Atrial Fibrillation Screening in General Practice

National Stroke Programme

HSE Clinical Strategy and Programmes Directorate

Atrial Fibrillation Screening in General Practice

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HSE Atrial Fibrillation Project Team

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Executive Summary

Background

Atrial fibrillation (AF) is a common cardiac rhythm disturbance and increases in prevalence with advancing age. In Ireland, the population 65 years and over is increasing at the rate of 4% annually. The Central Statistics Office is predicting that over 65's will represent between 21.5 and 27.9% of the population in 2046. As a result AF is a growing public health concern.

The causes of AF are multifactorial and it can be difficult for clinicians to manage as AF symptoms can range from non-existent to severe. Admission to hospital can be frequent and haemodynamic abnormalities and thromboembolic events related to AF result in significant morbidity and mortality. AF is associated with a five-fold increased risk of stroke and stroke risk increases with age. AF related stroke is likely to be more severe than non-AF related stroke. AF is also associated with a three-fold risk of heart failure and two-fold increased risk of both dementia and mortality.

Diagnosing AF is based on confirmation by an electrocardiogram (ECG) of an irregular rhythm interpreted by the clinician as AF. After diagnosis, treatment of AF includes a number of options which can include pharmaceutical agents, medical procedures and lifestyle changes. A recognised priority for the prevention of stroke is diagnosing AF before the first complications occur. The European Society of Cardiology, in their 2012 update that focused on the management of atrial fibrillation, recommended that in patients aged 65 years or over, opportunistic screening for AF by pulse palpation, followed by a recording of an ECG to verify diagnosis, should be considered for the early detection of AF.

'*Changing Cardiovascular Health*' identified as a priority for the Irish Health System the prevention of stroke in primary care. The policy noted that the detection and management of elevated blood pressure and anti-thrombotic therapy for those with AF were of particular relevance for the prevention of stroke. In addition, the policy stated that improved detection of AF and anti-coagulation could be achieved by developing structured systems between primary care and the hospital setting. The HSE National Stroke Programme prioritised stroke prevention as a leading objective. An Atrial Fibrillation/Stroke Prevention Working Group was convened to implement a programme of opportunistic screening for AF in two geographic areas and to carry out a formal evaluation.

Methodology

This was a multi-site prospective observational study and was a partnership between primary and secondary care providers. Secondary care centres were selected and Galway University Hospital and Sligo Regional Hospital were the successful sites following an application process. Each centre was incentivised to provide open access to General Practitioners (GPs) for cardiology diagnostics, cardiology clinic appointments and clinical advice via telephone.

All GPs in Galway and Sligo/Leitrim were invited to participate and the process involved GPs screening, via pulse palpation, all patients 65 years of age and older attending the practice, over a period of 6 months, to identify new cases of AF. When an irregular pulse was detected, an ECG was performed and if this confirmed AF the patient was invited to participate in the study. Informed consent was obtained from all participants. GPs were provided with copies of the HSE Atrial Fibrillation Care Pathway that was developed by the National Stroke Programme Atrial Fibrillation Steering Group in 2012/2013. Each GP practice was provided with an MS Excel based data collection tool in which they recorded demographic data on each patient screened and the care pathway of all participants. The GP then returned this anonymised dataset at the end of the study. An education programme was provided in Galway and Sligo in December 2013 with representatives from 35 GP practices attending.

Key Messages

- This is the first study of opportunistic Atrial Fibrillation Screening in General Practice where a choice of treatment options for patients diagnosed with AF were available.

- The findings reinforce the utility of opportunistic screening for AF even in rural populations.

- 7,262 patients over 65 years were screened in the six months 1st January to 30th June 2014. The prevalence of AF in the study population during the study was 10.9% or 220/1,000 over 65 years/year. This is higher than reported in other Irish populations - TILDA reported a prevalence rate of 5.3%.

- There were fifty five new cases of AF detected, giving an incidence rate of 17/1,000 over 65 years/year. Forty-nine percent were male and the mean age was seventy-seven years.

- The cardiovascular risk factor profile in the population screened was:
    - Smoking: 8.9% with a significant difference between males (10.5%) and females (7.6%)
    - Alcohol: 55% consumed alcohol and, of these patients, 81% consumed less than 14 units per week, consumption was significantly higher among males (64% versus 47%)

- The cardiovascular risk factor profile of the new AF cases was:
    - BMI: Almost thirty-four percent were obese (BMI ≥ 30 Kg/m^2) and 69% of males and 81% of females were either overweight or obese.
    - Diabetes: The prevalence of diabetes was 25%.
    - Alcohol: 56% consumed alcohol and, of these patients, 77% consumed less than 14 units per week
    - Smoking: 5.7% were current smokers and all were female.
    - Blood pressure: 4% of patients had a systolic blood pressure reading of ≥150mmHg. Females had significantly higher average systolic blood pressure reading than males (132.9mmHg versus 123.7mmHg). 70% of patients had medical history of hypertension and 97% of these were prescribed some form of anti-hypertensive medication.

- The study shows that 95% of patients with newly diagnosed AF were at high enough risk of stroke to be considered for anticoagulation therapy. The prescribing of oral anticoagulation was high, indicating a positive change in practice, and evenly distributed between warfarin and the new oral anticoagulant agents.

- The wider implementation of opportunistic screening for AF in Primary Care should be considered in the context of:
    - the additional burden on general practice – additional ECGs, referral and patient follow up

- the additional burden on the hospital centre, in particular the cardiology service – 46% were referred for cardiac investigations

- Opportunistic screening for AF in general practice is cost effective in stroke prevention

Introduction

Atrial fibrillation (AF) is a common cardiac rhythm disturbance and increases in prevalence with advancing age. In Ireland, the population 65 years and over are increasing at the rate of 4% annually. The Central Statistics Office is predicting that over 65's will represent between 21.5 and 27.9% of the population in 2046[1]. As a result AF is a growing public health concern.

Prevalence data from the Irish Longitudinal Study on Ageing (TILDA) estimate that prevalence of AF is 3.2% of the total population aged over 50, 5.3% in the over 65's and almost 11% in those aged over 80 years old[2]. These proportions are an underestimate as they do not include patients in hospitals or long stay institutions at the time of the survey. Alarmingly, 40% of identified AF patients were unaware of their diagnosis at the time of the survey. AF is currently and will increasingly give rise to significant burden to our health system. In 2013, there were 8,894 discharges from hospital with a principal diagnosis of AF, while a further 33,926 were discharged for a different principal diagnosis but had AF recorded as a non-principal diagnosis.

The causes of AF are multifactorial and it can be difficult for clinicians to manage as AF symptoms can range from non-existent to severe[3]. Admission to hospital can be frequent and haemodynamic abnormalities and thromboembolic events related to AF result in significant morbidity and mortality. AF is associated with a 5-fold increased risk of stroke and stroke risk increases with age[4 5]. AF related stroke is likely to be more severe than non-AF related stroke[6]. AF is also associated with a 3-fold risk of heart failure[7 8 9] and 2-fold increased risk of both dementia[10] and mortality[5].

What is Atrial Fibrillation?

According to January et al[3], *"AF is a supraventricular tachyarrythmia with uncoordinated atrial activation and consequently ineffective atrial contraction. Electrocardiogram (ECG) characteristics include: 1) irregular R-R intervals (when atrioventricular conduction is present), 2 (absence of distinct repeating P waves, and 3) irregular atrial activity".* The clinical consequences of AF can result from a combination of the heart rate being too quick or too slow, loss of coordinated atrial contraction and variability from beat to beat in ventricular filling. The most common symptom of AF is fatigue but can also be manifested in patients in various ways ranging from no symptoms at all to palpitations, hypotension, dyspnoea, syncope or heart failure[11]. As already noted, AF is associated with an increased

risk of stroke and this is due to the formation of atrial thrombi which may migrate to the brain causing a stroke.

Atrial Fibrillation Classification

The European Society of Cardiology (ESC) (2010) distinguishes five types of AF based on presentation and duration of arrhythmia as noted below[12]. Classification of AF is important as outcomes of particular therapies are better for certain types of AF[13].

First diagnosed AF	• Every patient who presents with AF for the first time irrespective of the duration of the arrhythmia or the presence and severity of AF-related symptoms
Paroxysmal AF	• AF that terminates spontaneously, usually within 48 hours although AF paroxysms may continue for up to 7 days • After 48 hours the likelihood of spontaneous conversion is low and anticoagulation must be considered
Persistent AF	• Continuous AF that is sustained for more than 7 days or requires termination by cardioversion, either with drugs or by direct current cardioversion
Longstanding persistent AF	• Continuous AF of greater than 12 months duration • It is usually decided to adopt a rhythm control strategy at this stage
Permanent AF	• Permanent AF is said to exist when the presence of the arrhythmia is accepted by the patient and physician. • Rhythm control interventions, by definition, are not pursued in patients with permanent AF

Atrial Fibrillation Diagnosis

Diagnosing AF is based on confirmation by an electrocardiogram (ECG) of an irregular rhythm interpreted by the clinician as AF. The steps to diagnosis include any relevant clinical history (symptoms, prior treatment, family history etc.) and a physical examination based on the initial detection of an irregular pulse. Two dimensional transthoracic echocardiogram is a further investigation that may be used to detect any possible underlying heart disease, to assess cardiac function and to determine the size of the atria.

Atrial Fibrillation Treatment

After diagnosis, treatment of AF includes a number of options which can include pharmaceutical agents, medical procedures and lifestyle changes. The main goals of treating AF include:

- Preventing blood clots from forming – using oral anticoagulants. Appropriate treatment with oral anticoagulants has been shown to reduce the risk of stroke by almost 70% in a person with AF[14].
- Controlling heart rate which allows the ventricles to fill completely with blood using agents such as beta blockers, calcium channel blockers or digoxin. The underlying atrial fibrillation continues but symptoms can be improved.
- Controlling heart rhythm which allows the atria and ventricles to work together to efficiently pump blood around the body by using medication such as amiodarone or sotalol. Heart rhythm can also be controlled by some procedures such as cardioversion, catheter ablation or maze surgery.
- Treating any underlying disorder that may be causing or increasing the risk of AF

Screening for atrial fibrillation

A recognised priority for the prevention of stroke is diagnosing AF before the first complications occur[15]. Studies in patients with implanted devices and by Holter electrocardiograms in epidemiological studies reinforce the assumption that even short episodes of 'silent' AF suggest an increased risk for stroke[16 17]. The European Society of Cardiology in their 2012 focused update on the management of atrial fibrillation recommend that, in patients aged 65 years or over, opportunistic screening for AF by pulse palpation, followed by a recording of an ECG to verify diagnosis, should be considered for the early detection of AF (class of recommendation 1, level of evidence B)[18 19 20].

Utilisation of Anticoagulation Therapy in Ireland

While the association between AF and stroke and the reported benefits of anticoagulation therapy is well recognised, a large proportion of patients with AF remain undetected or untreated. The reported overall rate of treatment with anticoagulants in AF patients is approximately 31% which indicates a substantial under utilisation of anticoagulants in AF patients[21]. The North Dublin Population Stroke Study identified AF in 31% of all incident stroke patients of which 46% were newly diagnosed[22].Of those with pre-existing atrial fibrillation, 28% were on oral anticoagulants, 55% were on anti-platelet therapy and 17%

were on no treatment. An earlier study in general practice in Dublin by White et al also demonstrated an under utilisation of anticoagulation in patients with AF where one third of patients with AF could have been anticoagulated but were not[23]. In addition, the Irish National Audit of Stroke Care reported that 22% of 2,173 patients were known to have AF, of whom 26% were on warfarin, 57% were on anti-platelet therapy and 22% were on neither[24]. These studies reiterate previous findings in both hospitals and community based studies in Ireland. Internationally, many studies have reported similar findings[25].

In addition, international studies have found that various factors contribute to non-prescribing of anticoagulation therapy in patients with AF. It is also possible that a substantial portion of patients who are not treated with anticoagulation may be appropriately selected as unsafe for anticoagulation by their treating physician. Supporting this possibility, one Boston-based study reported that, among 49% of older AF patients not anticoagulated, almost all were considered for warfarin therapy but not treated because they had at least one contraindication[26]. The introduction of the novel oral anticoagulation therapies (NOACs – e.g. Dabigatran, Apixaban, Rivaroxaban etc.) has improved this landscape. However, anticoagulation rates in AF patients remain suboptimal[27].

Irish Cardiovascular Health Policy

'*Changing Cardiovascular Health'* identified as a priority for the Irish Health System the prevention of stroke in primary care[21]. The policy noted that the detection and management of elevated blood pressure and anti-thrombotic therapy for those with AF were of particular relevance for the prevention of stroke. In addition, the policy stated that improved detection of AF and anti-coagulation could be achieved by developing structured systems between primary care and the hospital setting.

The problem of under detection and under treatment of AF has been addressed in '*Changing Cardiovascular Health'* and a recommendation was made regarding the need for effective means of early detection in people aged 65 years and older, in addition to clinical leadership of integrated anticoagulation services.

Recommendation 4.7

- **A screening programme for atrial fibrillation.** This should be established, with formal evaluation, to ensure an effective means of implementation for people aged 65 and over - **Lead Organisation:** Health Service Executive (HSE)

As noted, population screening for AF has been recommended by the ESC at their conference in August 2012 with a Class 1 recommendation which is a further endorsement for the recommendation on AF screening as outlined in 'Changing Cardiovascular Health'.

HSE Clinical Strategy and Programmes

In 2010 the HSE introduced a range of clinical programmes that aimed to address some key health policy objectives and provide standards and guidelines for a range of clinical services. The National Stroke Programme, in addressing chronic disease management, set out a range of objectives that would be delivered across primary and secondary care. Under the prevention work stream, both transient ischaemic attack (TIA) and AF were prioritised. An Atrial Fibrillation/Stroke Prevention Working Group was convened with acknowledged leaders in the field of AF from primary care, interventional cardiology, pharmacology, hospital care and public health. The group carried out a review of warfarin services in the acute hospitals, developed an AF care pathway and recommended that a study on the feasibility of AF screening in General Practice be undertaken. An Atrial Fibrillation Project Team was convened to deliver this recommendation.

