Final report

February 2017

Innovating for Improvement

Enhanced atrial fibrillation medicines use reviews (AF MURs) using Kardia monitors to improve the identification and treatment AF - Capture AF.

Royal Brompton and Harefield NHS Foundation NHS Trust

The Health Foundation

About the project

Project title:

Enhanced atrial fibrillation medicines use reviews (AF MURs) using Kardia® monitors to improve the identification and treatment of patients with AF.

Lead organisation:

Royal Brompton and Harefield NHS Foundation Trust

Partner organisation:

Community pharmacy

Project lead

Zainab Khanbhai

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Part 1: Abstract

Atrial fibrillation (AF) increases the risk of stroke, reduces quality of life and increases morbidity and mortality. A third of patients who have AF are asymptomatic and too often AF is only detected with the patient presents with serious complications, such as stroke. Anticoagulation reduces the risk of stroke but data have shown that only half of the patients eligible for an anticoagulant actually receive it. In England, approximately 835,000 people have been diagnosed with AF, with the overall prevalence rate of 1.6%, increasing to 9% at age 80-89 years.

We believe that if we are able to detect undiagnosed AF in patients sooner and improve anticoagulation for patients already diagnosed with AF, we can significantly reduce the risk of stroke. Also, if we detect patients that have AF and have a high symptom burden we will be able to greatly enhance their quality of life.

Our team at the Royal Brompton and Harefield NHS Foundation have devised an innovative method for improving AF detection and treatment. By combining the untapped skills of the community pharmacist with new technology. Community pharmacists currently provide Medicines Use Reviews (MURs) to patients and are ideally situated to facilitate the diagnosis of AF.

We trained 10 pharmacists in the Hillingdon area to carry out enhanced Atrial Fibrillation Medicines Use Reviews (AF MURs). As part of the AF MUR the pharmacists identified patients that had risk factors for atrial fibrillation. Eligible patients received a free and instant electrocardiograph (ECG) using a single lead handheld ECG monitor, Kardia (AliveCor) monitor. The pharmacist also completed a detailed review of the patients' medications and symptoms (MUR).

The community pharmacist referred the patient to the Arrhythmia Care Team (ACT) at Harefield Hospital if:

- Possible AF was detected on the Kardia ECG reading
- A patient had a previous diagnosis of AF but was not ant coagulated;
- A patient with a previous diagnosis of AF that had a high symptom burden.

I took over as project lead from Sally Manning in February 2016. I was impressed by the truly innovative and transferable nature of the project and was ready to take it on to the best of my ability. I ensured I understood exactly what the project entailed by going through the handover Sally had provided and I contacted the relevant stakeholders. This included community pharmacist lead Rikin Patel and Consultant Cardiologist Wajid Hussain. Before data collection could begin there were several outstanding features of project. My main aims for setting up was to purchase the equipment required by the pharmacists, arrange further training of the community pharmacists and understand how data was to be recorded on the PharmOutcomes database (database used to document the MUR). I spoke to the legal advisor to ensure we were complying with data protection requirements and ask for advice on the specific information required on the patient consent form. With help from the trust communications team we created a dynamic and eye catching poster to advertise the project (see appendix 1). I arranged a community pharmacist working group (CPWG) meeting on 6th April 2016. This was a great opportunity for all the

pharmacists involved to meet each other and the project team. At this meeting Dr Hussain talked about AF and the importance of the project and I went through the logistics of identifying patients, recording the ECG and completing the MURs. Everyone was provided an electronic tablet, promotional posters and a training pack. The meeting was a great success and everyone understood the importance of and were motivated to provide the service. Dr Hussain attended the primary care Cardiology Working Group to present the project. We had initial support of a local GP and this was then extended to the other GPs in the locality. Next I visited each pharmacy in turn to provide one to one training. We set up the electronic tablet, NHS email and went through the training once more. I found that by the end the pharmacists felt confident to carry out the MURs independently. Instantly the MURs and ECGs started to be reported a very satisfying result!

Now the set up phase was complete and implementation phase was full speed ahead! The next step was to collect and collate the results. The community pharmacist would email us the ECGs that they had recorded. At the same time they would record the MUR on PharmOutcomes. When a patient had triggered a referral on PharmOutcomes we would receive an email from PharmOutcomes with patient details, contact number and reason for referral. Each ECG was reviewed together with a cardiologist and if a patient deemed suitable for referral we would call the patient to come in for an appointment if possible within 2 weeks to the arrhythmia clinic.

The patient would be seen in clinic at Harefield Hospital. At this time, we would do a 12 lead ECG. If AF was confirmed on this 12 lead ECG we would explain the diagnosis to the patient and enter into a discussion regarding anticoagulation using a shared decision making tool: http://sdm.rightcare.nhs.uk. In some cases where the diagnosis was not clear extra tests were arranged. Each patient who attended was called by telephone after 3 months for follow up and seen after 6 months in clinic. The data collection phase lasted from May 2016 until October 2016 with 591 patients seen during this time.

- **How have you gone about testing your intervention?**

Study design	New service evaluation
Study population	Patients aged 65 or over with AF associated risk factors
Intervention	Screening process involves the pharmacist 1. Using a single lead handheld ECG monitor (Kardia (AliveCor) monitor) 2. Completing an enhanced AF 'medicines use review' using a national pharmacy database called PharmOutcomes Patient referred directly to specialist arrhythmia care team (ACT) at Harefield Hospital if : • Possible AF is detected on the Kardia ECG • The ECG is unable to be interpreted • The patient has previous AF but is not anticoagulated

Figure 1: Data collection method

Before data collection phase began a test patient produced on PharmOutcomes to ensure that a referral came through to the NHS email address.

Pharmacists were given scenarios and used the Kardia ECG monitor several times to ensure they felt able to use the different systems.

- **What has gone well?**

The community pharmacists have been extremely committed and motivated even with their day to day pressures. They have been approachable, easy to train and have sound clinical knowledge and skills. Several have commented that they have found the MURs easy to complete, one pharmacist commenting that it has helped her engage further with the clinical pharmacy. Another pharmacist has written a case study based on the AF MUR project published in the Chemist and Druggists website. I keep in regular contact with the pharmacists either by phone, email or site visits.

The CCG have been supportive and have promoted the project within their Medicines Management Newsletter.

There is great enthusiasm for the project outside of the people involved in it. GPs have been impressed by the project and many have commented that they would like more pharmacies represented. One GP contacted us directly to insist that his local pharmacy be involved!

The Community Pharmacist Working Group was a good platform for all the pharmacists to meet; this was repeated again in September, where we provided an update of the results.

The posters to promote the project were of a high quality and eye catching and something I am very proud of. We contacted patients for their views and advice.

Patients have been very appreciative of the service. Several patients commented that that it was a great idea and that is took the pressure off the GP, the pharmacists were easy to access, it was convenient and they felt it was a relaxed environment.

I submitted an abstract of the preliminary results to the American Heart Association conference which was accepted. I was able to present the project in a poster form at the conference in New Orleans in November 2016.

I submitted a case study to the Heart Rhythm Congress HealthCare Pioneers report. The case study won and has appeared on the 2017 Healthcare Pioneers Report.

A case study of the Early detection of atrial fibrillation via community pharmacists led by the Royal Brompton and Harefield NHS Foundation Trust was used in the Royal Pharmaceutical Society's newly published report on long term conditions. We were invited to attend the launch of this report at the Houses of Commons on 30th November 2016. The project was commended by the RPS chair Sandra Gibley for its innovation.

