

# Screening and Optimising Stroke Prevention in Atrial Fibrillation (SOS-AF) project

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## **Abstract**

Atrial fibrillation (AF) is a growing worldwide health problem affecting 1-2% of the population. Patients with AF are at risk of cardioembolic stroke, which are often more severe compared to other stroke aetiologies, with a greater burden of disability, dementia and death. Without effective screening and prevention strategies, the burden of stroke will continue to rise on already stretched healthcare resources.

Anticoagulation is the only proven effective method to reduce an individual's stroke risk, however, due to the perceived increased risk of adverse complications many patients who benefit from anticoagulation do not receive it. This is highlighted by previous studies in optimising stroke prevention at Cambridge University Hospital from 2012 onwards which showed that nearly half the individuals admitted with AF in our area are not anticoagulated. In the second stage of our work, we showed that active screening in secondary care followed by collaborative communication with primary care led to more individuals being appropriately anticoagulated.

The SOS-AF project encompasses establishing a stroke prevention service based in Cambridge University Hospital. This specialist service, consisting of 2 stroke consultants, 1 registrar and 2 specialist nurses, would provide in-hospital screening for AF, initiate anticoagulation, provide specialist assessment and advice to primary and secondary care, and hold an outpatient service and an MDT to discuss stroke prevention with individuals with AF. SOS-AF will lead to increased anticoagulation rates in our region, as well as better patient understanding, and allow us to support our primary and secondary care colleagues with stroke prevention in AF.

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## Overall Goals and Objectives

### **Background**

Atrial fibrillation (AF) is the most common and clinically relevant cardiac arrhythmia which is particularly prevalent in the elderly population. It is estimated that 1.36 million individuals in the United Kingdom<sup>1</sup> and around 33.5 million people worldwide<sup>2</sup> have AF. However, these figures are likely gross under-estimations due to the absence of routine screening services to enable appropriate and timely detection.

AF-related or cardioembolic stroke is the most devastating complication of AF and accounts for at least 20% of ischaemic strokes. It is estimated that this rate increases to around 30-40% of ischaemic strokes in patients over 80. Cardioembolic strokes are often more severe compared to other stroke aetiologies, with a greater burden of disability, dementia and death.<sup>3</sup> This stroke subtype constitutes a disproportionate burden of the total cost of stroke, with a two-fold increase in median total healthcare costs compared to non-AF related stroke.<sup>4</sup> The prevalence of AF has been shown to increase with each decade of life beyond the age of 50 years, reaching almost 10% by the age of 80. Due to the ageing population, clinicians are therefore encountering more AF in both primary and secondary care. As the population becomes older, the number of individuals with AF is set to increase, inevitably resulting in cardioembolic stroke imposing a greater burden on patients, families and healthcare resources.<sup>5,6</sup> Stroke prevention strategies in AF can broadly be divided into detection of AF, increased awareness amongst patients and clinicians and prevention of stroke via appropriate therapeutic options.

As highlighted in national and international guidelines such as NICE guidelines, anticoagulation is the only effective treatment for stroke prevention in AF<sup>7</sup> and appropriate management of at-risk individuals could prevent 4500 strokes and 3000 deaths each year in the United Kingdom.<sup>8</sup> However, due to the perceived risk of complications from anticoagulation,<sup>9,10</sup> for example, unwanted gastrointestinal and intracerebral bleeding, low rates of anticoagulation use is seen, especially in the older patients where up to half do not receive anticoagulation.<sup>11,12</sup>

### **The scale of the problem in East of England**

Data provided by the Sentinel Stroke National Audit Programme (SSNAP) for the period 1 July 2013 to 30 June 2014, demonstrates that in the area covered by the East of England Strategic Clinical Network (SCN), 1,667 patients (22%) of all stroke admissions had a prior diagnosis of AF. Of these patients, prior to hospital admission for stroke, **56%** were not on anticoagulation. The estimated cost to the NHS for the first year of care for these patients is up to £19,837,300.

Previous work on optimising stroke prevention in patients with AF carried out by the Department of Stroke Medicine at Cambridge University Hospital highlighted suboptimal anticoagulation rates in the community and in secondary care and emphasised the need for an in-hospital stroke prevention team providing specialist anticoagulation advice to medical inpatient teams as well as local general practitioners.