Methodology

Overview of Study Design

This was a multi-site prospective observational study and was a partnership between primary and secondary care providers. Secondary care centres were selected and Galway University Hospital and Sligo Regional Hospital were the successful sites following an application process. Each centre was incentivised to provide open access to General Practitioners (GPs) for cardiology diagnostics, cardiology clinic appointments and clinical advice via telephone. The list of participating GPs is contained in Appendix 1.

All GPs in Galway and Sligo/Leitrim were invited to participate and the process involved GPs screening, via pulse palpation, all patients 65 years of age and older attending the practice, over a period of 6 months, to identify new cases of AF. When an irregular pulse was detected, an ECG was performed and if this confirmed AF the patient was invited to participate in the study. Informed consent was obtained from all participants. GPs were provided with copies of the HSE Atrial Fibrillation Care Pathway (Appendix 2) that was developed by the National Stroke Programme Atrial Fibrillation Steering Group in 2012/2013. Each GP practice was provided with an MS Excel based data collection tool in which they recorded demographic data on each patient screened and the care pathway of all participants (Appendix 3). The GP then returned this anonymised dataset at the end of the study. An education programme was provided in Galway and Sligo in December 2013 with representatives from 35 GP practices attending.

Pilot Areas

The selection of areas to participate in the study was a two-step process. Suitable hospital sites were first selected and then all GPs in that hospital service area were invited to participate.

Acute Hospital Selection

An application process was devised by the AF project team for hospital selection. All acute hospitals in the ROI were invited to submit an expression of interest in participating in the study by completing a simple one-page application form. The application could have been submitted by one consultant or more consultants from different specialities, for example stroke and cardiology.

In December 2012, nine hospitals expressed an interest in participating in the study. All hospitals who applied fulfilled the mandatory criteria. The hospitals were designated as either rural or urban and the five top scoring hospitals from each group were shortlisted. These five hospitals were then requested to provide further information and four responded. At the conclusion of the second round of scoring and taking into account the scores received by each hospital that expressed an interest and the issues relating to the feasibility of implementation, the project team chose two sites for the implementation of this study: Galway University Hospital was the urban site and Sligo Regional Hospital was the rural site. In anticipation of increased demand for echocardiograms during the study, each hospital received a set amount of funding to cover the estimated additional echocardiogram requests.

GP Selection

An expression of interest letter was circulated to all GPs in the catchment areas of Galway University Hospital (Galway) and Sligo Regional Hospital (Sligo/Leitrim). The HSE Primary Care Units in Galway and Sligo/Leitrim provided administrative support to the project team with regard to contacting and collating the returned applications. A response was received from 27 practices from Galway and 24 practices from Sligo/Leitrim

As a requirement for inclusion, GPs had to have a practice nurse available to participate in the study, access to a 12 lead ECG machine and access to MS Excel. This information was requested from the GPs that submitted an application and all GPs who provided supplementary information were included in the study - 24 GP practices (totalling 54 GPs) in Galway and 21 GP practices (totalling 46 GPs) in Sligo.

Participating practices were informed that they would be eligible to purchase a piece of equipment to a set amount, the cost of which would be reimbursed by the National Stroke Programme on return of a complete set of data at the end of the study and the furnishing of a paid invoice.

Patient Selection

As detailed in the study design, all patients 65 years and over attending the GP practice during the six month study period had their pulse checked. Subsequently, all newly diagnosed AF patients identified as a result of pulse-taking during this period were invited to participate in the study. All patients received a participant information leaflet and informed

consent form (Appendix 4 and 5). If patients declined to participate in the study, no further information was collected on them.

GP Practice Information Sessions

Information sessions for the participating GPs were held to prepare and support the practices for study engagement. It was recommended that at least one team member (GP or Practice Nurse) from each practice attend where possible.

These information sessions allowed for introduction of the AF project team. The main aims of these information sessions were to:

- provide information to the practices on the background of the study
- educate the practices as to why early detection and management of atrial fibrillation in primary care is important in the prevention of stroke
- introduce the HSE AF Care Pathway to the practices
- educate the practices on the use of current oral anticoagulants
- reintroduce the principles of pulse palpation, ECG recording and interpretation to the practices
- inform the practices of the dataset being collected for the study
- demonstrate the electronic data collection tool used in this study

Each practice was provided with an information pack on completion of their education. This pack included:

- HSE Atrial Fibrillation Care Pathway
- ESC AF Pocket Guideline
- EHRA 2013 Practical Guidelines on Novel Oral Anticoagulants (NOACs)
- List of Cardiac Medications
- Paper version of the MS excel based data collection tool
- Patient Consent Forms
- Labels for attaching to referral letters

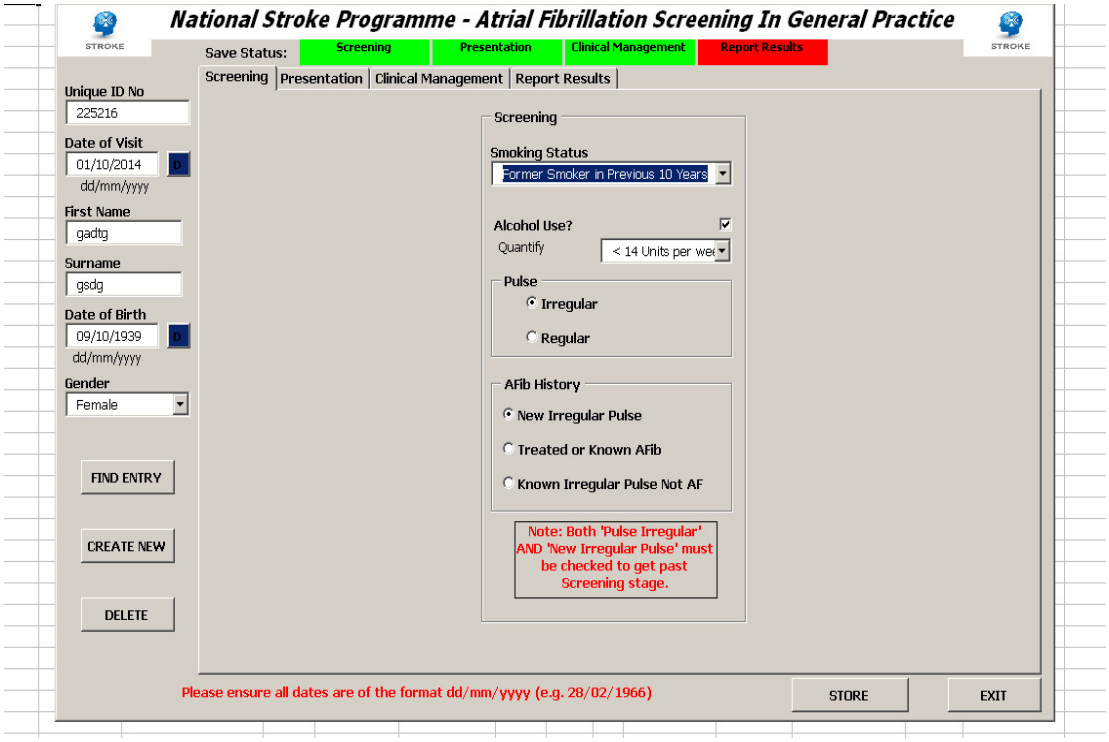
The information sessions were held in December 2013 in venues in Galway and Sligo. Both sessions were very well attended by participating GP practices.

Dataset Design

The final dataset was based on the HSE AF Care Pathway. For data collection, there were two methods employed – a paper based format and an electronic MS-Excel based format with emphasis placed on electronic data capture. The electronic format was preferred for ease of data collection within the practices and for data return centrally for analysis. The dataset was divided into four sections.

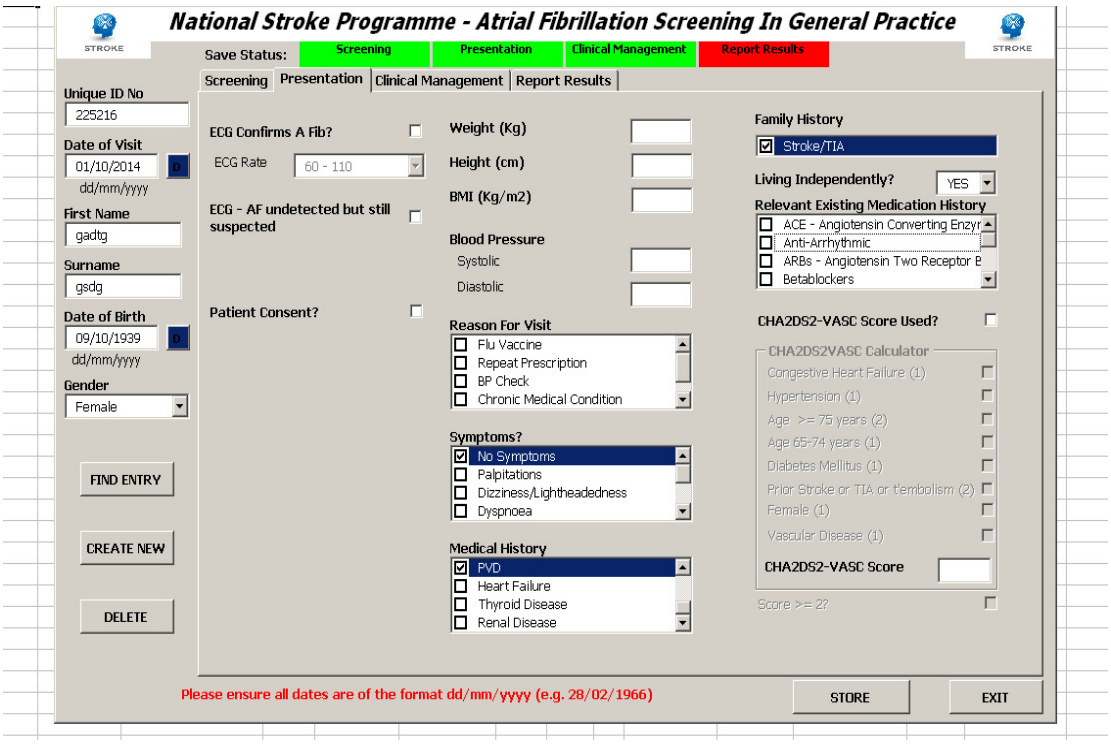
A. Screening Section

This section was completed on all patients whose pulses were taken as part of the study. A unique ID number was generated for all patients entered. This unique ID number and the patient's date of birth acted as an identifier for the study. Patient's names were also collected at the practice to assist with identification of any duplicate entries. It was a requirement that all patient names were removed from the data prior to return at the end of the study. Data collected in this section included data on risk factors - smoking status and alcohol use, in addition to results of the pulse screening and the patients AF history. For patients who were found to have a regular pulse, no further data was collected and the data was stored in a background spreadsheet within the data collection tool. For patients whose pulse palpation was found to be irregular, there were three potential options as outlined in the 'A Fib History' question. Only those recorded as 'New Irregular Pulse' proceeded to the next section 'Presentation' which then opened for data entry.



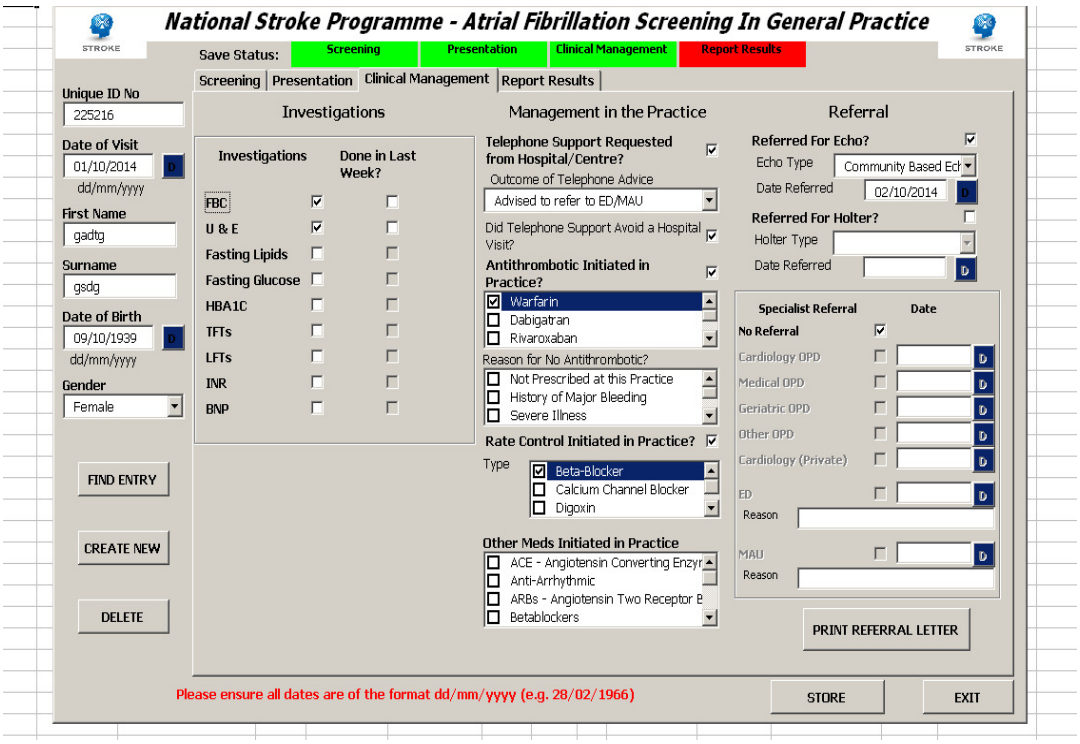
B. Presentation

This section collected data regarding the presentation of the patient at the screening visit such as background history of the patient including ECG results, height and weight, blood pressure, reason for attendance, symptoms, medical history, family history, medication history and the CHA_2DS_2VASc Score. On completion of this element of data collection, the next section 'Clinical Management' opens for data entry.