- **What have the challenges been and how have these been addressed?**

The tablets purchased initially were incompatible with the Kardia device. We made a loss on this as we did not get the full refund and we had to purchase a more expensive alternative. In addition, this whole process delayed roll out.

We determined that the AliveCare website which was used to store patient data and review ECGs was not a secure platform to store patient confidential information. I found a suitable alternative to transfer the data which was via NHS email We determined that not all community pharmacists had this which meant there was a delay in activating the accounts.

It took several emails and meetings but finally the legal team approved our patient consent form. With my limited knowledge on legal matters this was a challenge for me to understand and it was important to get it right.

We had to quickly identify and train 2 more pharmacies from the south of the borough in order to comply with the GPs request that there is fair representation of

pharmacies. These pharmacies began their data collection some weeks after the other pharmacies, but knowing they had a limited time, worked harder to collect patient data and soon caught up with the other pharmacies.

10% of ECGs were unable to be interpreted – this was more than expected. In order to prevent unnecessary referrals to the ACT we reviewed all of the ECGs in advance only contacting those patients where AF was clearly detected or where the cardiologists was unsure of the reading. This meant more time spent looking through ECGs which we had not factored in. However it resulted in less unnecessary referrals to hospital.

The data collection period which was initially planned for 3 months, took 6 months instead. I calculated that if we completed all the data collection by end of October this would mean that some of the follow up data would not be available for the final report but all patients would have a 3 month follow up call, which would be sufficient. Also by extending the data collection period it meant we had more robust data.

For our business case submission and to pitch the project to the CCG we needed a robust economic profile for the project. It was important to show the financial benefits of the project. We tried to calculate these ourselves but realised quickly we would need expert help with this. Therefore we procured the help of a Health Economist.

It was frustrating when eligible patients did not agree to have anticoagulation even though we had provided them with full information. This is a consequence of having a shared decision making process and in the end we had to respect the patients' decision.

- **What are your outcomes and what is the impact of this?**

Our results show that community pharmacists are well placed and have the skills to be able to identify and screen patients for AF. The process used has been simple and patients have been quickly seen in clinics. Anticoagulation has been started. In some cases patients have had further interventions such as cardioversions and ablations. Patients diagnosed with AF have had their stroke risk reduced by 2/3rds due to them starting anticoagulation. The identification rate for AF has been 2.5% (AF prevalence is 1.6% nationally).

I cannot emphasise enough the steep learning curve for me over the past year. This has ranged from:

- Understanding the ordering process of goods within an NHS institution, grasping legal jargon and patient data confidentiality. Improving my basic IT skills in terms of setting up emails/uploading apps.

- Creating links with key stakeholders especially in the primary care setting; something which I am not used to dealing with.

- Setting up of clinics, understanding payment arrangements, maintaining and adhering to budgets. Understanding about health economics.
- How to write an abstract and produce a poster for an international conference.
- How to engage with the CCG and pitch to regarding a service provision.

Part 2: Progress and outcomes

The data collection period ranged from May 2016 until October 2016 (6 months). During this time 10 pharmacies completed a total of 591 AF MURs. 21 patients were seen in clinic and these patients have been followed up after 3 months by telephone to assess any changes in symptoms, medication, quality of life and health score. We are in the process of conducting our 6 month clinic follow up – at this time we have seen 12 patients, the rest are yet to be seen.

The results are as follows: Patient demographics and AF associated risk factors:

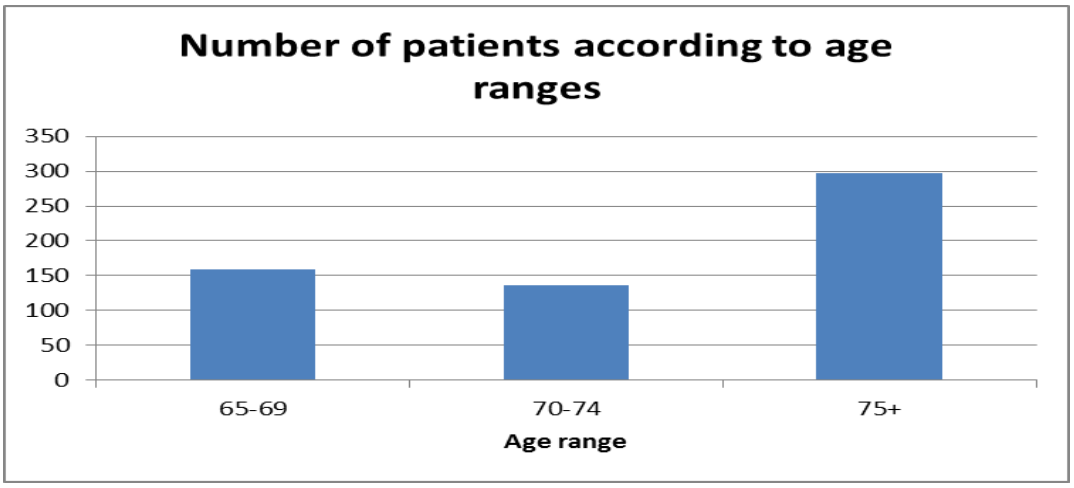


Figure 2: Column chart showing the age ranges for the 591 participants.

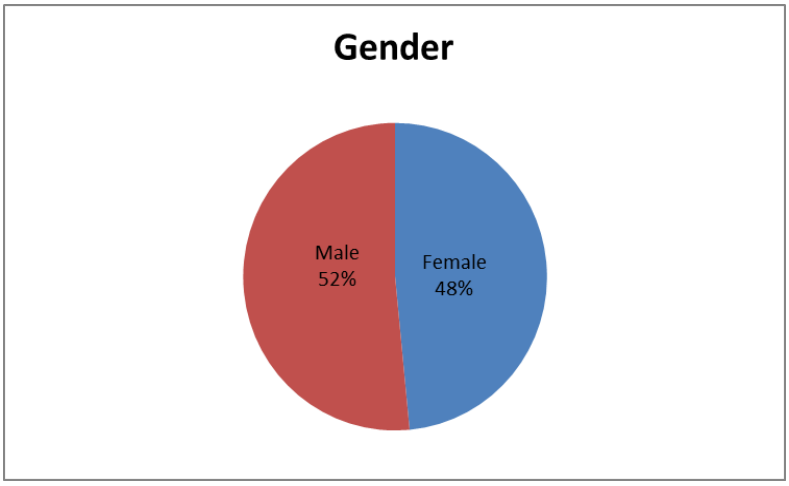


Figure 3: Piechart showing the distrubution of males and females participants

Table 1 describes the percentages of patients with the AF associated risk factors.

The majority of participants (88.5%) suffer from hypertension, with very few (0.8%) who have congestive heart failure. This could be because heart failure pateints are less likely to be mobile enough the visit their local pharmacy and may have their medications delivered to them. Diabetic patients make up enarly a quarter of those inviolved.

Table1: Table describing the AF associated risk factors

Patient demographics (data collection phase May – October 2016)	**(n = 591)**
Male (n, %)	305 (51.5)
Age (years)	75 ± 6.9
Risk Factors (n, %)	
Vascular disease	88 (14.9)
Congestive Heart Failure	5 (0.8)
Hypertension	506 (88.5)
Diabetes	145 (24.4)
Previous history of stroke/transient ischaemic attack/thromboembolism	34 (5.7)
Previous AF diagnosis	49 (8.3)

Figure 4 explains the results of the Kardia ECG findings. As expected majority (81%) of patients had a normal ECG. 9% of patients had possible AF detected. This included patients already diagnosed with AF. The number of unable to interpret ECGs was reasonably high at 10%.