## **Overall Goal**

We propose developing a secondary care-led service, called Screening and Optimising Stroke Prevention in Atrial Fibrillation (SOS-AF) which will provide the following services: active screening for AF in medical patients admitted to Cambridge University Hospital, risk stratification and initiating anticoagulation after balancing benefits and risks, providing advice and support for patients, supporting acute medical services in hospital and primary care colleagues by providing advice and by outpatient AF clinics and multidisciplinary team (MDT) meetings to review and discuss challenging cases.

## **Aligning with the focus of the RFP**

Prevention of cardioembolic stroke in the East of England, which is endorsed by policy makers within the local NHS, could help to improve patient outcomes and reduce the number of AF-related strokes. SOS-AF service will undoubtedly improve the quality of care available to patients with AF by introducing an effective approach to screening and anticoagulation of patients with AF at risk of stroke, implementing local guidelines, patient education, improved primary-secondary care working as well as highlighting the importance of stroke prevention in AF across the East of England.

Our vision in the Stroke Department, which is shared by colleagues involved in the AF pathway in the East of England, is:

*“No one with known AF should suffer an avoidable stroke”.*

## **Key objectives**

### *1) Improving detection of AF in secondary care*

Secondary care is often an under-utilised, but important place to screen individuals at high risk of cardioembolic stroke. The SOS-AF team would actively screen all medical admissions for AF with the strategy to use cost-effective methods for early diagnosis of AF.

### *2) Creating a liaison service for medical inpatient teams*

This would help improve awareness of clinicians about AF management with regards to stroke prevention and advocate the adherence to guidelines. We would be able to offer advice on cases where anticoagulation decisions are difficult or not clear cut.

### *3) Supporting and advising primary care on decisions regarding anticoagulation*

We would be able to support GPs, accept referrals, and facilitate communication between secondary and primary care to ensure at-risk individuals are appropriately anticoagulated.

### *4) Establish an outpatient stroke prevention service*

A clinic based service where individuals can be referred in from primary or secondary care to speak to a specialist with regards to weighing up a decision on anticoagulation. This would help improve the education of patients and their relatives about AF as well.

## Current Assessment of Need in Target Area

Currently, AF is managed in the community by general practitioners or in hospital by various inpatient teams. Within hospital, no central team exists to take ownership of anticoagulation decisions, which can sometimes lead to difficulties in managing patients who are frequently admitted, but scattered under the care of various medical teams at different times. Our local commissioning group is dedicated to increasing the detection of AF, patient and clinical education and development of pathways and clinics to help manage the condition. However, no such service geared towards stroke prevention exists within hospital or the surrounding area. The importance of AF in stroke prevention has made it a topical issue but many of the interventions designed to combat it have proven ineffective. Public engagement campaigns using poster, paper, and television advertisements to raise awareness of AF proved to be fruitless, with some studies showing a lower awareness of AF after publicity than prior to the campaign.

We believe that the Stroke Department in Cambridge University Hospitals is in the best position to take leadership on this important issue and support both primary and secondary care colleagues. Our department has a strong and established record working with various groups to highlight the need for optimising stroke prevention in AF over the last few years. This already includes a close working relationship with primary care, working with them to improve stroke care, screen for arrhythmias and improve stroke prevention in AF as a priority for future regional stroke management strategies.

### **Previous work on optimising AF-stroke prevention**

Our work to date has shown that anticoagulation rates in our region average around 50% with particularly poor rates of anticoagulation seen in patients with a new diagnosis of AF in the hospital. The first stage of our work in 2012-13 looked to identify the burden of AF in admissions to Cambridge University Hospital and assess the compliance with stroke prevention recommendations in patients identified with AF. The results, presented at the European Stroke Conference at Nice in May 2014, showed that around 40% of patients admitted to hospital with AF are not anticoagulated and only 38% of newly diagnosed AF patients were started on anticoagulation prior to discharge. What was clear when analysing the discharge letters was that there was a poor understanding in secondary care about the importance of stroke prevention in AF, and that the communication to the general practitioners about decisions regarding anticoagulation was unclear or non-existent.

In the second stage of our work, we carried out a prospective study on optimising stroke prevention within Cambridge University Hospital over 6 months between September 2014 and February 2015. This project involved 1 stroke consultant, 1 senior research nurse, 1 specialty registrar and 1 data management assistant. For 5 days a week, the team actively screened all medical admissions for AF within 24 hours of admission using their medical notes and ECG. For those patients confirmed to have AF who were not anticoagulated, a consultant and a specialist registrar reviewed their notes to assess an individual's appropriateness to receive anticoagulation. For patients that we felt are suitable for anticoagulation, a letter was sent to their general practitioner recommending consideration of anticoagulation, where they were then able to feedback to us a reason as to why anticoagulation was not started, if this was the case.