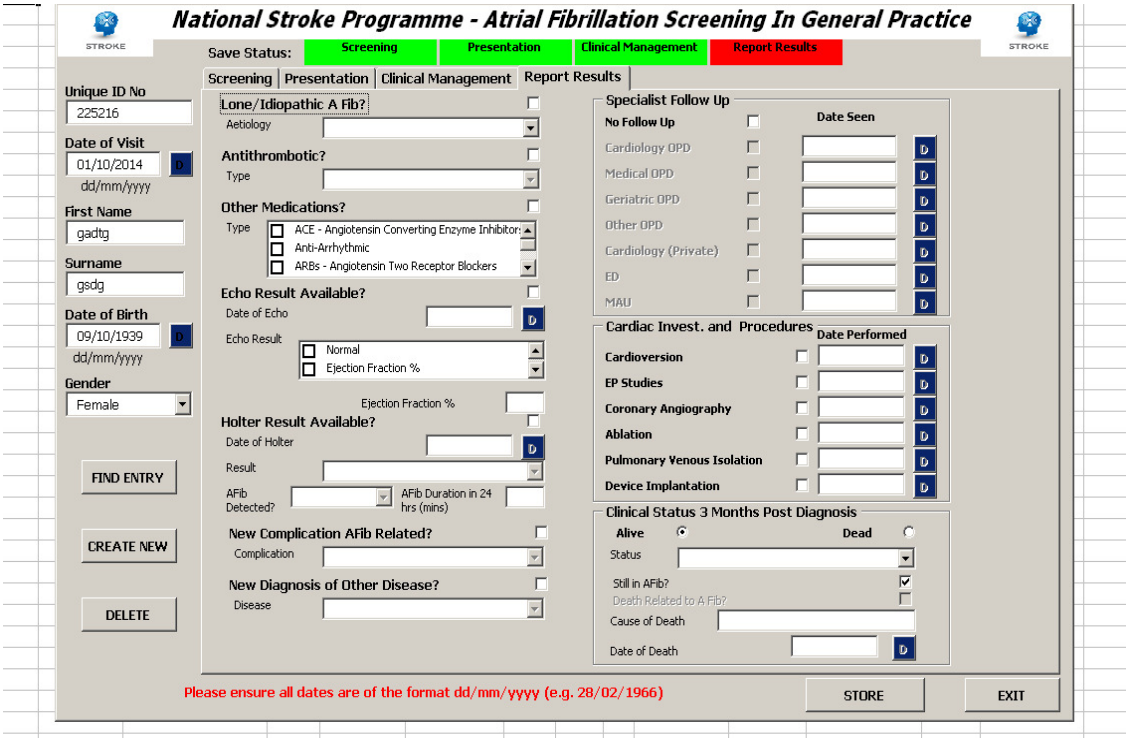
C. Clinical Management

This section recorded the results of investigations on the patient, patient management to include initiation of relevant medications and also referral information for further investigations if deemed necessary by the GP. This section was linked to an automatically generated referral letter using data entered by the GP for use in referring the patient to the hospital as part of the study. Alternatively the practices, if they preferred, could use their own referral letter but were asked to use the labels provided to them in their information packs so the patients could be identified as being part of the study. A designated e-fax/email address was provided to accept referral through the study. Practices were also asked to send a copy of the ECG with the referral (ensuring the ECG is adequately labelled). Once the data was inputted into this screen, the next section 'Report Results' opened.



D. Report Results

This section recorded any relevant follow up data such as results of any investigations, specialist follow up clinics, further interventions or procedures and clinical status at three months. This section may have had to be completed at a later date.



This MS Excel based data collection tool was sent to all practices via email and members of the project team assisted the practices in its download and use thereof. Members of the project team were available to support the practices throughout the duration of the project.

At the end of three months, an interim dataset was requested from each GP practice enrolled in the study. The aim of this interim data request was to ensure that practices were able to extract and submit the data as required and to have a mid-point review of the data captured to date. At the end of six months, completed datasets were returned by each practice for analysis. Practices were asked to review their data before returning this final dataset. As it was highly likely that patients could be screened more than once during the study, the importance of identifying any duplicate entries before data return was highlighted to the practices.

Qualitative Research

An important element of the study was to ascertain the opinions and perceptions of the GPs and Practice Nurses with regard to opportunistic detection of AF by pulse checking and also to discover the patient experience of this enhanced AF care. This feedback was obtained utilising structured questionnaires submitted to each participating practice.

GP/Practice Nurse Questionnaires

Each practice was asked to complete a questionnaire (Appendix 5) to determine the GP and practice nurse experience of the study process, to include their opinions on the IT application used and whether their practice has changed as result of partaking in the study.

Patient Questionnaire

Each practice was asked to identify at least one patient who had AF detected through the opportunistic screening process to complete a questionnaire (Appendix 6) on their experience of being involved in the study, their knowledge of AF since being diagnosed and how their attitudes and behaviours have changed as a result of being diagnosed.

In addition feedback was requested from both hospital sites to obtain their views on the screening process.

Data Analysis

Data was returned from each GP practice and combined into one MS Excel data file. Data were analysed using IBM Statistical Package for Social Sciences (SPSS v22) and Microsoft Excel where appropriate. Basic descriptive statistics were used such as frequencies with means, medians etc. and relevant statistical tests applied where deemed appropriate.

Research Ethical Approval

Research ethical approval was sought and obtained from the ICGP Research Ethics Committee.

Results

This was a multi-site observational prospective study. A study site was defined as the service area of the participating hospital. Galway University Hospital (GUH) and Sligo Regional Hospital (SRH) were the selected hospitals. The study model was a partnership between primary and secondary care. Implementation of the study took place for a six month period from January 1st 2014 to 30th June 2014.

Forty five GP practices participated - 24 in the GUH and 21 in the SRH catchment areas. This involved 100 GPs in total. Participating practices were instructed to record every screening visit for every patient aged 65 years and over during the study period. AF may manifest at any stage during the study period and patients in this age group tend to be repeat attendees. Therefore, there are two samples within this dataset:

- i) all screening visits containing multiple repeat visits by individual patients
- ii) individual patients

Demographic analysis was carried out on individual patients only using on their most recent screening visit to account for any changes in age, smoking or alcohol status that may have occurred during the study period.

A data cleaning exercise was carried out whereby potential duplicate visits were identified. Gender, date of birth and date of visit were queried and validated for all individuals and confirmed with the relevant GP practice. This process yielded 89 duplicate screening visits which were removed. Most duplicates arose as a result of both GP and practice nurse reviewing the patient on the same day and performing data entry separately.

The population profile of the practices is shown in Table 1. This was collated from baseline data provided by participating practices at the outset of the study and it was noted that 14.8% of the practice population was aged 65 years and over.

Table 1: Practice population profile at start of study

	ALL	Galway	Sligo/Leitrim
No. of GP Practices	45	24	21
No. of GPs	100	54	46
Total practice population (estimate)*	185,018	95,974	89,044
Practice population ≥ 65 years (estimate)*	27,464	12,295	15,169

* Estimated by practices when returning application

During the study, five GP practices withdrew and three GP practices participated for three months only. The data from the three GP practices that only partially participated was not included in the final dataset for analysis. The practice population at the end of the study is shown in Table 2. Complete six months data was returned from 37 practices. 9,713 screening visits took place for 7,262 individual patients. This represents 29.5% of the estimated population aged 65 years and over at these practices.

Table 2: Practice population profile at end of study

	ALL	Galway	Sligo/Leitrim
No. of GP Practices	37	20	17
No. of GPs	89	49	40
Total practice population (estimate)	171,468	90,224	81,244
Practice population ≥ 65 years (estimate)	24,609	11,122	13,487
Screening Visits	9,713	5,085	4,628
Patients Screened	7,262	3,461	3,801

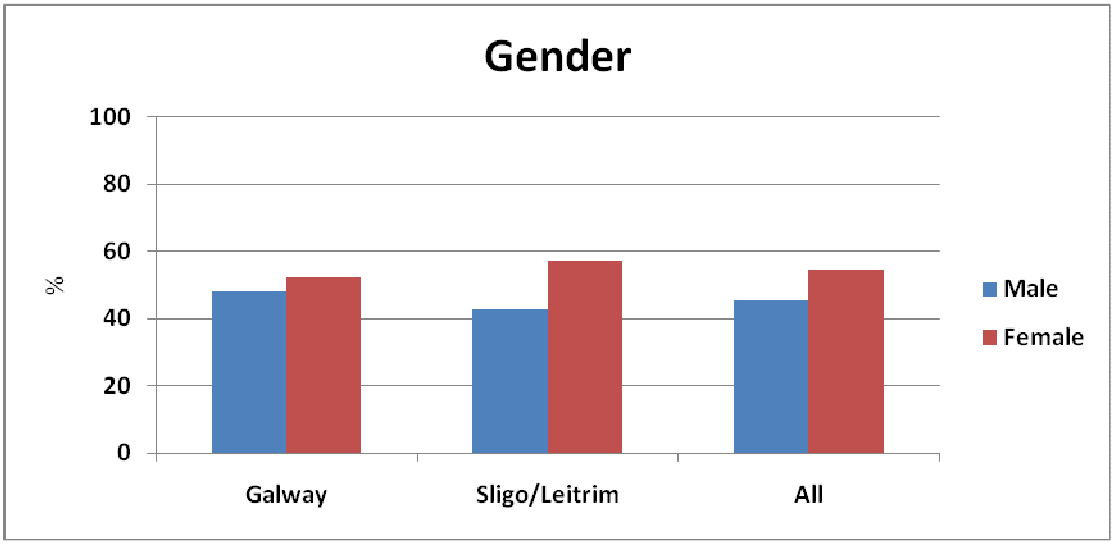
Demographics

All demographic analysis was based on the final screening visits of patients with a sample size of 7,262. Overall, 54.7% of the patients screened were female – Table 3, Figure 1, with a higher proportion of females screened in Sligo/Leitrim compared to Galway (57.1% compared to 52.1%).

Table 3: Gender (n=7,262)

	Galway		Sligo		All	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
Male	1,659	47.9	1,631	42.9	3,290	45.3
Female	1,802	52.1	2,170	57.1	3,972	54.7
All	3,461	100	3,801	100	7,262	100

Figure 1: Gender



Age Profile

The mean age of the screened patients was 75.1 years (standard deviation ± 7.1) with a median age of 74 years. The age profile by gender is shown in Table 4 and females were on average one year older and this difference was statistically significant (p=0.000). Analysing by region showed a statistically significant difference in mean age of males with patients from Sligo-Leitrim older than their Galway counterparts (p=0.031) but there was no significant difference for females (p=0.138). There were a number of patients (n=51) who were 64 years of age at the screening visit but as they were in their 65th year they were included.

Table 4: Age profile of screened patients (n=7,262)

	Mean (±sd)	Median (IQR)
All	75.1 (±7.1)	74 (69 – 80)
Male	74.4 (± 6.8)	73 (69 – 79)
Female	75.6 (±7.4)	75 (70 – 81)

Table 5: Age profile of screened patients by region (Galway n=3,461, Sligo/Leitrim n=3,801)

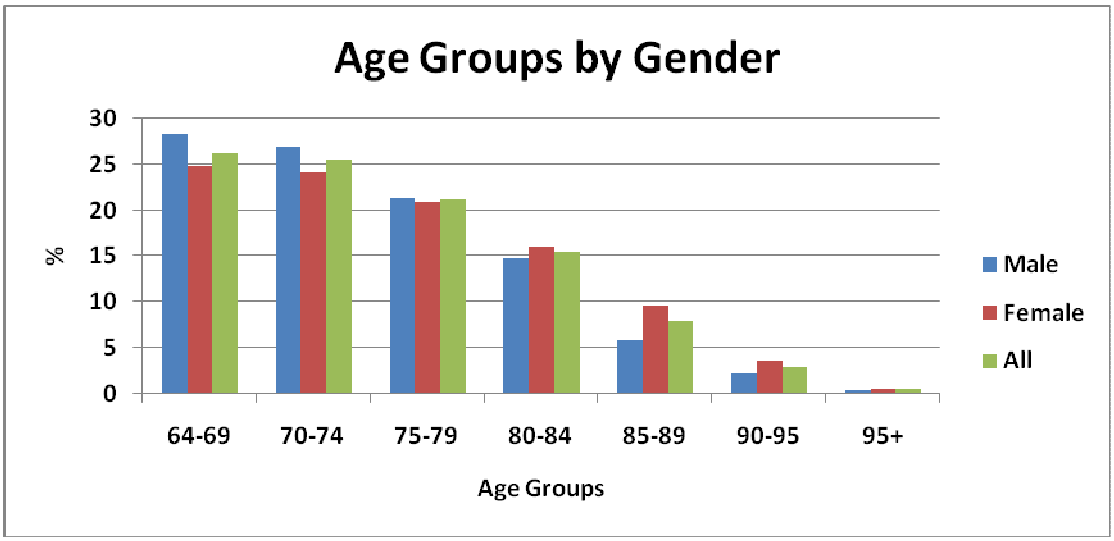
	Galway Mean (±sd)	Sligo/Leitrim Mean (±sd)
All	74.8 (±7.1)	75.3 (±7.2)
Male	74.2 (± 6.8)	74.7 (± 6.8)
Female	75.4 (±7.3)	75.7 (± 7.5)

Grouping the sample by age and gender is presented in Table 6 and Figure 2 and shows that the distribution is as expected with a higher proportion of males in the younger age groups (65 – 80) and higher proportion of females in the older age groups (>80).

Table 6: Age Group Distribution

Age	64-69	70-74	75-79	80-84	85-89	90-94	95+
Male	28.3	26.9	21.4	14.8	5.8	2.3	0.4
Female	24.8	24.2	20.9	16.0	9.6	3.6	0.6
All	26.3	25.6	21.2	15.5	7.9	3.0	0.5

Figure 2: Age group distribution by gender



Risk Factors

Practices were asked to document smoking status and alcohol consumption for the patients that they screened. After removal of patients where the smoking status was recorded as 'Unknown' (n=295), current smokers made up 8.9% of the screened patients with a further 7.4% documented as having quit sometime in the previous ten years. The rate of non-smokers was reported as 84% - Table 7. Smoking status by gender is shown in Table 8 and Figure 3 with more males recorded as current smokers, 10.5% compared to 7.6% of females and this difference is statistically significant (p=0.016).