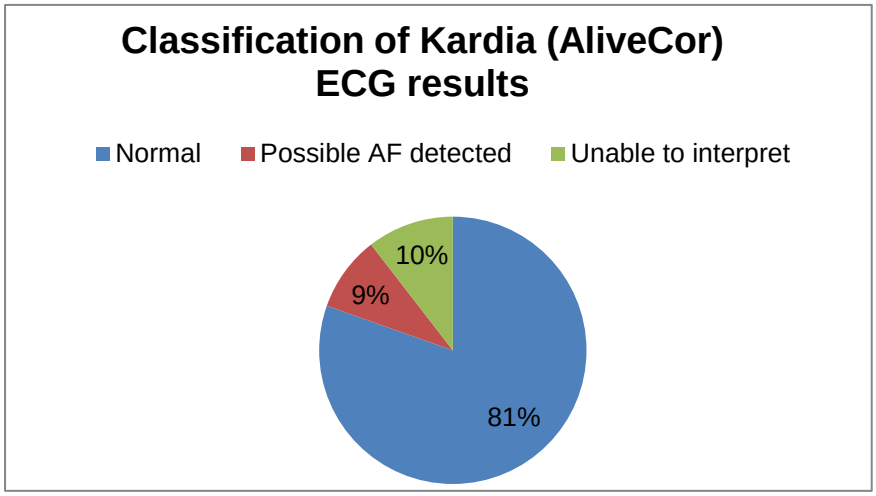


Figure 4: Kardia ECG results

Table 2 describes the outcome measures we in our project. The primary outcomes being the number of people identified with AF. This was 15 patients equating to 2.5% of participants. None of these patients had a poor symptom burden with the average EHRA score of 2 (mild symptoms).

Table 2: Process and Outcome measures: Final results

Outcome measures	
Total number of MURs completed	**591**
Primary outcomes	
Number of patients identified with newly diagnosed AF	10
Number of patients identified with previous AF and not anticoagulated	5
Number of patients identified with new AF and poor symptom burden	0
Number of patients identified with previous AF and poor symptom burden	3
Secondary Outcomes	
Number of patients with AF and HR below 60bpm or above 100bpm	13
Number of patients with anticoagulation started	10
Number of patients with optimisation to medication	7
Process measures	
Number of AF MURs completed	591
Number of referrals generated	92
Number of patients referred with possible AF detected on ECG	26
Number of patients referred with previous AF (plus normal/possible AF on ECG)	21
Number of patients referred that have then called for clinic	26
Number of unable to interpret ECGs	62
Number of unable to interpret ECGs with AF subsequently identified	0
Number of patients referred to GP for other abnormality detected in ECG	5
Number of patients declining treatment	6

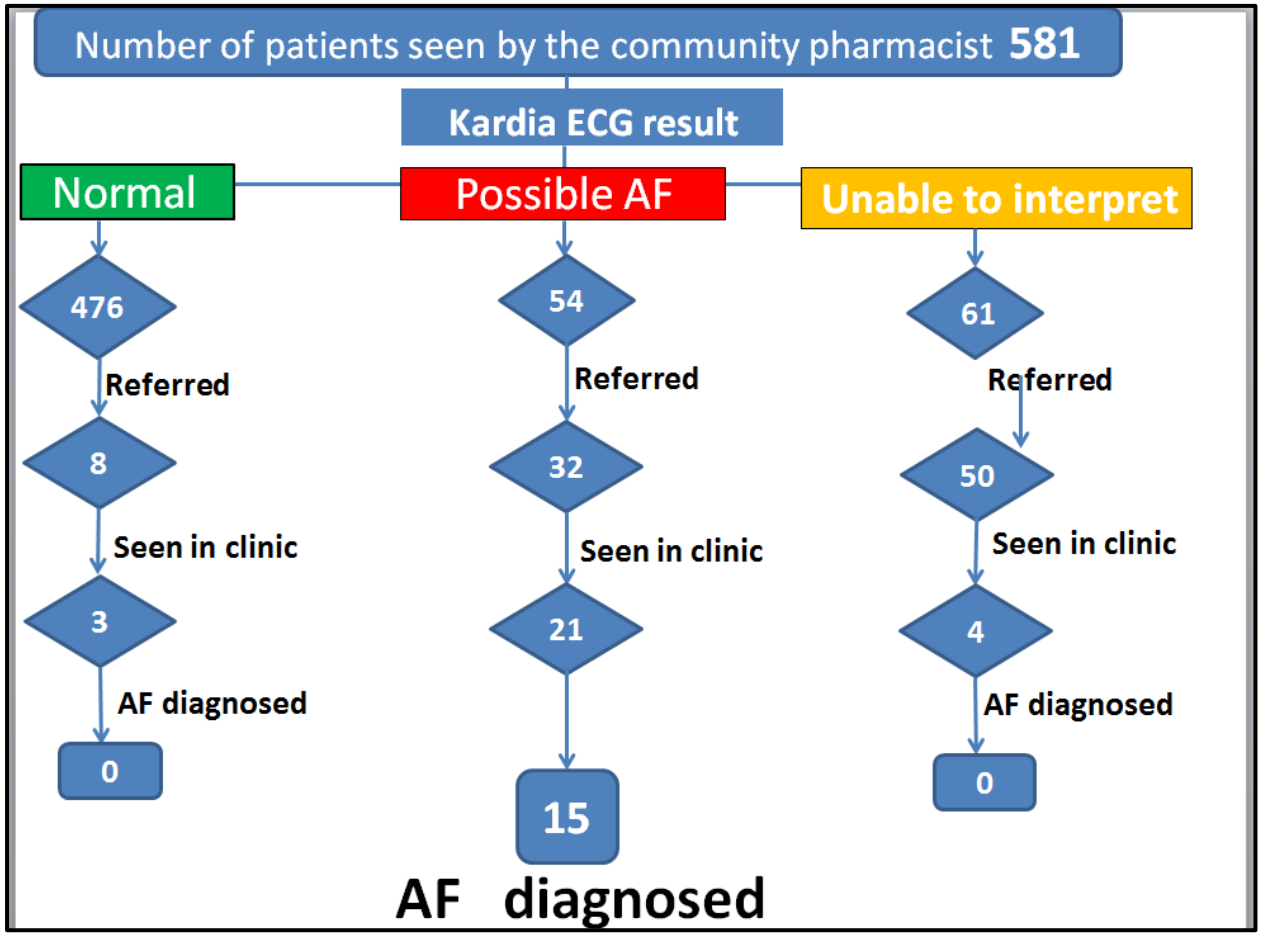


Figure 5: Flow chart showing patient ECG results and subsequent AF identification

Analysis of results:

Possible AF ECGs

54 (9%) of patients had possible AF detected on their ECG reading. 32(59%) were referred to Harefield Hospital. The other 22 patients were well controlled with anticoagulation therefore no referral was generated. From 32 patients, 21 were suitable for referral after review by the cardiologist. For the 11 patients that did not require referral 3 patients were already under the care of the cardiologist and were either not suitable for anticoagulation or were having further investigations, 8 patients had incorrect information entered by the pharmacist. 15 of the 21 patients seen in clinic were diagnosed with AF. The other 6 patients were ruled out of having AF after examination and testing but all showing some other rhythm abnormality.

Table 3 below shows further details of the results of the patients seen in clinic with Kardia ECGs showing possible AF.