Over a 6-months period on a 5-day a week basis, a total of 847 patients were admitted to Cambridge University Hospital with AF as the main diagnosis or a comorbidity. Of these, 671 patients (79.2%) had an existing diagnosis of AF, and 176 (20.8%) were newly diagnosed during that admission. Of patients with known AF, only 56% were on anticoagulation at the time of admission. Of the remaining 44% who were not anticoagulated at the time of admission, and excluding those who died, 78% were still discharged from hospital without initiation of anticoagulation therapy. Furthermore, only 42% of newly diagnosed AF patients were started on anticoagulation at the time of discharge.

After reviewing the medical notes (no face to face contact with the patients and no influence on the treatment plan while the patient was in hospital), we identified 112 patients that could have been started on anticoagulation. We made individualised recommendation in writing to general practitioners based on patient’s stroke risk and other factors, and received a 91% response rate. **An additional 43 patients (38.4% of all letters sent) were started on anticoagulation.**

The anticoagulation rates seen in this study are similar to the results of previous AF screening studies carried out by our group in 2012 and 2015 at Cambridge University Hospitals. (Table 1) This suggests that more work needs to be done to ensure high risk AF patients are anticoagulated in hospital.

	Total AF in patients admitted to CUH	Known AF	Known AF on anticoagulation at admission (%)	New AF	New AF discharged anticoagulated (%)
November 2012	433	404	58.2	29	37.9
Jan-March 2014	690	597	51.1	93	37.6
Sep 2014 – Feb 2015	847	671	55.7	176	42.4

Table 1

### Main conclusions from our work to date

From our work to date, the following important conclusions can be reached:

- 1) The burden of AF is growing rapidly within the population of patients admitted acutely to secondary care: Cambridge University Hospitals admits around 1500 patients a month to general medicine and our results show that **11%** of these admissions had AF. This value is a stark contrast to the previous estimates of burden of AF on acute hospital admissions, which was reported to be around 3-6%.<sup>13,14</sup>

- 2) On average, 1 new AF per day was diagnosed during different stages of our work, equaling to 365 patients per year.
- 3) Patients admitted to hospitals are older with multiple comorbidities, which have high CHA<sub>2</sub>DS<sub>2</sub>VASc scores and are at very high risk of ischaemic stroke (median CHA<sub>2</sub>DS<sub>2</sub>VASc score of 4.4).
- 4) The older and frailer patients are at more risk of adverse effects from anticoagulation, making such decisions more challenging. This is illustrated through the fact that 15% of patients admitted with old or new AF died prior to discharge or were discharged to community palliative care.
- 5) Over the past 3 years, the rate of anticoagulation for AF patients in the community or in secondary care has not improved, as shown in Table 1, and demonstrated in national statistics.
- 6) At present, majority of patients discharged from hospitals with known AF or newly diagnosed AF are not anticoagulated and no discussions are held with patients regarding importance of stroke prevention.
- 7) The high response rate (91%) from general practice as seen in our recent study when prompted to consider anticoagulation in a letter suggests that primary care find specialist input and support valuable.

Clinicians tend to over-estimate the risk of adverse effects from anticoagulation<sup>15-17</sup> putting some patients at risk of cardioembolic stroke. From primary care feedback to our letters, the most common reason for not starting anticoagulation was patient preference against blood thinning medication. Similar studies have highlighted poor patient understanding of AF where 1 in 4 sufferers were unable to describe AF or their risk of stroke.<sup>18</sup> If individuals get an opportunity to discuss in detail the implications of AF and possible strategies to reduce their overall risk of stroke with a specialist, they are more likely to agree with appropriate treatment. This suggests that patient education raising awareness of the impact of AF and cardioembolic stroke is a key factor that may overcome poor anticoagulation prescription rates as well as poor therapy adherence rates.

Our service would provide both inpatient and outpatient advice in an environment where patients can carefully weigh up the decision to start anticoagulation, with the help of specialist input. Setting up a screening and stroke prevention service in hospital will not only improve the awareness of clinicians in primary and secondary care, but also can make sure that we can offer our expertise to this cohort of patients at high risk of stroke.