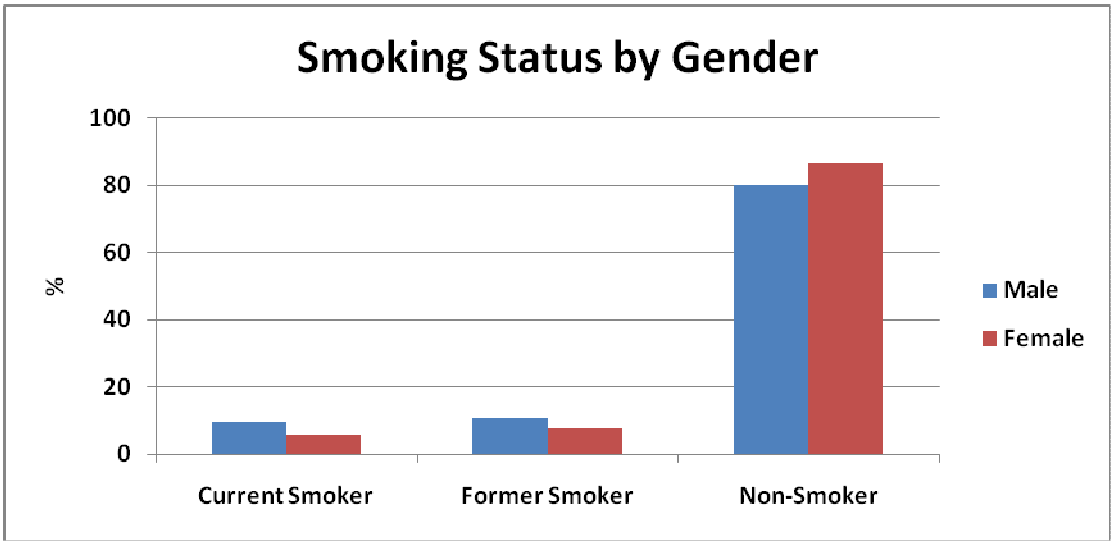
Table 7: Smoking status at screening (n=6,967)

	Frequency	%
Non smoker	5833	83.7
Current smoker	620	8.9
Former smoker in previous 10 years	514	7.4

Table 8: Smoking status at screening by gender (n=3,144 Male, n=3,823 Female)

	Male (%)	Female (%)
Non smoker	80.1	86.7
Current smoker	10.5	7.6
Former smoker in previous 10 years	9.4	5.7

Figure 3: Smoking Status by Gender



Regarding alcohol use, after removal of one patient where the alcohol status was recorded as unknown, 55% of screened patients were recorded as consuming alcohol with the vast majority of these, 81%, consuming less than 14 units per week – Table 9. Alcohol consumption was higher amongst males, 64.1% compared to 46.5% (p = 0.000) and they consumed more units per week than females – Table 10, Figure 5.

Table 9: Alcohol use (n=7,261)

	Frequency	%
No	3304	45.5
Yes	3957	54.5
If Yes, units/week		
- ***<14 units***	*3219*	*81.3*
- ***≥ 14 units & < 21 units***	*351*	*8.9*
- ***≥ 21 units***	*187*	*4.7*
- ***Unknown***	*190*	*4.8*
- ***Not Recorded***	*10*	*0.3*

Table 10: Alcohol use by gender (n= 3,290 Male, n=3,971 Female)

	Male (%)	Female (%)
No	35.9	53.5
Yes	64.1	46.5
If Yes, units/week		
- ***<14 units***	*76.1*	*87.4*
- ***≥ 14 units & < 21 units***	*12.4*	*4.8*
- ***≥ 21 units***	*7.7*	*1.4*
- ***Unknown***	*3.7*	*6.0*
- ***Not Recorded***	*0.9*	*0.4*

Figure 4: Alcohol Consumption by Gender

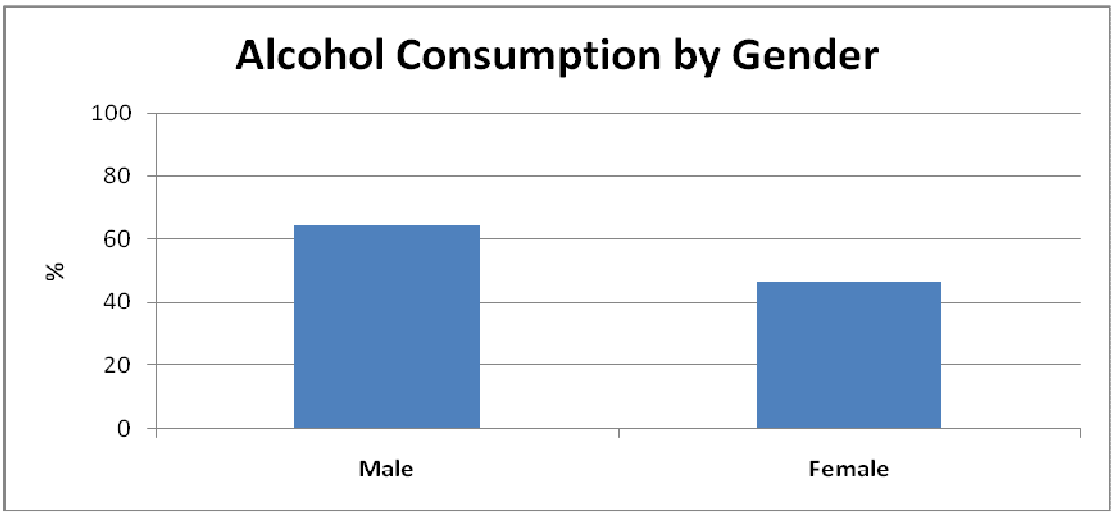
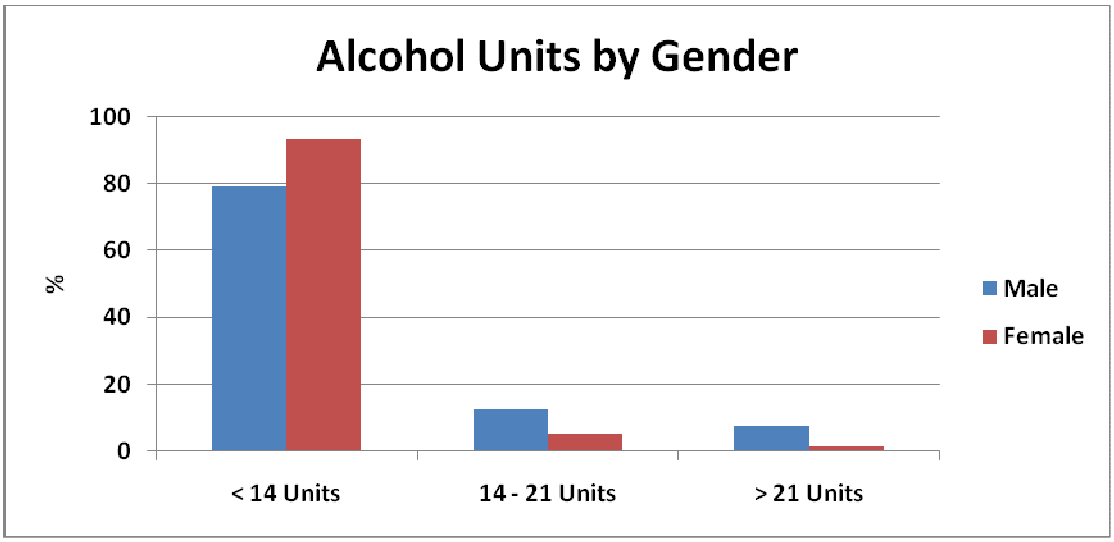


Figure 5: Alcohol Units by Gender



Atrial Fibrillation Screening Data

There were 9,713 incidents of opportunistic screening for an irregular pulse during the study period involving 7,262 individual patients. The following analysis will be based on individual patients, i.e. sample size of 7,262 as there were cases of multiple screening visits occurring for individual patients.

Detection of an irregular pulse

An irregular pulse was detected in 916 patients (12.6%). The majority of these, 735 or 83.1%, were already known to the practice as having AF while a further 111 patients, or 11.6%, were noted as having a known irregular pulse not attributable to AF – Table 11.

Regarding identification of new AF patients, by definition these needed to be confirmed via follow up ECG. There were 70 cases where a new irregular pulse was detected but for 15 of these there was no confirmation of AF by ECG. Therefore 55 new cases of AF were detected or 6% (55/916) of those detected has having an irregular pulse. The overall detection rate of new atrial fibrillation amongst all patients screened was 0.8%.

Table 11: Pulse Screening (n=7,262 individual patients)

	Frequency	%
Total Patients Screened	7262	100
Regular Pulse	6346	87.4
Irregular Pulse	916	12.6
Known AF	*735/916*	*80.2*
Known Irregular Pulse not AF	*111/916*	*12.1*
Irregular Pulse but no confirmed AF via ECG	*15/916*	*1.6*
New AF	*55/916*	*6.0*
New AF as % of all screened	55	0.8

Using this data, the six month prevalence rate for AF in the population of over 65's in this study was 10.9% (CI:10.2-11.6%) which can be extrapolated to give a prevalence rate of 21.8% for a full year – Table 12. This equates to a prevalence rate of AF of approximately 220 patients per thousand over 65 year olds per year. There was a marked gender difference in six month prevalence of AF with 13.5% males versus 8.7% females (p =0.001).

Table 12: Prevalence and Incidence of AF (n=7,262)

Prevalence	
- ***Known AF***	*735*
- ***New AF***	*55*
- ***Total AF***	*790*
- ***Total Patients***	*7262*
Prevalence Rate – 6 months	10.9
Prevalence Rate – 12 months	21.8

Incidence	
- ***New AF***	*55*
- ***Population less Known AF***	*6527*
Incidence Rate – 6 months	0.84
Incidence Rate – 12 months	1.7

The study data shows an incidence rate of 0.84% over six months or 1.7% when extrapolated to a full year. Therefore, based on this data, general practice would expect to see 17 new AF patients per 1000 patients over 65 years of age in a full year – Table 12. There was also a gender difference with incidence of AF in males of 0.9% versus 0.8% females.

Management of New Atrial Fibrillation Patients

The remainder of the analysis will focus on the 55 patients identified, through screening, with previously undetected atrial fibrillation. There was one patient for whom no further data was collected after screening as this patient requested to be referred for private consultation and was not seen by the general practice in question regarding their atrial fibrillation. One further patient died on the day of their practice visit after referral to the Emergency Department – the cause of death was as yet unknown when queried with the practice. Therefore the main element of this analysis will be focused on the 53 patients for whom follow up data is available but data on all 55 patients will be noted where available.

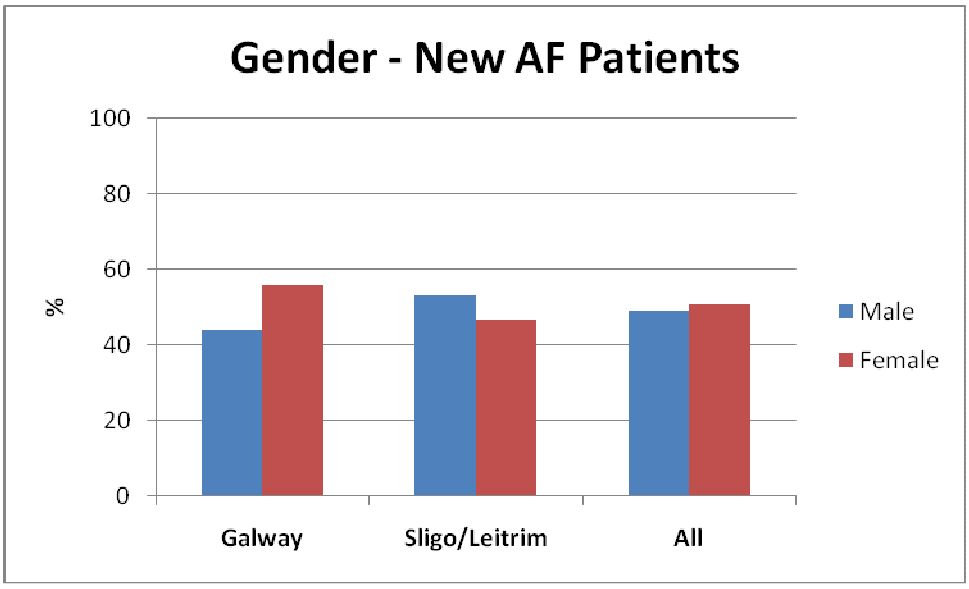
Demographics

There was no major difference in gender amongst those identified with AF through screening although there was a higher proportion of females identified in Galway and a higher proportion of males identified in Sligo/Leitrim – Table 13.

Table 13: Gender (n=55)

	All		Galway		Sligo/Leitrim	
	Frequency	%	Frequency	%	Frequency	%
Male	27	49.1	11	44	16	53.3
Female	28	50.9	14	56	14	46.7
All	55	100	25	100	30	100

Figure 6: Gender of New AF Patients



Age Profile - New AF Patients

The mean age of the newly identified AF patients was 76.6 years (standard deviation ± 8.1) with a median age of 76 years. The age profile by gender is shown in Table 14 and females were on average 2.8 years older but this difference was not statistically significant (p=0.208).