Clinic results.docx

Unable to interpret ECGs

61 (10%) of the ECGs have been reported as unable to be interpreted. We have reviewed these ECGs and 57 did not require referral to HH. Out of these 57 all patients were in sinus rhythm with slight abnormalities in their ECGs such as atrial/ventricular ectopics. 4 patients were invited to clinic where the Kardia ECG results were not clear. For all 4 patients the 12 lead ECGs showed sinus rhythm. In some cases we informed the GP of these results. There was one patient who we would have liked to see in clinic who had atrial tachycardia (a precursor of AF) but this patient declined. Interestingly 28 out of 61 patients (46%) had a heart rate below 100bpm or above 100bpm.

Table 4 below outlines the unable to interpret ECGs and the reasons for this result:

Unable to interpret ECG results.docx

Normal ECGs

As expected the majority 476 (81%) of patients had a normal ECG. Out of these 17 (3.6%) had a previous diagnosis of AF, 9 of which were referred as they were not anticoagulated (the other 8 patients were anticoagulated with mild or no symptoms). We contacted these 8 patients for further information and 6 were under the care of a cardiologist and had been investigated. 5 of these could not tolerate anticoagulation and one patient had a recent ablation and had remained AF free since. One patient was already taking rivaroxaban. One patient was called into clinic as there was a possibility of PAF. Tests in clinic did not reveal any evidence of AF.

Robustness of the data

The data has been accessed from the PharmOutcomes website which the pharmacists have been using to record their AF MURs. The raw data that is directly inputted by the pharmacists as they are completing the MUR is then converted into an excel spreadsheet to review and therefore is very easy to access and reliable as the potential for errors in data manipulation is minimised. Although this is generally of a high quality it does depend on the pharmacists inputting the data correctly into PharmOutcomes. There have been several instances as described above where the information entered by the pharmacist does not align with the information given by the patient when spoken to on the phone or in clinic. There are several reasons for this. Often the patient does not divulge all the information to the pharmacists. Sometimes the pharmacist has not correctly extracted all the information from the patient or there is a time limitation. In 4 situations, the patient themselves did not believe themselves to have AF, but rather an ‘irregular rhythm’. Hence, the patients’ understanding of their own diagnosis is paramount. Taking this forward, the training of pharmacists can be adapted in order to meet these needs, improve extraction of information and prevent unnecessary referrals. Encouragingly none of the patients with unable to be interpreted ECGs were found to have AF, validating the specificity of the

Kardia ECG. In terms of sensitivity of the machine, 6 patients found to have AF on the Kardia machine were not found to have AF after further examination. This could be due to a possibility of paroxysmal AF. One patient found to be in sinus rhythm in clinic, was found to be in AF at 3 month follow up confirming the paroxysmal nature of his AF. Therefore we need to ensure patients who present in this way are followed up regularly.

Baseline numbers and quality of data:

As we achieved a total of 591 MURs the quality data is thorough and robust. We have lots of information on patient demographics, history, quality of life and EHRA has been used to determine patient progress and satisfaction. By completing this many MURs it also allows to be able to understand trends and any important changes we would make to the system in the future.

Timeliness of data

PharmOutcomes can be accessed anytime and the inputted information can be reviewed instantly. The time between pharmacists entering the data has been very quick with the majority entered within 24 hours. We reviewed the entries on a bi-weekly basis and any patients that required referral to Harefield Hospital were contacted first. Out of the 25 patients seen in clinic 17 (68%) were seen within 2 weeks.

Adjustments made to the outcome measures:

Our outcomes measures were amended to reflect the importance of new AF diagnosis and anticoagulation. Therefore our primary outcomes were amended to:

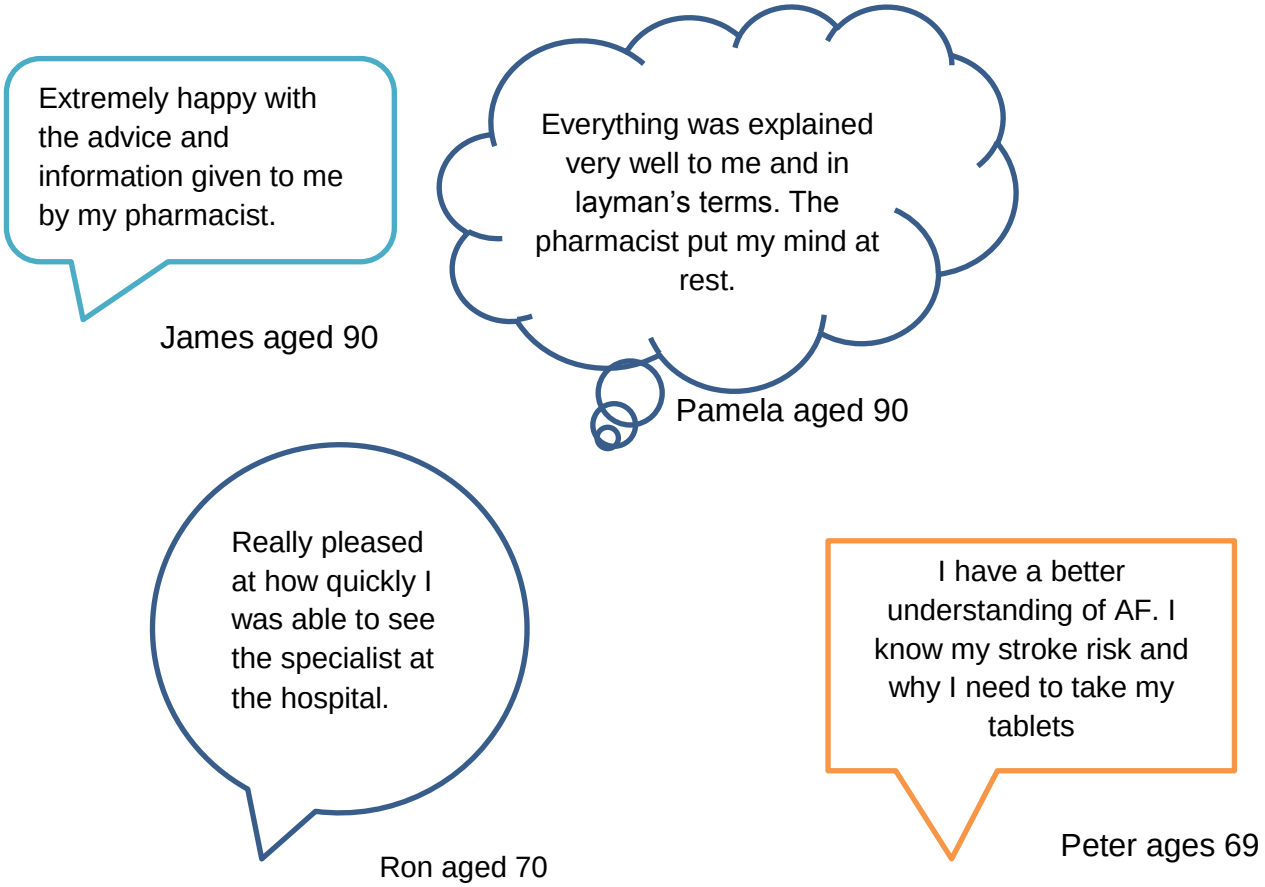
1. Number of newly diagnosed AF
2. Number of newly diagnosed AF with poor symptom burden
3. Number of newly diagnosed AF with no symptoms (i.e. the impact of silent AF)

We did not have many patients with previously diagnosed AF who were anticoagulated with poor symptom burden and we found that all patients who were previously diagnosed AF and not anticoagulated were being followed up by cardiologist.

