation in ECG outcome across the network

Indirectly

F. RECOMMENDATIONS

- For clinical commissioning groups to explore the options and the benefits of commissioning this service

- Practices to review there current processes and work to integrate a same day service, releasing follow up slots and further improving the service effectiveness

- For the CCGs to collectively identity a consensus approach and standards of GP competence and role in ECG interpretation in primary care based on evidence including the findings of this pilot and the findings of a BMJ study that audited 49 GP practices in Birmingham (BMJ 2007; 335:380).

- To ensure commitment into the further training of practices nurses to increase competence and confidence in recording the ECG, and reporting findings to patients – knowing when it is appropriate to ask for senior clinical support