Table 14: Age profile of screened patients (n=55)

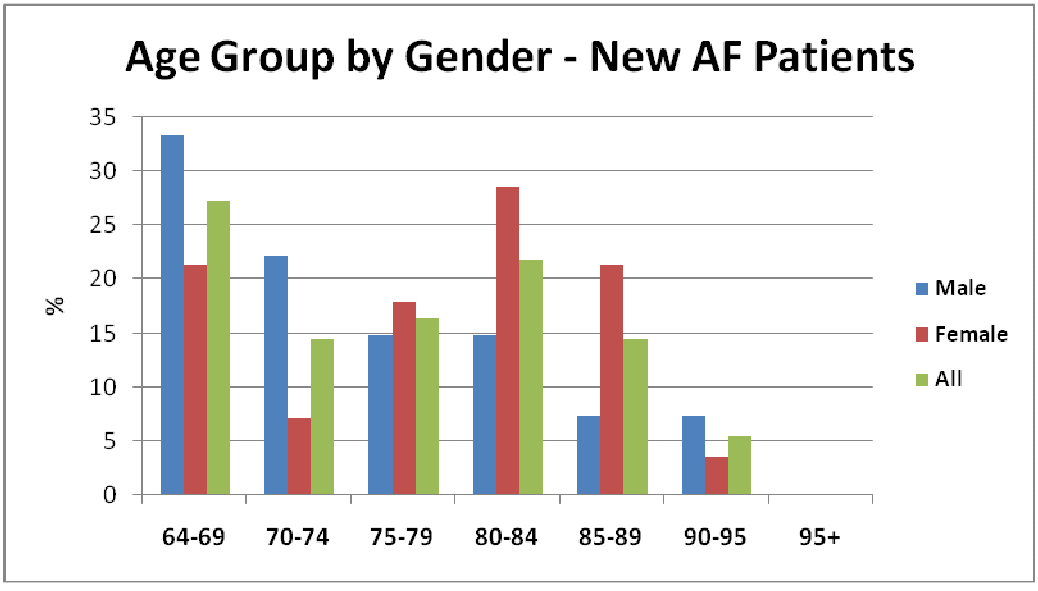
	Mean (±sd)	Median (IQR)
All	76.6 (±8.1)	76.0 (68 – 83)
Male	75.2 (± 8.1)	73.0 (68 – 83)
Female	78.0 (±8.1)	80 (72 – 85)

Grouping the sample by age and gender is presented in Table 15 and Figure 7 and shows that the distribution is as expected with a higher proportion of males in the younger age groups (65-80) and higher proportion of females in the older age groups (>80) apart from the 90-95 age group where there was a higher proportion of males but the numbers were small.

Table 15: Age Group Distribution

Age	64-69	70-74	75-79	80-84	85-89	90-94	95+
Male	33.3	22.2	14.8	14.8	7.4	7.4	0
Female	21.4	7.1	17.9	28.6	21.4	3.6	0
All	27.3	14.5	16.4	21.8	14.5	5.5	0

Figure 7: Age Group by Gender – New AF Patients



Risk Factors – New AF Patients

Amongst the patients newly diagnosed with AF, smoking status was recorded in 53 of the 55 patients. After removal of the two patients where the smoking status was recorded as 'Unknown', current smokers made up 5.7% of the screened patients with a further 9.4% documented as having quit sometime in the previous ten years. The rate of non-smokers was reported as 85% - Table 16. Smoking status by gender is shown in Table 17 and shows that all the current smokers from this group of newly diagnosed AF patients were female with more males recorded as having quit in the previous ten years.

Table 16: Smoking status at screening (n=53)

	Frequency	%
Non smoker	45	84.9
Current smoker	3	5.7
Former smoker in previous 10 years	5	9.4

Table 17: Smoking status at screening by gender (n=26 Male, n=27 Female)

	Male (%)	Female (%)
Non smoker	80.8	88.9
Current smoker	0	11.1
Former smoker in previous 10 years	19.2	0

Regarding alcohol use, 56% of newly diagnosed AF patients were recorded as consuming alcohol with the vast majority, 77%, consuming less than 14 units per week – Table 18. Alcohol consumption was higher amongst males, 67.7% compared to 46.4%– Table 19.

Table 18: Alcohol use (n=55)

	Frequency	%
No	24	43.6
Yes	31	56.4
If Yes, units/week		
<14 units	24	77.4
≥ 14 units & < 21 units	1	3.2
≥ 21 units	3	9.7
Unknown	3	9.7

Table 19: Alcohol use by gender (n= 27 Male, n=28 Female)

	Male (%)	Female (%)
No	33.3	53.6
Yes	67.7	46.4
If Yes, units/week		
<14 units	72.2	84.6
≥ 14 units & < 21 units	5.6	0
≥ 21 units	5.6	15.4
Unknown	16.7	0

Weight and Body Mass Index (BMI)

After diagnosis with AF, GPs recorded the patient's weight and height and the data collection tool automatically calculated the patients' BMI. Males were on average 9.1 Kg heavier than female but this was not statistically significant (p=0.071).

However, when comparisons are made using BMI, females on average had a higher BMI (2.8kg/m^2) but this difference was not statistically significant (p=0.065).

Table 20: Weight and BMI

	Mean Kg (±sd)	Median Kg (IQR)
Weight – Male (n=26)	85.4 (±16.7)	85.5 (72.6 – 97.8)
Weight – Female (n=27)	76.3 (±18.9)	76.2 (58 – 92)
Weight – All (n=53)	80.7 (±18.3)	80 (65 – 95.3)
	Mean BMI Kg/m^2 (±sd)	**Median BMI Kg/m^2 (IQR)**
BMI – Male (n=26)	27.5 (±4.6)	26.6 (25 – 30.4)
BMI – Female (n=27)	30.3 (±6.2)	29.4 (26.7 – 24.8)
BMI – All (n=53)	28.9 (± 5.6)	28.3 (25 – 31.1)

BMI Categories

The World Health Organisation have defined any person with a BMI greater than or equal to 25 kg/m^2 as being overweight and a BMI greater than or equal to 30 is classified as obese. Elevated BMI is known to be a major risk factor for cardiovascular diseases, diabetes, musculoskeletal disorders and some cancers. The data from this sample shows that 81% of newly diagnosed females and 69% of newly diagnosed males were overweight or obese as

per Table 21. When analysed by gender and age group it is clear that there is a gender difference by age group – Table 22, Figure 8. While there are a greater proportion of females obese across all the age groups, the difference is more pronounced at the younger age groups – 65 – 69 and 70 – 79.

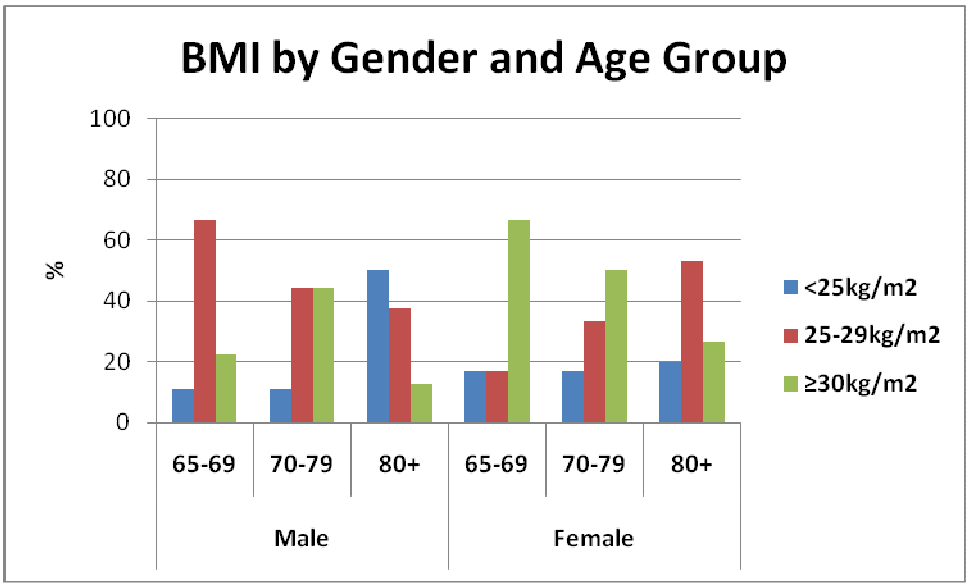
Table 21: BMI categories by gender (%)

	< 25 Kg/m^2	25 Kg/m^2 – 29.9 Kg/m^2	≥ 30 Kg/m^2
Male (n=26)	23.1	50	19.4
Female (n=27)	18.5	40.7	40.7
All (n=53)	20.8	45.3	33.9

Table 22: BMI categories by gender and age group (%)

	< 25 Kg/m^2	25 Kg/m^2 – 29.9 Kg/m^2	≥ 30 Kg/m^2
Male			
65 – 69 (n=9)	11.1	66.7	22.2
70 – 79 (n=9)	11.1	44.4	44.4
80+ (n=8)	50	37.5	12.5
Female			
65 – 69 (n=6)	16.7	16.7	66.7
70 – 79 (n=7)	16.7	33.3	50.0
80+ (n=15)	20.0	53.3	26.7

Figure 8: BMI by Gender and Age Group



Blood Pressure

According to the European Society for Hypertension/European Society for Cardiology (ESH/ESC) guidelines, in the elderly patient, there is strong evidence of benefits from the lowering of systolic blood pressure by antihypertensive treatment to <150mmHg[28]. For those under 80 years, antihypertensive treatment may be considered at systolic blood pressure values of >140mmHg and aimed at values <140mHg provided the patients are fit and the treatment is well tolerated. Hypertension puts the arteries and heart under strain and can increase the possibility of heart attack, stroke and kidney disease. After detection of new AF, systolic and diastolic blood pressure was also taken by the GP and recorded. The mean systolic blood pressure for the sample was 128.6mmHg and the mean diastolic blood pressure was 75.7mmHg. A gender breakdown is presented in Table 23 and the proportions within relevant categories of systolic blood pressure (i.e. 150mmHg) are shown in Table 24. The majority have a systolic blood pressure of <150mmHg but this may be due to appropriate treatment with anti-hypertensives and medication data shows that 37 patients were on some form an antihypertensive medication as described later in the report.

There was a statistically significant difference in systolic blood pressure between males and females (p=0.018) with average female systolic blood pressure at 132.9mmHg compared to 123.7mmHg for males. There was also a statistically significant difference in diastolic blood pressure with the female patients having higher average diastolic blood pressure of 78.2mmHg compared to males at 72.2mmHg (p = 0.017).

Table 23: Blood Pressure

	Systolic BP (mmHg)		Diastolic BP (mmHg)	
	Mean (±sd)	**Median (IQR)**	**Mean (±sd)**	**Median (IQR)**
Male (n=25)	123.7 (±15.8)	125 (112-131)	72.2 (±9.9)	70 (68-80)
Female (n=28)	132.9 (±11.5)	131 (127-140)	78.8 (±9.6)	80 (70-85)
All (n=53)	128.6 (±14.3)	130 (120–138)	75.7 (± 10.2)	80 (70-80)

Table 24: Blood Pressure categories – Systolic BP (%)

	≤ 150mmHg	**>150mmHg**
Male (n=25)	96 (n=24)	4 (n=1)
Female (n=28)	96.4 (n=27)	3.6 (n=1)
All (n=53)	96.2 (n=51)	3.8 (n=2)

It was recorded that of the two patients with a systolic blood pressure of ≥150mmHg, one was on some form of anti-hypertensive medication at their screening visit and had a medical history of hypertension recorded.

In the presence of diabetes, the guidelines recommend that a systolic blood pressure measurement ≥ 140mmHg be treated[28]. There were 14 patients recorded with a medical history of diabetes. Two of the 14 (14.3%) had a systolic blood pressure reading of ≥ 140mmHg and both were currently prescribed anti-hypertensive medication.

Three patients were recorded as having a medical history of renal disease and again the target systolic blood pressure is ≥ 140mmHg. Two of these three patients had a systolic blood pressure less than 140mmHg while the third was exactly 140mmHg. All three were currently prescribed anti-hypertensive medication.

ECG Pulse Rate

All 55 patients had their new diagnosis of AF confirmed by ECG and the pulse rate was then recorded as per Table 25. There was one patient that did not have a rate recorded in addition to the patient for whom no data was available due to attending a cardiologist privately. Thirty two percent of patients had a pulse rate greater than 110 beats per minute according to ECG.

Table 25: ECG rate for patients with ECG confirmed AF (n=53)

	Frequency	%
< 60	1	1.9
60 – 110	35	66.0
>110	17	32.1

Of the 17 patients for whom it was recorded that they had a pulse rate of greater than 110 beats per minute on ECG only seven patients were documented as being on rate control medication (calcium channel blockers = 4 patients, anti-arrhythmics = 2 patients, betablockers = 1 patient). In the practice, rate control medication was prescribed for four of these patients and a further patient was initiated on rate control medication after referral. There were five patients who had a pulse rate of greater than 110 on ECG not prescribed

rate control medication at any stage according to the data although it should be considered that perhaps these patients' pulse rate may have normalised and rate control medication may not have been required.

Reason for visit

As this is an opportunistic screening programme it is useful to know why the patient attended the GP that day. The dataset had a number of predefined options for selection by the GP and these are outlined in Table 26. The majority of patients were noted as attending the practice for 'Other' reasons (72.2%) and not for presumed routine attendances such as follow up for a chronic medical condition (16.7%), blood pressure check (7.4%), repeat prescription (3.4%) and flu vaccine (0%).

Table 26: Reason for visit (n=54)

	Frequency	%
Other	39	72.2
Chronic Medical Condition	9	16.7
BP Check	4	7.4
Repeat Prescription	2	3.7
Flu Vaccine	0	0

Presenting Symptoms

The GP was asked to record the presenting symptoms of the patient when the pulse check was performed and these are detailed in Table 27. As multiple symptoms could be selected, the table presents the number of incidences each symptom was noted. There were 27 patients (50%) that did not have any symptoms upon presentation – 12 of these were attending for one of the predefined reasons for visit outlined in Table 27 while the remaining 15 had 'Other' noted as their reason for visit. For the remaining 27 patients, there were a number of symptoms noted with dyspnoea the most frequent, followed by fatigue, palpitations, dizziness/light-headedness, other and chest pain. Sixteen patients reported one symptom, six reported two symptoms, four reported three symptoms and one patient reported four symptoms. Analysing by gender shows that females were more likely to have presented with fatigue, palpitations or other compared to males prior to diagnosis of their AF, while males were more likely to have presented with syncope.