## Target Population

The SOS-AF service would initially target all medical patients admitted to Cambridge University Hospital. Every admitted patient has a 12-lead ECG, which is then screened for AF by a member of our team, so this screening is feasible and comes at no extra cost. Given the fact that the majority of patients that are admitted acutely to hospital are older and have a number of comorbidities (such as hypertension, diabetes and heart failure), they constitute a high risk group which is appropriate and cost-effective for systematic screening in this way and anticoagulation is likely to dramatically decrease rates of cardioembolic stroke.

Medical inpatients and patients attending clinic will have the opportunity to discuss the condition and methods of stroke prevention with specialist stroke clinicians, which will allow them to better weigh up the risks and benefits of starting anticoagulation therapy and make an informed decision. From our experience, this will increase anticoagulation prescription rates, likely promote better adherence to therapy and increase transparency on the part of the clinician due to clearer communication between healthcare professionals. The patients and primary care would feel more supported as they have a point of contact within the team for future discussions and advice.

We believe that the SOS-AF project is the stepping stone to delivering a coordinated regional strategy for AF-related stroke prevention in the East of England. It will be able to support both primary and secondary care in challenging decision making in AF patients and will act as a point of contact for patients as well. Better patient understanding of AF and their stroke risk will lead to a more empowered and health aware wider community in our region. SOS-AF will be the first AF-related stroke prevention team in the area and will set the gold-standard for other hospitals to follow.

## Project Design and Methods

### **Overall design**

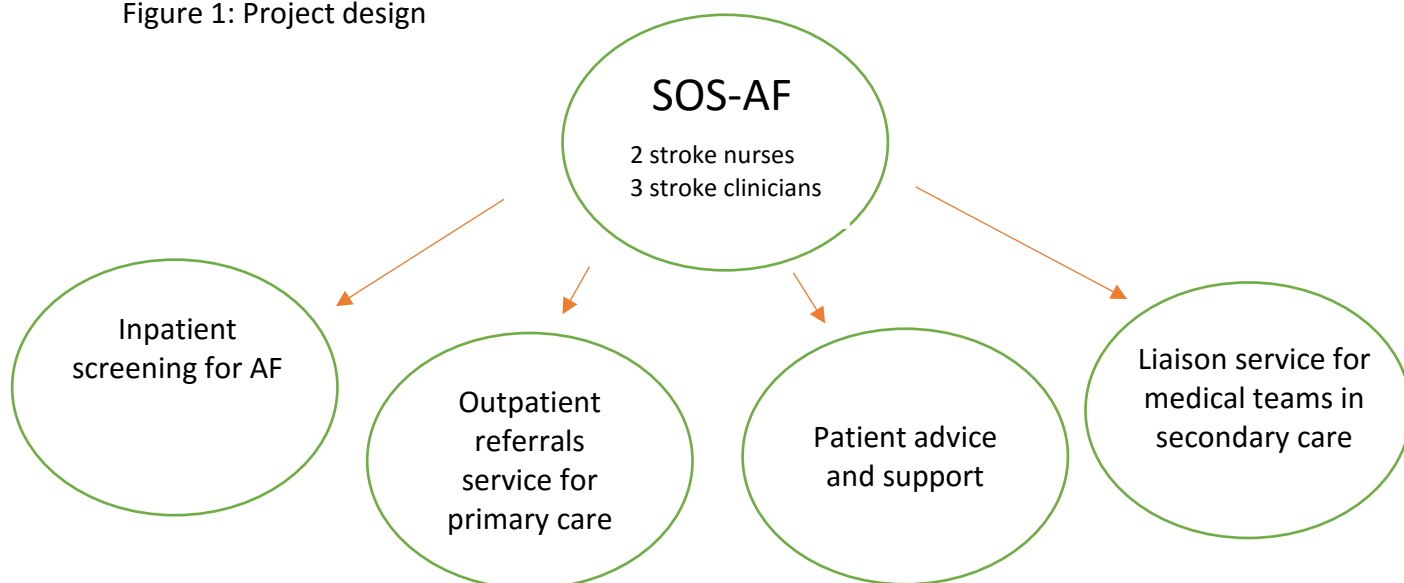
SOS-AF has the strong backing of the clinical leaders within the department and can utilise the experience of physicians and nurses skilled in service delivery and patient engagement.

The creation of the SOS-AF team builds on from a vast amount of work done regarding stroke prevention in AF by the Department of Stroke Medicine at Cambridge University Hospital. The SOS-AF team will consist of:

- 1) 2 consultants in Stroke Medicine
- 2) One specialty registrar in Stroke Medicine  
All 3 have a considerable amount of experience in stroke prevention in AF and have actively been working on our ongoing projects since 2012.
- 3) 2 experienced nurses: to facilitate screening, case finding for the MDT, patient education and communication with GPs, who will dedicate their time to the project, and will always be supported by senior medical staff.
- 4) 1 Data Management Assistant to ensure rigorous data collection and audit.