One of the other outcomes measures the number of patients with HR below 60 or above 100bpm. For those patients with possible AF we were able to address in clinic if the patients were bradycardic or tachycardic. However a large number of the unable to interpret ECGs patients (46%) had heart rates out of range. We were unable to address these with the resources that we had and also as our study was focused on AF detection treatment we felt this was out of the remit of the project. Any patients with significantly high or low heart rates were contacted by phone and if it seemed appropriate we would advise them to see their GP. This process could be amended so that any of these patients can be referred directly to their GP.

Impact seen to date:

- 15 patients have been diagnosed with atrial fibrillation. Majority of these patients had no symptoms/minor (average EHRA score 2) and may never have been diagnosed had it not been for their local pharmacy providing this service.
- Out of these 15 patients, 11 are now anticoagulated reducing the risk of stroke by two thirds.
- All patients have been provided with clear, extensive information to allow them to make an informed decision regarding their treatment options.
- 5 of these patients had their medications optimised to improve/adjust their heart rate control
- 3 patients have had interventional treatments carried out such as ablation/cardioversion increasing patient access to alternative treatment options.
- 68% of patients were seen at a specialist centre within 2 weeks of the community pharmacist undertaking the ECG.
- All but one patient has been seen within one month facilitating early referral, optimisation and treatment of patients within a specialist arrhythmia service.
- The impact to the patients regarding their understanding of their condition. Comments as follows:



- The comments from the community pharmacist and the impact to them are shown below:


Patients have been really grateful for the service that has been provided


Quick and simple process


Really enjoying the clinical side


We have gained links with the hospital pharmacist


Have learned about AF and the treatment options available

Part 3: Cost impact

- The primary costs are summarised and explained in table 5 below and relate to delivering of this service including personnel involved, cost of equipment, reimbursement to the community pharmacist and training and education. The cost estimated is for the first year of delivery.

- The summary below does not take into account the intangible costs of a stroke such as psychological burden for the patient and their family.

- The hospital based costs (such as cost of a 12 lead ECG) is provided by the trust finance team.

- Not all patients will be offered a cardioversion or ablation and this may potentially not be within the first year of diagnosis.

- Initially we had intended for a nurse to lead the AF clinics, however since being in clinic, I believe that the pharmacist is important in terms of anticoagulation counselling and advice and being a prescriber I have been able to provide a prescription for this. In addition, I feel that having myself as a pharmacist linking with the community pharmacists has worked extremely well and would benefit the service as a whole. Therefore going forward, we would strongly advise there to be a pharmacist of significant experience to organise and plan this service in other areas.

This HEC (Health Economic Consultants) report undertook a retrospective health economics analysis of the cost-effectiveness and implications related to opportunistic AF screening in primary care based on a series of assumptions and modelling estimations. With this intervention at least 2 strokes per every 10 newly identified AF cases can be avoided. Assuming that these potential patients were unaware of their condition before the opportunistic AF screening these can be translated to extra money spend to yield higher longevity and additional health benefits regarding quality-adjusted-life-years.

Table 5: Cost of service delivery for the first year based on NICE estimation cost template

Input	Estimated time / cost
Cost of clinical staff (required to review ECGs, call patients where necessary, refer to Harefield Hospital and book clinic appointment, see the patient in clinic, three month telephone follow-up)	1.5 hours per patient identified Band 7 nurse = £42.87 Band 8a pharmacist= £51.25
Cost of administration staff (write letters, book appointments)	1 hour per patient at Band 4 level = £16.57
Reimbursement to community pharmacist for undertaking MUR	30mins on average at £12 per patient
Cost of portable ECG device	£0.3 per patient (if average of 300 patients seen per year)
Cost of 1st clinic appointment	£187.43 per patient
Cost of follow-up appointment (6 months)	£102.00 per patient
Cost of 12 lead ECG	£27.37 (x 3) = £82.11
Cost of ECHO	£132.97
Cost of acquisition, monitoring and administration of medication	NOAC = £638.4 per patient (in case of Apixaban: £53.20 per monthly treatment £46.60 per patient nurse time (total = £685) Warfarin = £41 per patient (accounting for 2/3rds well controlled and 1/3rd not well controlled) £242 per patient nurse time (total = £283)
Cost of an intervention therapy (cardioversion)	£965.31 per patient (approx. 60 patients referred, 10% DCCV, 10% ablation –average cost calculated)
Cost of training package	£.30 per patient (approx. - £18,000 cost of training package, 200 pharmacists trained up in 1st year each completing 300 MURs)
Upgrading of PharmOutcomes (Medicine Use Reviews and Reporting system)	£0.015 per patient (£50,000 cost nationally, 11,000 pharmacies, 300 patients per pharmacy)
Chances of Major Bleeding due to treatment	DOAC = 2.87% ≤ 0.5 (from the 13 newly confirmed AF cases) (Health Improvement Scotland, 2014) Warfarin = 3.57% ≤ 0.5 (from 13 newly confirmed AF cases) (Health Improvement Scotland, 2014)
Cost of treating a Major Bleeding incidence related to anticoagulant	£1171 per patient

Total average cost	**£1859.55** per patient who is identified with AF and anticoagulated (Warfarin) and sustains intervention therapy for the 1rst year **£2261.55** per patient who is identified with AF and anticoagulated (NOACS) and sustains intervention therapy for the 1rst year

Table 6: Each healthy patient tested costs:

Input	Estimated time / cost
Reimbursement to community pharmacist for undertaking MUR	30mins on average at £12 per patient
Cost of portable ECG device	£0.3 per patient (if average of 300 patients seen per year)
Cost of training package	£.30 per patient (approx. - £18,000 cost of training package, 200 pharmacists trained up in 1st year each completing 300 MURs)
Upgrading of PharmOutcomes (Medicine Use Reviews and Reporting system)	£0.015 per patient (£50,000 cost nationally, 11,000 pharmacies, 300 patients per pharmacy)
Total average cost	**£ 12.32**

Table 7: Each false positive case costs the system:

Input	Estimated time / cost
Cost of clinical staff (required to review ECGs, call patients where necessary, refer to Harefield Hospital and book clinic appointment, see the patient in clinic)	1.5 hours per patient referred Band 7 nurse = £42.87 Band 8a pharmacist= £51.25
Cost of administration staff (write letters, book appointments)	1 hour per patient at Band 4 level = £16.57
Reimbursement to community pharmacist for undertaking MUR	30mins on average at £12 per patient
Cost of portable ECG device	£0.3 per patient (if average of 300 patients seen per year)
Cost of 1st clinic appointment	£187.43 per patient
Cost of 12 lead ECG	£27.37
Cost of ECHO	£132.97
Cost of training package	£.30 per patient (approx. - £18,000 cost of training package, 200 pharmacists trained up in 1st year each completing 300 MURs)
Upgrading of PharmOutcomes (Medicine Use Reviews and Reporting system)	£0.015 per patient (£50,000 cost nationally, 11,000 pharmacies, 300 patients per pharmacy)
Total average cost	**£471.14**

Figure 6 is a diagrammatic representation of costs savings due to stroke prevention. This is explained in detail below.