Table 27: Presenting symptoms

	Frequency	Frequency - Male	Frequency - Female
No Symptoms	27	14	13
Dyspnoea	15	7	8
Fatigue	9	3	6
Palpitations	7	1	6
Dizzyness/Light-headedness	5	3	2
Other	4	1	3
Chest Pain	2	1	1
Syncope	2	2	0

Medical History and Family History

Medical history was not recorded in the data for 10 patients (excluding the patient seen privately by cardiologist) and in the absence of a 'No Medical History' option, it is assumed that they had no relevant medical history; i.e., 18.5% of patients had no medical history prior to this presentation. As with presenting symptoms, multiple options could be selected and are presented in Table 28. Hypertension was the most frequent medical history (n=38), followed by diabetes (n=14), thyroid disease (n=5), previous cardiovascular disease (n=3), renal disease (=3), heart failure (n=3) and TIA (n=2). There were three patients that recorded a previous history of AF. No patients reported any previous medical history for stroke, intracranial bleed or peripheral vascular disease. Regarding multiple co-morbidities at presentation, 21 patients reported one, 19 patients reported two and four patients reported three co-morbidities. Analysing by gender shows that females exclusively presented with thyroid disease while all other co-morbidities were evenly distributed.

Table 28: Medical History

	Frequency	Frequency - Male	Frequency - Female
Hypertension	38	19	19
Diabetes	14	7	7
Thyroid Disease	5	0	5
Previous CVD – MI/CABG	3	2	1
Heart Failure	3	1	2
Renal Disease	3	1	2
Previous History of AF	3	1	2
TIA	2	1	1
No Medical History	12	6	6

Of the 38 patients who had a history of hypertension, 37 were recorded as being prescribed one or a combination of anti-hypertensive medication (ACE inhibitor = 13 patients, Calcium channel blockers = 21 patients, betablockers = 11 patients, diuretics = 11 patients, ARBs = 9 patients).

There were four patients, all female that reported a family history of Stroke/TIA (7.3% of full sample or 14% of females).

Living Independently

The vast majority, 88.9%, of the patients newly diagnosed with AF were living independently at the time of diagnosis.

Current Medication

There were 12 patients reported as being on no medication at the time of screening – 22%. The current medications prescribed for the other 42 patients are presented in Table 29. Calcium channel blockers were the most commonly prescribed medication followed by cholesterol lowering agents and diuretics.

Table 29: Current Medications

	Frequency	Frequency – Male	Frequency - Female
Calcium channel blockers	21	8	13
Cholesterol lowering agents	19	10	9
Diuretics	17	8	9
ACE Inhibitors	14	6	8
Beta blockers	14	8	6
Anti-thrombotic agent	11	6	5
ARBs	10	7	3
Thyroid replacement therapy	4	0	4
Anti arrhythmics	3	2	1
Digitalis preparations	1	1	0

CHA_2DS_2VASc Score

The CHA_2DS_2VASc Score is a clinical prediction tool for estimating the risk of stroke in patients with non rheumatic atrial fibrillation. It can be used to determine whether or not oral anticoagulation treatment is required with a score of greater than or equal to two equating to a recommendation to prescribe oral anticoagulation[18].

The CHA_2DS_2VASc Score was calculated in 39 cases with it being greater than or equal to 2 for 37 (95%).

Table 30: CHA_2DS_2VASc Score (n=39)

CHA_2DS_2VASc Score	Frequency	%
1	2	5.1
2	9	23.1
3	11	28.2
4	13	33.3
5	2	5.1
6	2	5.1

Clinical Management of New AF Patients

Clinical Investigations

GPs were asked to record the clinical investigations that were performed on their patients newly detected with AF and if the investigations had been performed in the previous week. The AF Care Pathway (Appendix 2) recommends that upon the detection of new AF the following clinical investigations must be carried out - Table 31.

Table 31: Clinical Investigations – Bloods

	Performed		Performed in the last week	
	Frequency	**%**	**Frequency**	**%**
FBC (n=54)	35	64.8	5	14.2
U&E (n=54)	36	66.7	5	13.9
Fasting Lipids (n=54)	33	61.1	5	15.2
Fasting Glucose (n=54)	26	48.2	5	19.2
HbA1c (n=54)	18	33.3	3	16.7
TFTs (n=54)	33	55.5	4	12.1
LFTs (n=54)	34	63.0	5	14.7
INR (n=54)	8	14.8	2	25.0
BNP (n=54)	16	29.6	4	25.0

Management in the practice

GPs were provided with the contact details of the local hospital cardiology department if there were any cases where further support was required and this support was available via telephone. There were 54 patients for whom this question was completed and it was recorded that telephone support was sought for seven patients (13%). With regard to five of the consultations, the GP was advised to refer the patient to the local Emergency Department/Medical Assessment Unit. One patient was advised to start treatment while the other patient was recorded as 'other' but there was no further data recorded to clarify the advice received. For these two patients, the question 'Did telephone advice avoid a hospital visit' was not ticked which may indicate that these two patients had to attend hospital but without further data this cannot be confirmed.

Initiation of antithrombotic medication in the practice

The AF Care Pathway outlines the risk assessment to be undertaken prior to prescription of appropriate treatment. This risk assessment is the CHA_2DS_2VASc Score, with oral anticoagulation (OAC) recommended for scores greater than or equal to 2, either OAC or aspirin for scores of 1 and either aspirin or no antithrombotic therapy for patients with no risk factors or a CHA_2DS_2VASc Score of 0 (no antithrombotic therapy is preferred to aspirin for those with no risk factors).

There were 54 patients who had data recorded for this question and anticoagulation was reported as initiated in the practice for 21 patients (38.8%). Three patients were recorded as commencing on aspirin but aspirin is not an oral anticoagulant, it is an antiplatelet.

A further seven patients had warfarin (n=3) and aspirin (n=4) recorded as an anticoagulant initiated in practice but the question 'Antithrombotic initiated in practice?' was not answered and a reason for not initiating anticoagulation was recorded. 'Other' was recorded for five of these seven patients, 'patient refused anticoagulation' was recorded for one patient who was prescribed aspirin and 'extreme fragility' was recorded for one patient who also received aspirin. In one case, for a patient for whom warfarin was noted, a note is recorded elsewhere to indicate that the patient was already on warfarin due to a previous aortic valve replacement.

The oral anticoagulants prescribed used and the corresponding CHA_2DS_2VASc Scores are presented in Table 32 for the 21 patients for whom anticoagulation was initiated in the practice.

Table 32: Antithrombotic Initiated in Practice (n=21)

	Frequency	%	CHA_2DS_2VASc Scores
Warfarin	10	47.6	1,2,2,3,3,3,4,4,6, NR
Apixaban	4	19.1	1,3,4,NR
Rivaroxaban	4	19.1	2,3,4,5
Dabigatran	3	14.3	2,4,NR

* NR = CHA_2DS_2VASc not done or recorded

For the 33 patients who did not have antithrombotic treatment initiated in the practice, the reasons given are documented in Table 33. GPs were able to select multiple options as required and responses covered 33 patients. There was no facility for GPs to further clarify where they selected 'Other' as the reason for not initiating an antithrombotic. One reason was recorded for 31 of the 33 patients while two reasons were recorded for the other two patients.

Table 33: Reasons for non initiation of antithrombotic

	Frequency
Other	20
Not prescribed at this practice	7
Extreme fragility	3
History of falls	2
Patient refused anticoagulation	1
History of major bleeding	1
Not Recorded	1
Liver disease	0
Severe illness	0

For the 33 patients for who did not have antithrombotic treatment initiated in the practice, CHA_2DS_2VASc scores were available for 21 patients as per Table 34 below.

Table 34: CHA_2DS_2VASc Score for patients not initiated antithrombotic in practice (n=21)

CHA_2DS_2VASc Score	**Frequency**	**%**
1	0	0
2	5	21.1
3	6	26.3
4	8	42.1
5	1	5.3
6	1	5.3

As all 21 patients had a CHA_2DS_2VASc greater than or equal to 2, oral anticoagulation would be recommended but they did not receive it at the practice for reasons identified in Table 35 below.

Table 35: Reasons for non initiation of antithrombotic in practice for a CHA_2DS_2VASc greater than or equal to 2 (n=21)

	Frequency
Other	12
Not prescribed at this practice	4
Extreme fragility	2
History of falls	2
Patient refused anticoagulation	1
History of major bleeding	1
Not Recorded	1
Liver disease	0
Severe illness	0

Following these patients further, 15 were recorded as being referred to the outpatient department, the emergency department or the medical assessment unit. After these referrals, seven of these patients were commenced on an oral anticoagulant.

Rate control initiated in the practice

This question was answered for 54 patients and it was recorded that 19 were prescribed a rate control medication in the practice (35.2%) – only six of these patients had a pulse rate on ECG of greater than 110 beats per minute at the time of ECG. Of these 19 patients, 12 patients were prescribed a beta-blocker only, four were prescribed a calcium channel blocker only, one patient was prescribed digoxin, one patient was prescribed 'other' while the remaining patient was prescribed a beta blocker and calcium channel blocker.

In Table 25 it was noted that 17 patients had a pulse rate on ECG of greater than 110 beats per minute and seven of these patients were prescribed rhythm control medication at that the time of their screening visit. A further four of these 17 patients were commenced on a rate control medication in the practice. Three patients were prescribed a rate control medication after referral to acute services. Therefore there were three patients who had a pulse rate greater than or equal to 110 who do not appear to be on any rate control medication.

Other medications initiated in the practice

There were no patients out of the 54 that had other medications initiated in the practice. Medications recorded were either pre-existing or were prescribed at that visit.

Referral for further investigations – Echocardiography

There were 54 patients for whom data was available in relation to referral for echocardiography. It was recorded that 24 patients (44.4%) were referred for echocardiography and the referral location is noted in Table 36. It is assumed that practices in Galway referred to GUH and practices in Sligo/Leitrim referred to SRH.

Table 36: Referral for echocardiography (n=24)

	Frequency	%
Hospital Based Echo – Galway practice	6	25.0
Hospital Based Echo – Sligo practice	15	62.5
Community Based Echo	3	12.5

Regarding the 15 referrals to SRH for echo, 12 were referred to either the outpatients department or ED/MAU (Cardiology OPD=7, Medical OPD=1, Cardiology Private=1, ED=1, MAU=2). Three were reported as not referred to any outpatients.

Referral for further investigations – Holter Monitoring

There were 54 patients for whom data was available in relation to referral for Holter monitoring and only one patient was referred for Holter monitoring and this was for a 24 hour Holter monitor.

Specialist Referral and Initiation of Oral Anticoagulation

There were 55 patients for whom data was available in relation to referral to specialist or hospital services. There were 15 patients (27.3%) for whom there were no referrals made to any of the relevant specialists or hospital departments. 53% of the patients not referred were under 80 years of age, 40% were between 80 and 90 years while 7% were over 90 years of age.

Of the remaining 40 patients for whom some referral was made, the specialist or hospital department referred to is as per Table 37 below. Regarding the age profile of those patients

referred to specialist of hospital services, 60% were under 80 years of age, 35% were between 80 and 90 years, while 5% were over 90 years of age.

Table 37: Specialist Referral

	Frequency	Frequency – Galway	Frequency – Sligo
Cardiology OPD	12	5	7
Medical OPD	1	0	1
Geriatric OPD	2	2	0
Other OPD	1	1	0
Cardiology Private	6*	4	2
Emergency Department	10	4	6
Medical Assessment Unit	8	3	5
No Referral	15	6	9

*The patient for whom it was noted at the outset that they were referred to cardiology privately and who had no more data recorded is included in this figure of 6 but not included in any further analysis.

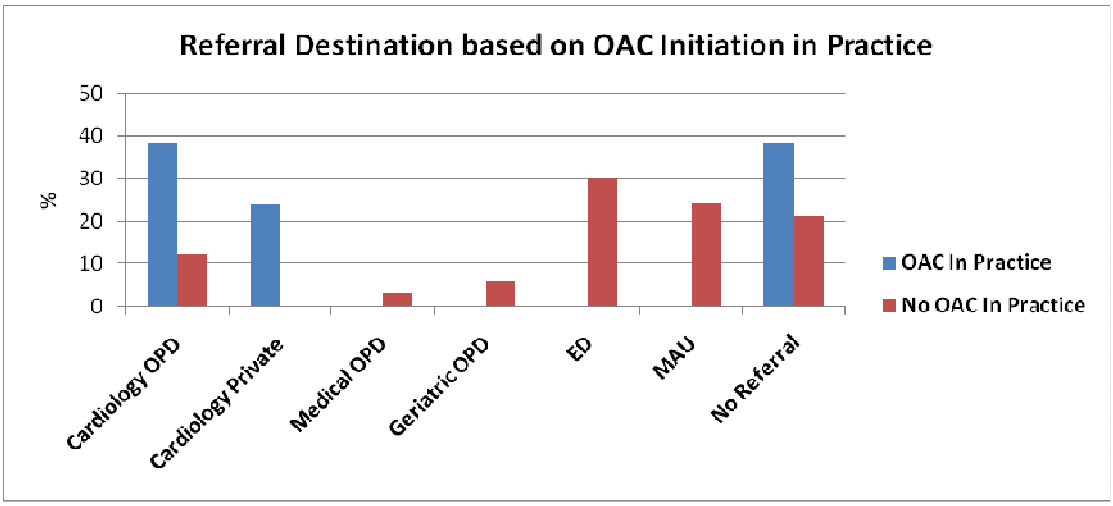
Analysing the referral pattern based on prescription of oral anticoagulation shows that of the 21 patients who were commenced on an oral anticoagulant in the practice, 38% of these patients were referred to cardiology OPD, 24% were referred to cardiology privately while the remaining 38% were not referred to any specialist service or the Emergency Department or the Medical Assessment Unit.

Of the 33 patients who were not started on oral anticoagulant treatment in the practice, 30% were referred to the Emergency Department, 24% were referred to the MAU, 15% were referred to cardiology OPD, 6% were referred to Geriatric OPD and 3% were referred to Medical OPD. 15% received no referral – Table 38, Figure 9.

Table 38: Specialist Referral - initiation of OAC in practice

	OAC initiated in Practice (%) (n=21)	OAC not initiated in practice (%) (n=33)
Cardiology OPD	38.1	12.1
Medical OPD	0	3.0
Geriatric OPD	0	6.1
Other OPD	0	3.0
Cardiology Private	23.8	0
Emergency Department	0	30.3
Medical Assessment Unit	0	24.2
No Referral	38.1	21.2

Figure 9: Referral destination based on whether OAC initiation in practice



This data shows that patients for whom oral anticoagulation was not initiated in the practice were more likely to be referred to the Emergency Department or the MAU compared to patients who were commenced on oral anticoagulation in the practice. 62% of patients who were commenced on oral anticoagulation in the practice were referred exclusively to cardiology OPD clinics with the remaining requiring no referral.