Figure 1: Project design



### **Patient engagement**

We recognise the importance of public engagement in projects such as SOS-AF. By organising appropriate follow up and good communication with primary care we will be able to measure patient engagement and adherence. Engaging with Arrhythmia Alliance and AF Association and feedback from individuals with regards to the effectiveness of the project will ensure public engagement. The department already has strong working relationship with such organisations, including the Stroke Association.

Research activities within our department have been awarded two public engagement prizes recently (at the Cambridge Science Festival and School of Clinical Medicine Research Day) and there is an active public engagement programme (Twitter, new public websites, blood pressure/heart rhythm screening for the general public, planned stroke education evenings).

### **Secondary and Primary Care engagement**

From our experience, secondary care physicians value a service that can advise them on stroke prevention measures in AF and SOS-AF service will be valued by our colleagues.

No similar service exists in our region and from our experience so far, it is clear that it could be helpful for some GPs to have support from secondary care stroke specialists in managing AF-related stroke prevention. Some CCGs in the region had previously provided a dedicated phone line or email address for GPs to ask secondary care clinicians questions regarding challenging anticoagulation decisions. However, it was noted that GPs who use the service often ask similar questions and so it was suggested that the production of a booklet of frequently asked questions might be beneficial for some GPs. This existing model however has minimal patient involvement and engagement.

## Evaluation Design

The project will deliver clear patient and service outcomes that can be measured in order to evaluate the project. We would create a database of patients who have been identified through screening which will include basic demographics, anticoagulation status, relevant medical history and CHA<sub>2</sub>DS<sub>2</sub>VASc score. Furthermore, the database would be a constant and easily modifiable source of anticoagulation decisions for each patient, alleviating the confusion created when a patient is re-admitted under another medical team.

### Evaluation measures

Such a powerful database will allow us to continually audit outcomes including:

- 1) Number of patients with AF admitted per month
- 2) Proportion of these patients which are new AF diagnoses
- 3) Anticoagulation status on admission and on discharge
- 4) Additional number of AF patients identified by screening
- 5) Number of referrals to the SOS-AF team from primary and secondary care
- 6) Number of patients seen in outpatient clinics
- 7) Number of patients discussed at MDT meetings
- 8) Number of patients that are truly not suitable for anticoagulation and the reason for this decision, which can be a guide for all clinicians looking after these patients in the future
- 9) Overall number of extra patients started on anticoagulation

### Oversight group consisting of stakeholders

We would form an **SOS -AF oversight group** consisting of patients/carers' representatives, (patients with AF and those who have had strokes due to AF), a GP Lead from the CCG, a representative from the anticoagulation services, a representative from the cardiology department, a pharmacist, and a representative from the department of medicine for the elderly.

This group could meet once each quarter to review how the project is progressing, advise on any governance issues and help disseminate good practice across the AHSN.

### e-Hospital

Cambridge University Hospitals NHS Foundation Trust has a strong commitment to facilitate deliverability and constant evaluation, in order to improve its service provision for our patients. As the first site in the UK to adopt e-Hospital, an entirely electronic hospital-wide records system, we are in a strong position to deliver innovative informatics gathering, integration, analysis and dissemination. The electronic system will allow easy screening of all admitted patients as well as keeping a permanent record of ECG tracings for future decision making. Furthermore, it makes it easier to assess an individual's stroke risk and compare it to the risk of adverse events from anticoagulation. Any such discussions or decisions made in hospital, in outpatient settings or the MDT meetings can be easily communicated and shared with primary care teams.

With the help of the e-hospital IT team, we would be able to create 2 important electronic tools:

- 1) A referral system for inpatient teams where the SOS-AF team can be reached from the click of a button. All communication letters with GPs can be scanned and uploaded so that a permanent record exists.
- 2) An “AF Discharge Tool” for every medical patient to prompt the clinical team to answer the question 'is this patient known or new AF?' which has to be answered before the discharge summary can be finalised. This will not only aid the teams to consider referral to our service, it will also encourage primary care to ensure that appropriate stroke prevention measures are instituted.