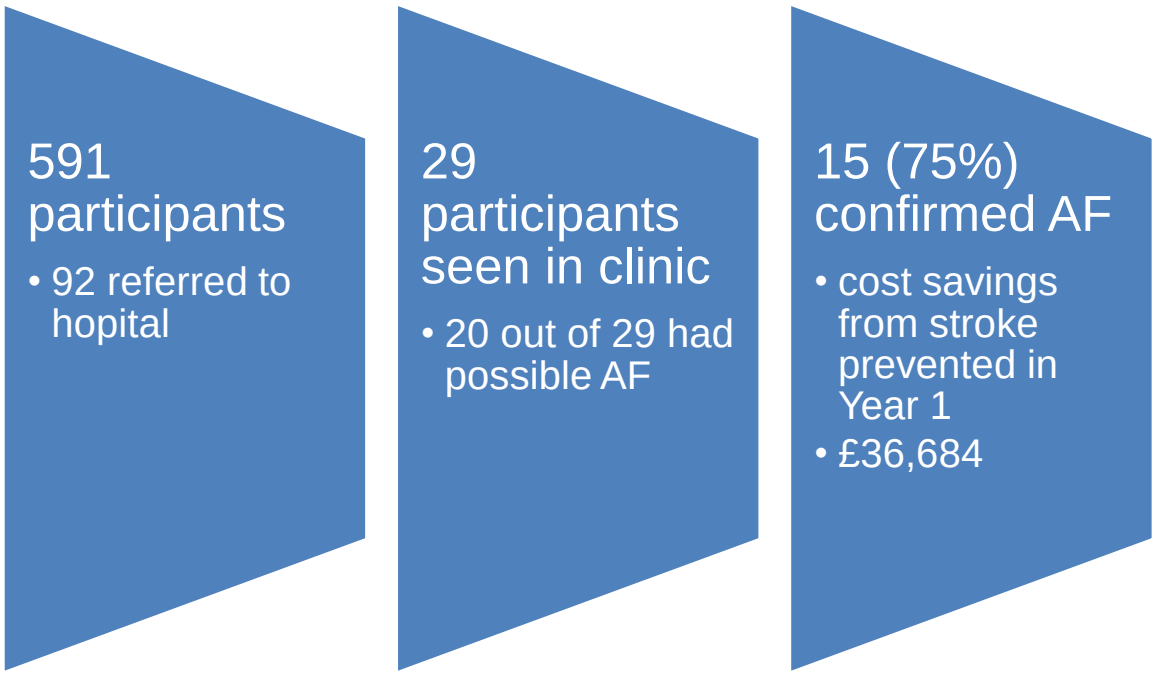


Figure 6: Cost savings diagram

Based on the PharmOutcomes excel file, **591** participants were examined by **10** pharmacy practices (**24** pharmacists). **92 out of 592 (15.54%)** participants that tested were referred to the hospital, but only **29 (31.5%)** of them were seen in the clinic**. 51 out of the 92 (55.43%)** were referred due to "unable to be interpreted" ECG. **15 out of 20 (75%)** patients that are seen in the clinic after a referral as "potential AF" cases where verified to suffer from. Assuming that these patients were previously unaware of their condition and were healthy (ceteris paribus) they had 10% risk of stroke according to CHA_2DS_2 – VASC Score, and 20% risk according to Chiuve et al. (2008). As a result, 2-3 of them could suffer a potential stroke incidence. The cost savings from the newly discovered condition can be **4 x £12,228** (cost of treating a stroke for the 1^{rst} year) = **£48, 912**
The **5 (5 out of 20 that referred = 25% or 5 cases for every 15 confirmed = 33%)** false positive cases cost the system 5 x £471.14 **= £ 2,355.55**

A cost benefit analysis (CBA) was carried out for the first year of service delivery comparing warfarin to the newer oral anticoagulants (DOACs). The figures below represent the costs of the service as calculated above and the cost of strokes.

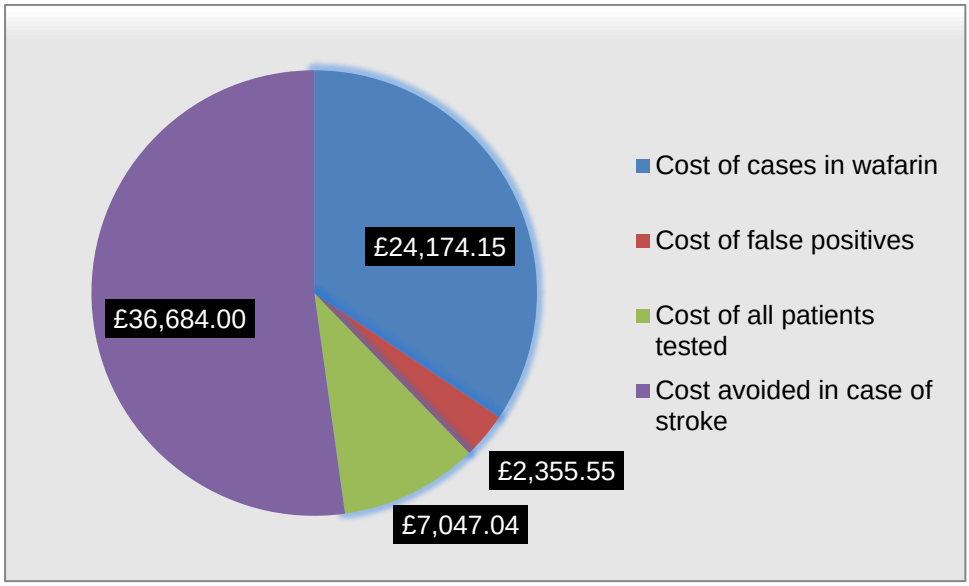


Figure 7: Diagrammatic representation of CBA in case of WARFARIN based on Table 6 values

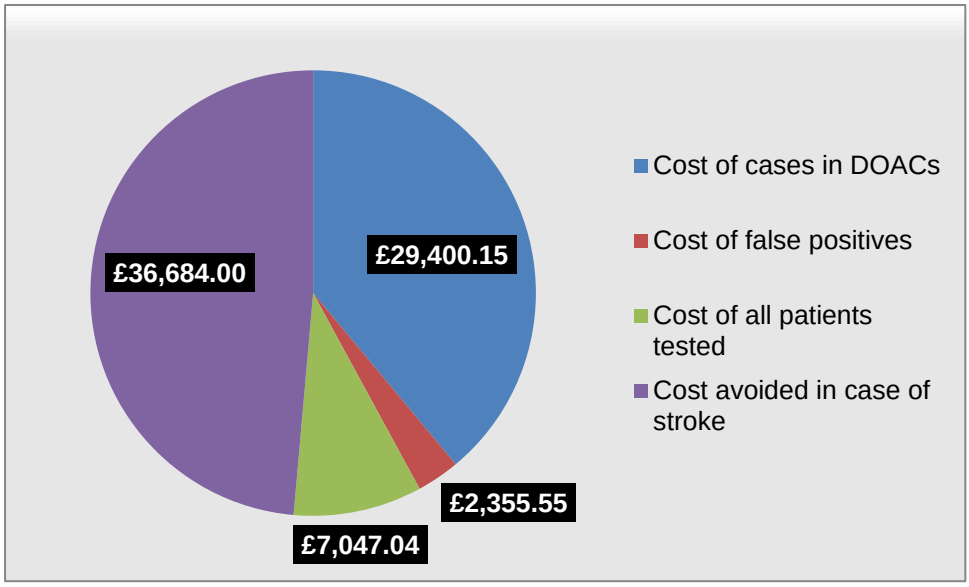


Figure 8: Diagrammatic representation of CBA in case of NOACS based on Table 6 values

The calculations below take into account the cost of service delivery including the cost of anticoagulation (warfarin versus DOACs) as depicted in the diagrams above compared against the savings from stroke prevention. This shows that in the first year of treatment there will be a net cost saving for a patient on warfarin and DOACs (even with the greater cost of the medication).