When patients were referred to the Emergency Department (ED) or the Medical Assessment Unit (MAU), the reason for referral was documented by the GP – Tables 39 and 40

Table 39: Reasons for referral to Emergency Department (n=10)

	Frequency	%
Fast AF	3	27.3
Unstable/Unwell	3	27.3
Chest Pain	1	9.1
Cardiac Failure	1	9.1
Acute Coronary Insufficiency	1	9.1
Palpitations	1	9.1

Table 40: Reasons for referral to the Medical Assessment Unit (n=8)

	Frequency	%
Dyspnoea	4	50
Pneumonia	1	12.5
Respiratory Infection	1	12.5
Further AF Investigation	1	12.5
For Assessment	1	12.5

These are all justifiable reasons for referral to the ED or MAU and shows that appropriate action appeared to be taken by GPs when required.

Results from referrals and investigations

Lone/Idiopathic Atrial Fibrillation

There were 53 patients that had this data completed. The patient who died on the day of referral had no further results data available. Of the 53 patients that had this data completed, 36 (67.9%) were documented as having lone/idiopathic atrial fibrillation.
The remaining 17 patients had an aetiology noted and these are outlined in Table 41.

Table 41: Aetiology of non idiopathic atrial fibrillation patients (n=17)

	Frequency	%
Infection	7	41.2
Heart Failure	4	23.5
Valvular Heart Disease	2	11.8
Coronary Heart Disease	2	11.8
Other	2	11.8

Anticoagulation for Atrial Fibrillation after referral

It was asked at this stage if the patient was prescribed an anticoagulant or antiplatelet and 33 patients were recorded as being on an anticoagulant as noted in Table 42. It is interesting to note that of these 33 patients, 21 were recorded as having anticoagulation initiated at the practice with the remaining 12 prescribed anticoagulation after referral – Table 43, while Figure 10 gives an overview of prescribing practices during this study.

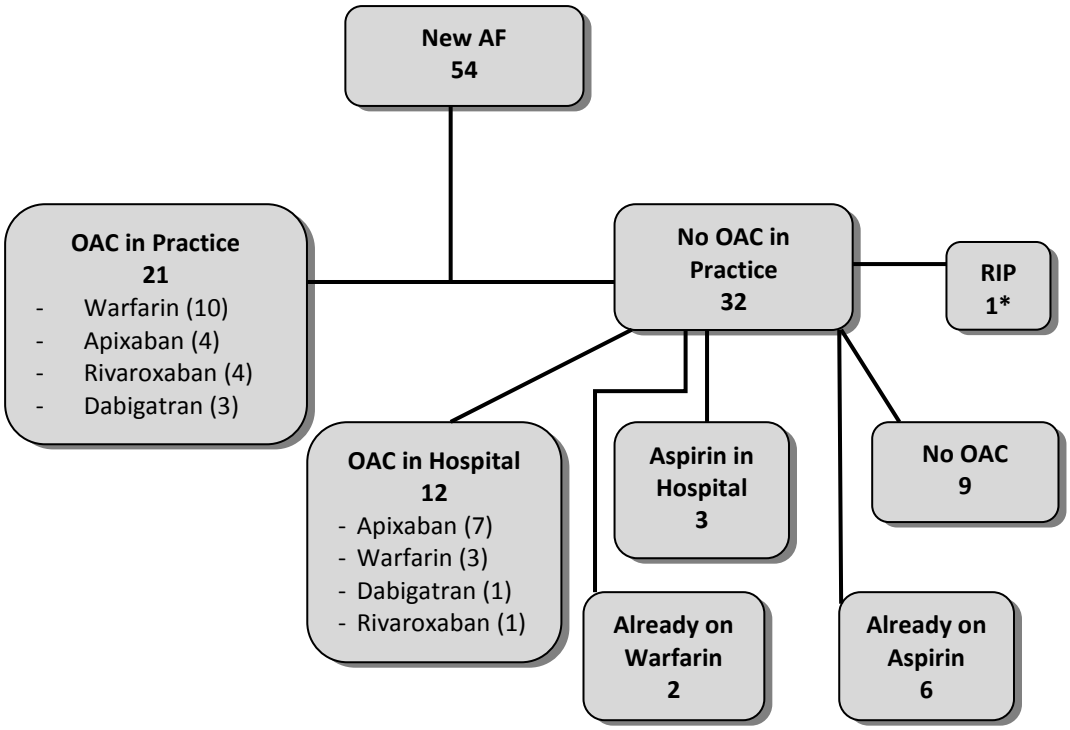
Table 42: Total patients on Oral Anticoagulation after referral (n=33)

	Frequency	%
Warfarin	13	39.4
Apixaban	11	33.3
Rivaroxaban	5	15.2
Dabigatran	4	12.1

Table 43: Patients prescribed Oral Anticoagulation in hospital (n=12)

	Frequency	%
Apixaban	7	58.3
Warfarin	3	25.0
Dabigatran	1	8.3
Rivaroxaban	1	8.3

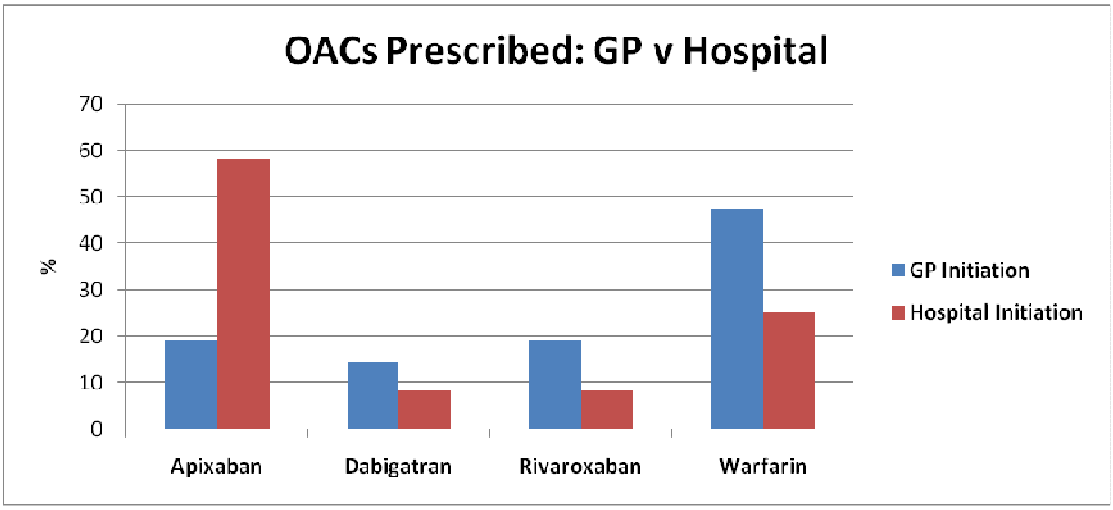
Figure 10: Initiation of anticoagulation



* For the patient that died after referral to ED, it was recorded that oral anticoagulation was not initiated in the practice but there was no further data recorded for this patient

Figure 11 outlines the prescribing practice of oral anticoagulants based on prescription by GP or in the hospital. This shows that GPs were more likely to prescribe warfarin to their patients more so than the novel oral anticoagulants while hospitals were more inclined to prescribe the novel agents although 25% these patients were commenced on warfarin.

Figure 11: Comparison of prescribing practice: GP v Hospital



Of the 21 patients that were prescribed anticoagulation in the practice, all 21 remained on an anticoagulant after any referrals.

Other medication initiated after referral

There were 37 patients for whom additional medication was prescribed after referral and multiple options could be selected and these medications are documented in Table 44.

Table 44: Other medications after referral (n=37)

	Frequency
Beta blockers	22
Diuretics	13
Cholesterol lowering agents	9
Calcium channel blockers	8
ACE Inhibitors	6
Anti arrhythmics	7
Oral antithrombotic agents	4
ARBs	4
Thyroid replacement therapy	3
Digitalis preparations	1

Echocardiography Result

The echocardiography result was available for 25 patients. Analysing the age profile of these 25 patients, 64% were under 80 years of age with 36% greater than 80 years. There were no patients greater than 90 years of age. However, eight of these were recorded as not having been referred for echo at all and there were seven patients who were referred for echo for whom the echo result was not available/recorded. The echo result for the 25 patients for whom data was recorded is noted in Table 45. There could have been more than one result selected.

Table 45: Echocardiography results (n=25)

	Frequency
Ejection Fraction ≥50%	7
Ejection Fraction < 50%	7
Other	7
Normal	5
Atrial Enlargement	4
Moderate Mitral Regurgitation	3

Holter Result

There was only one patient referred for Holter monitoring with a normal result reported.

Specialist Follow Up

There were 19 patients for whom a result of specialist follow up was carried out. Patients could attend more than one clinic and one patient attended both a cardiology outpatient clinic and the medical assessment unit while another patient attended both a cardiology outpatient clinic and a medical outpatient clinic. There were 33 patients for whom there was no record of any specialist follow up recorded despite 19 of these indicating that they were referred. For those that had some specialist follow up the clinics that they attended are noted in Table 46.

Table 46: Specialist Follow Up (n=19)

	Frequency
Cardiology OPD	8
Medical Assessment Unit	5
Cardiology Private	3
Geriatric OPD	2
Other OPD	1
Emergency Department	1
Medical OPD	1

Cardiac Investigations and Procedures

A small number of patients had further cardiac investigations and procedures as outlined in Table 47. No patient had more than one investigation or procedure carried out

Table 47: Cardiac Investigation and Procedures

	Frequency	Galway	Sligo-Leitrim
Cardioversion	4	2	2
Device Implanted	1	0	1
Cardio	1	1	0
Angiography			
PV Isolation	0	0	0
EP Studies	0	0	0
Ablation	0	0	0

New complications detected that were AF related

There were three patients for whom it was noted that there was a new complication detected that was AF related. The options provided for this question were 'Stroke/TIA', 'Bleeding' and 'Other' and all three recorded 'Other' indicating that there were no cases of Stroke/TIA or bleeding in patients during the study. Two of these patients were prescribed oral anticoagulant – one in the practice and one after referral.

New diagnosis of other disease

There were five patients who had a diagnosis of another disease as a result of this screening process. One patient was diagnosed with diabetes; one was diagnosed with a urinary tract infection with acute kidney injury while a third patient was diagnosed with heart failure. The two remaining patients were recorded as 'other' but no further details were recorded.

Clinical Status

Table 48 outlines the clinical status of the newly diagnosed AF patients three months post diagnosis. There was one patient who died after screening. They were referred to the Emergency Department on the day of screening with fast AF and died later that day. The cause of death was as yet unknown at the practice when queried.

Table 48: Clinical Status Three Months Post Diagnosis (n=54)

	Frequency	%
Alive	53	98.1
Dead	1	1.9

Of the 53 patients that were recorded as alive three months post diagnosis, 41 (77.4%) were recorded as still being in AF while 12 were recorded as no longer being in AF (21.7%). Of the 12 patients no longer in AF it was recorded that AF was still suspected in two cases.

There were 46 patients (86.8%) recorded as being 'Clinically Stable', two patients (3.8%) were recorded as 'Clinically Unstable' while five patients (9.4%) were recorded as 'Living Independently'.

General Practitioner/Practice Nurse Survey

One of the main aims of the study was to report on the perceptions of clinicians, general practitioners and practice nurses, to opportunistic detection of AF by routine pulse checking. This was achieved by the circulation of a questionnaire (Appendix 6) to all participating practices with instruction for any GP and/or practice nurse who participated in the study to complete it. While the project team knew that there were 89 GP's based in the participating practices, it was not known how many of these actually participated in the study. In addition, not all practices had a practice nurse and some may have had more than one assisting with the study. With that in mind each practice was sent three surveys for completion and informed to request more if required. As a result 111 surveys were issued and 65 were returned – a response rate of 59% of which 68% were from GPs and 32% were from practice nurses.

Rural practices provided 54% of responses, 40% were described as rural with 3% recorded as a mixed practice. Two practices (3%) did not provide an answer to this question. Just under half of practices (49%) reported that they were located more than 10 miles from their nearest hospital with 31% located less than three miles away. The remaining 17% were located between 3 and 10 miles away with 3% not recorded.

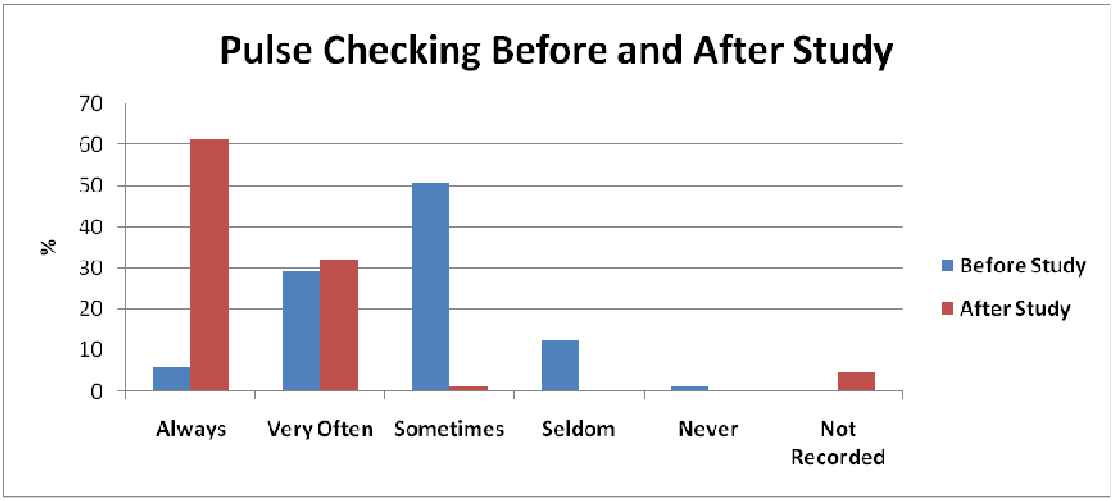
Changing practice – pulse checking

Respondents were asked how often they would have tested the pulse of a patient over 65 years of age both before and after the study. There appears to have been a major change in practice with regard to regular pulse checking as a result of the study as 62% of GPs and practice nurses reported that they always checked a patients pulse after the study compared to 6.2% before the study. After the study, no GP or practice nurse reported that they seldom or never checked pulse. There was very little difference in change in the practice of pulse checking when analysed based on respondent category – GP or Practice Nurse.