The e-Hospital system will facilitate the collection of outcome measures and metrics to evaluate the effectiveness of the SOS-AF project. Using this system, it would be possible to either follow-up individual patients to assess their long-term outcomes (ischaemic or haemorrhagic strokes, readmission, complication of anticoagulation) or to monitor the effects on a population basis by measuring the proportion of strokes due to AF being admitted.

#### **Quantifying amount of change**

In our most recent optimising stroke prevention project, we facilitated 43 (out of 112) individuals over 6 months being anticoagulated by liaising with GPs only using written communication. We envisage that if we actually directly engage with patients and families we would increase that number considerably. Based on the data from our work, we can extrapolate that:

- In 12 months, 273 extra inpatients would be appropriately anticoagulated. This means an increase of 13-14% in the rate of patients discharged from secondary care on anticoagulation.
- We expect large numbers of referrals to our clinic and MDT and also a large number of telephone advice from primary care, therefore, as a conservative estimate, at least extra 100 patients a year would potentially be optimised in terms of their stroke prevention in our region.

Starting anticoagulation on 373 patients with average CHA<sub>2</sub>DS<sub>2</sub>VASc score of 4.4 (with yearly stroke risk of 4% to 6.7%), will prevent at least 15 to 25 disabling cardioembolic strokes in a year.

The average cost for the first year after a cardioembolic stroke, is estimated at £11900, not including the long-term care costs and re-admissions. SOS-AF service can potentially save the CCG between £178500 to £297500 in the first year. When long-term effects of a disabling stroke on the patient and relatives is considered, in terms of lost productivity, long-term care, psychosocial effects etc., the potential savings will be much more significant.

### **Dissemination of results**

Our Department has an established record of sharing its experiences and results of various research and service delivery projects in different regional, national and international meetings and conferences.

The outcome of SOS-AF project will be fed back directly to CCG with a view to continue this service in the future. It will also be shared with colleagues at different levels:

- Departmental and divisional governance meetings
- Department of Medicine meetings
- Local meetings (CCG, AHSN, SCN, East of England Stroke Forum)
- National (UK Stroke Forum) and international conferences (European Stroke Conference)

In addition to healthcare professionals, we will engage patient representatives at these meetings as well as our public engagement initiatives with the Stroke Association. Our work carried out in optimising stroke prevention has been presented and published internationally at both the European Stroke Conference and European Stroke Organisation Conference.

### **Work Plan and Deliverability Schedule**

As we have been working on different projects on stroke prevention in AF as described, much of the personnel and experience is already in place, therefore a start date of January 2017 will be feasible. The clinic space required to provide the outpatient service is abundant in R3, Clinical Neurosciences at Cambridge University Hospitals, where the current stroke clinics and neurovascular clinics already take place. We would need to employ 2 stroke prevention nurses and provide them with 2 weeks intensive training and employ 1 data management assistant as previously detailed. We will provide general practices information about the SOS-AF service and how to refer. To promote the service in the hospital, we will use posters, e-mails, intranet, newsletters and events such as grand round (weekly) and medical morning report (daily).

### **Work plan**

The plan will include screening for AF on all medical admission seven days a week by 2 dedicated stroke prevention nurses. They would be able to accurately risk stratify all admitted patients with AF and have a discussion with these individuals while they are in hospital with regards to starting anticoagulation if it was felt appropriate and after discussion with direct-care team. Face to face contact with patients from specialists within the SOS-AF team will allow better patient education both as inpatients and using the outpatient service. This will further be strengthened by provision of leaflets and links to online material. For more complicated cases, we will hold 2 outpatient clinics and 2 MDT meetings a month, held on alternate weeks. The abundance of individual information that can be gathered from e-hospital will allow a holistic approach to anticoagulation decisions when being discussed at MDT. It will also allow easy discussions with other teams such as haematology and cardiology to seek advice on the more challenging cases.

## Deliverability Schedule

Stage 1: SOS-AF team members	Deliverability time frame
2 Stroke Consultants	Already in place
1 Stroke Specialty registrar	Already in place
2 Stroke Nurses	December 2016, recruitment 2-4 weeks
- Training	2 weeks
1 Data Management Assistant	December 2016, recruitment 2-4 weeks
- Training	1-2 weeks
Stage 2: Service provision	
Liaising with primary care and secondary care teams	November-December 2016
Liaising with patient groups	November-December 2016
Advertising SOS-AF service	November-December 2016
e-hospital inpatient referral system	December 2016, 2-3 weeks
Sourcing clinic/MDT space	Already in place

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