$$\boldsymbol{CB\ net\ benefit\ approach}_{\boldsymbol{Table\ 2\ Warfarin}} = (\text{Difference in Costs}) - (\text{Difference in Benefits}) = [(Confirmed\ cases\ Cases\ in\ Warfarin) + (Cost\ of\ false\ positive\ cases) + (Cost\ of\ all\ patients\ tested)] - [\text{Cost Avoided in case of stroke in the 1rst year from unidentified AF cases}] = [(15 * 1859.55\ ) + (5 * 471.14) + (572 * 12.32)] - (4 *\ 12228) = (\ 34519.17) - (36684) = |\mathbf{11,615.98}$$

Net Profit.

$$\boldsymbol{CB\ net\ benefit\ approach}_{\boldsymbol{Table\ 2\ NOACS}} = (\text{Difference in Costs}) - (\text{Difference in Benefits}) = [(Confirmed\ cases\ Cases\ in\ NOACS) + (Cost\ of\ false\ positive\ cases) + (Cost\ of\ all\ patients\ tested)] - [\text{Cost Avoided in case of stroke in the 1st year from unidentified AF cases}] = [(15 * 2261.55\ ) + (5 * 471.14) + (572 * 12.32)] - (4 *\ 12228) = (\ 34519.17) - (36684) == \mathbf{5,586.01}|$$

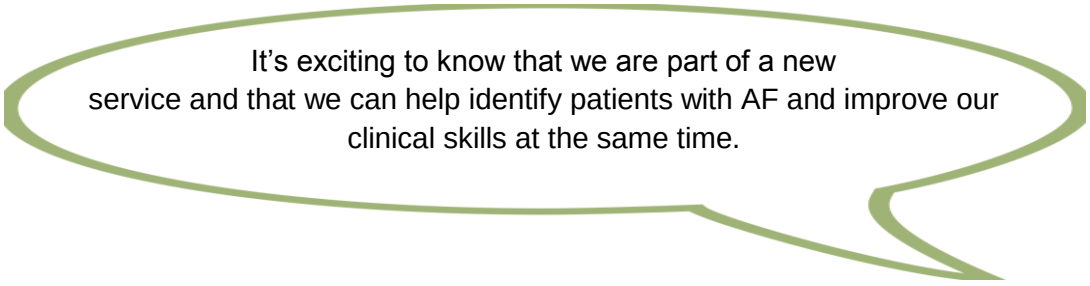
Net profit

Part 4: Learning from your project

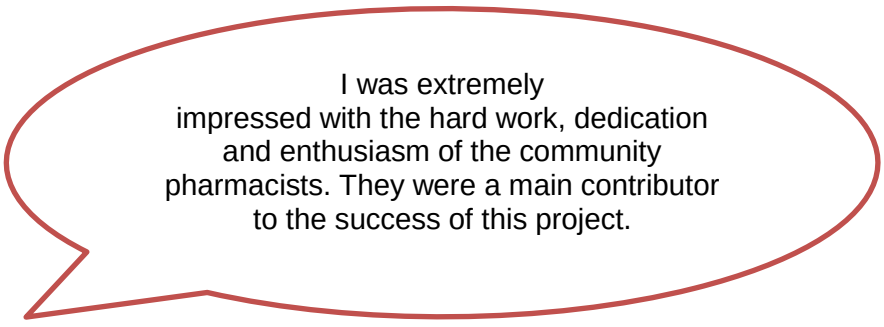
- **Did you achieve all of what you had hoped to achieve at the start of the project?**

The aims and objectives set out in 2015 have been met. Our success has mainly been due to the excellent relationships with our community pharmacists, the arrhythmia team and key stakeholders. Patients have also been willing and happy to take part in the project. The comments above can attest to this. Much of our success is down to the meticulous planning stage which involved ensuring that there was a simple and effective system for recording patient information and communication of that information. Also included in this is the promotional aspect. We approached the CCG in order to get the project advertised via their newsletter and raise the profile. We also produced eye catching and simple posters to promote the service. Once the service delivery began the results came through easily.

The community pharmacists were tremendous in their motivation and engagement with the project, without them this would not have been possible. I was in constant contact with the pharmacists, establishing an open and sound working relationship, providing updates and organising meetings. This proved to be instrumental in ensuring that the community pharmacists felt they were being updated and appreciated.



Community pharmacist



Wajid Hussain, Consultant cardiologist

The technology also proved to be ideal. Once set up, performing the ECG was straightforward and quick. This meant the patient did not feel it was too long and it was not an onerous process for the pharmacist.

I was surprised at how quick the whole process was! I put my fingers on the little metal plates and before I knew it the result flashed up!

Patient PE aged 69

Even for those patients that did not end up being diagnosed with AF, they were appreciative of the quick service and referral to Harefield Hospital.

It put my mind at rest to know there was nothing wrong with my heart except a few extra 'blips'.

Mrs JM, 67

- **Challenges and the things that didn't work out quite as planned:**

Once we had determined that the project was a success we decided to contact the local CCG as an initial meeting to present the results. I was enthusiastic about the meeting as I knew the project showed the importance of screening for AF and the excellent work of whole team involved. However, we had a lukewarm response from the CCG, with them initially requiring a cost impact analysis before going further. I personally disappointed with but am confident that with the health economist findings we will be able to approach them again with renewed vigour!

The lead arrhythmia nurse who had been approached by Sally initially also went on maternity leave at the same time. It was difficult to find another nurse to see these patients in clinic. Initially I was hoping that they would help to review the ECGs emailed by the pharmacists, but due to their lack of resources I was unable to find support for this. In the end one of the nurses helped to see patients in clinic. This meant that we didn't have nursing support as originally indicated in our budget setting. However, I feel I have gained in my personal learning and development as I have established links with the cardiologists, seen patients in clinic and written letters to GPs all of which I had no experience of before.

We had a quick referral from the community pharmacist straight to the ACT. However, this also meant that the GP was not involved in the patient referral. Although in most cases the GP was happy for us to diagnose and treat the patients in some instances their view would differ from ours. This begs the question as to whether the referral should be straight to secondary care or to the GP. Going forward the referral pathway will need to be reviewed and tailored to each specific area.

There were many more unable to be interpret ECGs then expected; encouragingly none of these were AF. Most of these we were able to confirm before calling the patient into clinic, there were some that needed clarification at clinic. This took up some time which was not factored in initially. Again, going forward this will need to be factored into staffing time or some other system for assessing these ECGs may be required.

We underestimated the timescale for data collection which meant that the follow up phase has been delayed and 6 month follow up data is incomplete.

In terms of the process I'm not sure I would do anything differently if I had to do the project again. For me, this was a learning process. Each barrier encountered resulted in some kind of learning or change. Regarding the outcome measures I would probably have simplified it slightly so that we were purely focusing on identifying new AF's rather than looking at symptom burden as well. In fact the majority of patients had very few or no symptoms at all, (Silent AF) so in terms of their quality of life there was little change from before and after treatment.

General advice I would give is:

- It is important to have a supportive and understanding team who you can feel comfortable approaching and will invest time and energy into the project.
- Take on other ideas and be flexible. Be willing to change for the benefit of the project as whole.
- Allocate specific time to the project rather than integrating it into your normal working day. This way you can keep on top of things.
- Be in constant contact with your stakeholders and provide regular updates. Keep up the motivation and continuity as often people can forget the purpose of their role.
- Promotion of the project is important. Get the information out on the trust website/facebook/twitter, newsletters, and conferences. Speak to anyone and everyone about it.
- There are times you will be frustrated by lack of progress or barriers. Keep at it, enlist some help, and talk to others.
- Use the help provided by Springfield Consultancy. Their advice is invaluable.

Part 5: Sustainability and spread

- **Will your intervention be sustained in your organisation beyond the funding period?**

No. Since primarily this a primary care led screening service, reimbursement to pharmacists, costs of medication and equipment will need to be organised through the CCG. The CCG will also commission services from Harefield Hosptial (e.g clinic costs, interventional treatment) and therefore they need to be informed of these costs as well.

- **What are the biggest risks and challenges you face in embedding the innovation into routine practice? What progress have you made to date and how are you planning to overcome them in the future?**

A big risk is if the CCG decide not to fund this innovation. The challenge is to get them to invest in this climate where every penny matters. We have attended a Hillingdon CCG meeting and provided them with the results. As mentioned before they would like us to present them with a cost impact model. Using the report from the Health Economist, the aim is to create a robust costing template where each CCG can input their specific population figures to determine the cost effectiveness for them we can use this to show the benefit of the service to the area. Already using the CBA we have shown a net profit.

The Atrial Fibrillation Association (AFA) is supporting the study and will use it to showcase the importance of AF screening. In the future we aim to include this as a case study in the Pan London AF toolkit. The British Heart Foundation has also been approached and we have links with the Academic Health Science Network. The AHSN network focus on improving the health of communities with AF being high on their agenda.

- **Do you plan to spread this innovation beyond the Innovating for Improvement award department or site?**

Yes, we would initially start by approaching other centres that we have links with, staring with Hillingdon and then spreading to other local areas such as Luton. The other option would be to start this as a pan London initiative and grow from there. This is similar to how pharmacy ‘flu’ clinics were initiated. We have links with the Pan London Atrial Fibrillation Network which could help us do this. At the moment there is a big drive to set up a London wide AF toolkit. The Pan London AF Network is looking for examples of best practice and this project is something that could easily fit in that category.

Our project is easily replicable. The Kardia monitor can be easily purchased and is quick to set up. Very little training is required for this. Each and every community pharmacist has access to PharmOutcomes and can be trained on how to complete the MUR with little input as they are used to using this system. The email referral

works very well and is timely, robust and effective. The difference will in where the referral is sent. At our trust we have a ready set up specialist arrhythmia clinic ideal for these patients. Other trust may not have this. Other areas may have specialist GPs or practice based pharmacists that could take this on. The flexibility of this service is integral to its sustainability.

In order to support this activity beyond the funding period we will require further funding and we will be requesting this from The Health Foundation through the online application. We will require resources to fund the project lead to ensure:

- The project is promoted and set up in other areas.
- To co-ordinate a Capture AF specific training package collaborating with the CPPE including the cost of setting up a training package.
- To train community pharmacists to be able to carry out the AF service and disseminate this training to other leads.
- To train and educate GPs and other health care professionals regarding the importance of AF detection and treatment.
- To publish these results in a journal which will promote the project and give it the recognition for full implementation.
- Adherence to medication – we have found during this process that many patients are very reluctant to start anticoagulation. GPs are also reluctant to prescribe it. We hope that the training package provided for the pharmacists will give them the skills to help empower patients and allow them to make the choices so that they will adhere to their medication. GP training is also important so that they are confident and happy with the advice given in hospital and support patients in this. If we are awarded further funding we will use the resources to create a robust standardised training package for pharmacists and other healthcare professionals.

- **What are some of the upcoming milestones/ activities beyond our funding?**
  - Renaming of the service to be called Capture AF. A slogan for this is being created. We feel branding the service will promote it further and people will automatically know what it is.
  - A video is underproduction which will be showcasing the work that has been done and have patient representatives on it. This is very exciting and we will be using this video as part of our pitch to the CCGs.
  - By April 2017 the 6 month follow up data will be completed and ready

- A training package is being looked at and a preliminary meeting with the CCPE has been arranged.
- Abstract has been submitted to the ESC with the final results.
- Application completed for the Chemist and Druggists excellence award
- Linking with the Local Pharmaceutical Committee

- **What external interest and recognition have you had on your innovation?**

At the moment, the UK National Screening Committee position is that AF screening should not be offered (report published in 2011). However, AFA believe this should be overturned and are asking for our data to submit to the UK SCN to overturn this stance.

- Stoke association have been in contact regarding an academic review of NHS atrial fibrillation pilots and would like the project to be included.
- The British Heart Foundation would like to help us with spreading this innovative service. The details of which they are to email us about.
- I have attended the Pan London AF meeting to engage with people at the forefront of AF detection and treatment.
- Royal Pharmaceutical Society have supported

- **If you have received any awards, spoken at conferences, been published or had media interest please include information here.**
  - Poster presented at the American Heart Association Conference, November 2016
  - Poster highly commended at the Trust Allied Health Professionals poster day
  - Case study won prize at the Heart Rhythm Congress and is included in the Healthcare pioneer's report 2017.
  - Case study included in the Long Term Conditions report by the Royal Pharmaceutical Society – commended for its work in engaging pharmacists in the improving management of long term conditions.
  - Spoken at the Cardiac Services Innovation conference in Oct 2016. Talk entitled: Enhanced medicines use reviews (MURs) to improve the detection and treatment of atrial fibrillation.
- Spoken at a GP study in November. Talk entitled: Improving the detection and

treatment of AF: The emerging role of the pharmacist.

- Abstract submitted at the Clinical Pharmacy Congress and 'Chemist and Druggists' excellence awards – yet to be informed of decision.
- Abstract submitted to the European Society of Cardiology – Yet to be informed of decision.

Appendix 1: Resources and appendices

ROYAL PHARMACEUTICAL SOCIETY England

CASE STUDY

EARLY DETECTION OF ATRIAL FIBRILLATION THROUGH 'ENHANCED' MEDICINES REVIEWS

Atrial fibrillation (AF) increases the risk of stroke, reduces quality of life, and increases morbidity and mortality.[42] A significant number of patients who have AF are asymptomatic, which often leads to a delay in diagnosis. Too often, AF is only detected when the patient presents with serious complications, such as a stroke. Anticoagulation reduces the risk of stroke, but data have shown that only around half of patients eligible for an anticoagulant actually receive one.[43]

Community pharmacists currently provide medicines use reviews to patients and are ideally situated to facilitate the diagnosis of AF.

The Royal Brompton and Harefield NHS Foundation Trust is currently running a programme to assess how the detection and treatment of AF can be improved via 'enhanced' medicines use reviews in community pharmacies.[44]

Ten community pharmacists are carrying out detailed medicines reviews for patients with risk factors for developing AF, for example high blood pressure or diabetes. In patients with existing AF, they are checking that they are receiving optimised treatment and are taking anticoagulants. As part of the consultation, the pharmacists are using a portable electrocardiography (ECG) device, called an AliveCor monitor, to detect AF.

Patients who are found to have undiagnosed AF, are not appropriately anticoagulated, have poor heart rate control, or have high symptom burden, will be referred to the Arrhythmia Care Team at Harefield Hospital, where they will be reviewed and offered individualised treatment.

Link to report: http://www.rpharms.com/promoting-pharmacy-pdfs/34.-long-term-conditions-report---web-version.pdf

http://www.heartrhythmalliance.org/files/files/afa/for-clinicians/170104-FINAL-Healthcare%20Pioneers%202017.pdf


Poster pdf.pdf


Case study - AF MUR Project.docx


Enhanced Atrial Fibrillation MUR Traini


Improving the detection and treatm


Invitation to Community Pharmacis


Heart rhythmn check - localpharma (2).pdf


AF MUR consent form -final.docx


Medicines management newslet


HEC AF study evaluation report 130