Table 49: Pulse Checking – before and after study

	Before Study (%)	After Study (%)
Always	6.2	61.5
Very Often	29.2	32.3
Sometimes	50.8	1.5
Seldom	12.3	0
Never	1.5	0
Not Recorded	0	4.6

Figure 12: Pulse Checking – before and after study



Confidence in diagnosing Atrial Fibrillation

During the study, diagnosis of AF involved the detection of an irregular pulse initially and then followed up with an ECG. GPs and practice nurses were asked about their confidence in diagnosing AF through pulse checking and ECG review both before and after the study. There was a high level of confidence in ability to detect an irregular pulse among the respondents

both before and after the study which increased as a result of the study – Table 50. Confidence with regard to diagnosing AF from an ECG was not as high but did improve after the study -Table 51. GPs expressed more confidence in both detection of an irregular pulse and diagnosis of AF from an ECG compared to practice nurses, particularly diagnosing AF from an ECG – 84.1% of GPs were confident in diagnosing AF from an ECG after the study compared to 33.3% of practice nurses.

Table 50: Confidence in Detecting an Irregular Pulse

	Before Study (%)	After Study (%)
Confident	80.0	92.3
Fairly Confident	18.5	6.2
Not Confident	1.5	0
Not Recorded	0	1.5

Table 51: Confidence in Diagnosing AF from an ECG

	Before Study (%)	After Study (%)
Confident	56.9	67.7
Fairly Confident	29.2	29.2
Not Confident	13.8	1.5
Not Recorded	0	1.5

The respondents were asked how often they referred to the HSE Atrial Fibrillation Care Pathway in caring for their patients newly diagnosed with AF. Only 26% of GPs and practice nurses reported that they either 'always' or 'very often' referred to the HSE AF Care Pathway. There was no facility within the questionnaire to probe this further.

Table 52: How often was the HSE AF Care Pathway referred to?

	GPs (%)	Practice Nurse (%)	All (%)
Always	20.5	4.8	15.4
Very Often	9.1	14.3	10.8
Sometimes	22.7	28.6	24.6
Seldom	18.2	9.5	15.4
Never	29.5	28.6	29.2
Not Recorded	0	14.3	4.6

Engagement with Secondary Care

Respondents were asked a number of questions regarding their engagement with secondary care when seeking clinical advice on their patients who they thought may have AF or who they diagnosed with AF and were seeking further advice. Almost two-thirds of respondents reported that they 'seldom' or 'never' phoned the hospital to seek advice and this actually decreased slightly after the study. A very small proportion reported that they phoned the hospital either 'always' or 'very often'.

Table 53: How often would practice phone hospital for advice on irregular pulse

	Before Study (%)	After Study (%)
Always	3.1	1.5
Very Often	1.5	6.2
Sometimes	26.2	23.1
Seldom	32.3	23.1
Never	33.8	41.5
Not Recorded	3.0	4.6

Respondents were asked to estimate how many times they rang the hospital during the study to seek advice and 81% reported that they never rang the hospital, 9.5% reported that they rang once and a further 9.5% rang twice. For those who needed to access clinical advice and support from the hospital, 40% indicated that they were satisfied with the support they received (59% recorded that they did not need advice). For those that needed access to diagnostic tests 48% were satisfied with the access they received (41.3% reported that they did not need access to diagnostic tests).

Seven respondents provided further comments with regard to their satisfaction of lack thereof to clinical advice and diagnostic tests. Most comments were regarding delays and need for the GP to follow up:

- *"No discernable difference in access despite using AF Study stickers"*
- *"re access to diagnostic tests, referred not seen to date"*
- *"Seemed to take longer than expected to have echo - i.e. several weeks"*
- *"Patients appointments for echo needed to be followed up by us - cardiology follow up not received"*

- *"Time waiting for echo was quite slow ~ 2 months. My main issue was time waiting to be seen by cardiologist"*
- *"Patients weren't started on anti-coags in hospital - seen on 2 occasions"*
- *"General comment re phoning hospital: really not practical for hospital or GP and no need anyway, access to diagnostic tests not timely. It took a few months to get the echo done and we still haven't got appt for cardiology OPD. Put patient on warfarin anyway after discussion with hospital".*

Treating Atrial Fibrillation Patients

Respondents were asked how many additional visits that a newly diagnosed AF patient would make to their practice in the first six months since their diagnosis. There were varying responses to this, twelve reported 6 visits, i.e. one a month but of the comments that were recorded all indicated that it depended on the medication prescribed with more visits expected if a patient was started on warfarin.

Table 54: Estimated Number of additional visits since diagnosis (n=54)

No. of Visits	Frequency	%
0 – 2	4	7.4
3 - 5	18	33.3
6 - 10	24	44.4
>10	8	14.8

Of the 44 GPs that completed the questionnaire, 42 answered the question regarding prescription of an oral anticoagulant for newly diagnosed AF patients at their practice and 48% of GPs reported that they did. Of the GPs that didn't prescribe an oral anticoagulant there were a number of comments made. There were 11 comments that noted that they didn't detect any new AF patients during the study. The remaining comments are noted below and generally indicated that the patients were contraindicated to oral anticoagulation referred to hospital:

- *"One patient diagnosed. She was referred privately and started on NOAC, not seen here since"*
- *"Our practice never prescribe warfarin, always started in hospital"*
- *"Elderly isolated man living alone with a high risk of falling"*

- *"Seen in hospital and prescribed anticoagulant"*
- *"Patients acutely unwell at that time, one had AF and PE"*
- *"CHAD Vas score too low"*
- *"Referred to MAU Sligo if new onset AF"*
- *"v. elderly/frail and referred to geriatrics who failed to prescribe anticoagulants due to falls risk"*
- *"Admitted to hospital in CCF"*
- *"Big decision (and life change for patient) to start someone on warfarin/NOAC and often not straightforward e.g. patient already on aspirin. I therefore think it is better usually to leave decision to specialist"*

Study Information Session

Attendance at the study information session organised by the study team was confirmed by 85% of respondents to the survey. In some cases it was the practice nurse, in others it was the GP Registrar but these were in the minority. Regarding usefulness of the study information session, the following were the responses:

Table 55: Usefulness of Study Information Session Topics

	Too Much Detail (%)	Sufficient Detail (%)	Not Enough Detail (%)
Epidemiology of AF (n=40)	5	95	0
HSE AF Care Pathway (n=40)	2.5	97.5	0
Checking for Irregular Pulse (n=40)	7.5	92.5	0
Interpreting ECG Results (n=40)	5	87.5	7.5
Overview of OAC Therapies (n=40)	2.5	97.5	0
Case Histories (n=39)	0	97.4	2.6
Using the AF Form & Data Entry (n=40)	0	95	5

The feedback was that there was generally sufficient detail provided for attendees. When asked how useful the information session was with regard to helping practices undertake AF screening themselves 42% reported that it was very useful, 56% reported that it was useful while 2% indicated that it was not useful. There were two comments provided for this section:

- *"Doing it by doing the research was very helpful but the education day not useful"*

- *"There was already a lot of info available from the drug companies selling the novel anticoags"*

With regard to need for further training in certain areas the responses were as follows with training needs identified in the areas of interpreting ECG and anticoagulation therapies in the main.

Table 56: Need for further training (n=65)

	Yes (%)	No (%)
Checking Irregular Pulse	0	100
Performing ECG	4.6	95.4
Interpreting ECG	32.3	67.7
Anticoagulation Therapies	24.6	75.4
HSE AF Care Pathway	20	80
Other	1.5	98.5

Information Technology (Data Collection Tool)

Almost two thirds of respondents (66.1%) reported that the data collection tool employed in the study was either 'very easy' or 'easy' to use with 12.3% reporting that it was 'somewhat difficult to use'. One in five (21.6%) indicated that they did not use the software or that another member of the practice used it. There were a number of comments recorded which related mainly to difficulties encountered with the software:

- *"Initial difficulties downloading software due to 'Macro' issues, with security settings. Cumbersome process with repetition when in A Fib element (newly diagnosed patients) with data not available at initial assessment e.g. alive at follow up"*
- *"It could only be used by one user at a time. Also, we had to search through if we had already seen a patient, time consuming"*
- *"The information from HealthOne would not go directly into the referral form of the presentation sheet or clinical sheet"*
- *"Just lots of windows clicking, it would have been easier if the AF study could have 'suck out' the (anonymised) data it required from the HealthOne system"*
- *"No place to put in if irregular pulse but no A Fib"*

- *"There should be a tab key to bring you directly into the next tab for filling in data besides having to direct yourself"*
- *"Didn't make it clear which box wasn't completed and it didn't save a few times when I thought it had"*
- *"Very time consuming when tab button could not be used, e.g. for the DOB, could not tab from day to month to year"*
- *"If patient with known A Fib had regular pulse difficult recording same"*
- *"Not linked to GP software"*
- *"Inputted after the event, 99% inputted and couldn't get pass screening page to input an admission. Opened new data excel for 1 file. Sent off both and Paul M merged them."*
- *"Using the printed blank spreadsheet was much faster and easier so therefore more likely to record more pulses"*

Support

Respondents were asked if there was anything further that the study team could have done with regard to support provided to practices during the study and of those that responded 89% reported that there was nothing else that they required. There were a number of comments provided. Most referred to the technological aspects of the study - data collection tool, integration with GP software packages etc.:

- *"Better data collection process vis a vis recent SIMPLE study (urine infection study). I know there is a cost element involved but frustrating spending so much time on demographic entry which could be automatic"*
- *"Improve the technological aspects of the study"*
- *"Better to integrate the referral sheet into HealthOne"*
- *"Should have been able to network the findings within the practice. Other people had been screened by Doc 1 and when Doc 2 saw them there should have been a way to input the data in real time"*

There were a number of miscellaneous comments which are noted below:

- *"However if irregular pulse detected and ECG normal, ?need screening, how often with further ECGs i.e. repeat feeling of irregular pulse over 6/12 with normal ECG on first , advice on what should I do?"*

- *"More feedback on referred patients"*
- *"Standard letters poor so only used occasionally"*

This final comment highlights one of the overall aims of the study – to change clinical practice with regard to detecting AF in general practice:

- *"I think the best thing about the project is that it changed our clinical practice. We now take (and record) the pulses in all those over 65. We have a significant number of elderly patients in our practice so that has been worthwhile for them"*

Change in Practice

As a result of the study 86.2% of respondents indicated that they now routinely checked pulses in all patients over 65 years of age with a further 3.1% reporting that it had always been standard practice. One respondent indicated that they checked pulses 'a lot more often'. There were six respondents (9.2%) who reported that they did not check pulses routinely as a result of the study. Five of these respondents provided comments to explain:

- *"Do it for some patients but not everybody"*
- *"Not all but much more frequently and much more likely to do it now when doing a BP"*
- *"I don't screen people. I still only check if presenting complaint is relevant"*
- *"Depends on when last seen"*
- *"9 out of 10, If consultation purpose is not linked to heart condition I might sometimes not check the pulse (i.e. verucca)"*

Patient Survey

The final aim of the study was to evaluate the patient experience of enhanced AF care and acceptability to patients of opportunistic detection of AF by routine pulse checking. This was achieved by the circulation of a questionnaire (Appendix 7) to all participating practices with instruction to present the questionnaire to any patient newly diagnosed at their practice through the screening process. There were 55 patients newly diagnosed with AF and 22 questionnaires were returned which is a 40% response rate.

Of the 22 respondents, 32% were male and the average age of the respondents was 75.6 years with a breakdown by gender shown in Table 57. While females were older, this difference was not statistically significant (p=0.429).

Table 57: Average age of patients who responded to the questionnaire (n=22)

	Mean (±sd)	Median (IQR)
All	75.6 (±7.2)	74.5 (70 – 81)
Male	73.7 (± 3.2)	74 (70 – 76)
Female	76.4 (±8.4)	77 (68 – 82)

Half of patients (50%) reported that they were located less than three miles from their GP with a further 40.9% between three and five miles away. The remaining 9.1% resided between 6 and 10 miles away with no patient living more than 10 miles from their GP. When asked about their distance from their nearest hospital 77.3% lived more than 10 miles away with 9.1% were between 6 and 10 miles away with the remaining 13.6% living less than five miles away.

Knowledge of AF prior to diagnosis

Knowledge of AF was quite limited amongst the patients prior to their enrolment in the study with 86.4% reporting that they had no knowledge of AF prior to their diagnosis. The patients were then asked a number of questions regarding the information they received when first diagnosed with responses outlined in Table 58. The vast majority of patients appear to have received relevant information at the time of diagnosis but there were a number of patients that were unsure.

Table 58: Information received by patients at time of diagnosis

	Yes (%)	No (%)	Could Not Remember/Did not know what it was (%)
What is AF? (n=22)	86.4	13.6	0
The health risks associated with AF (n=21)	85.7	9.5	4.8
What is involved in having an ECG (n=21)	90.5	4.8	4.8
Medication for AF (n=20)	90	10	0

Regarding information received since diagnosis, 68.2% indicated that received just the right amount with 22.7% indicating that they did not receive enough information. The remaining patients reported that they received too much information.

When asked about their ECG, 95% reported that they had one when informed that the GP had detected an irregular pulse with 70% having the ECG during the same appointment. A follow up appointment was made for 25% with 5% providing no answer.

Encouragingly, 91% of respondents were aware of the increased risk of having a stroke as a result of their diagnosis with AF.

Hospital Appointments

Patients may have been referred to hospital for an appointment with a cardiologist or other specialist services and 86.4% reported that they attended hospital as a result of their diagnosis with AF. Of these patients, 37% reported that hospital attendance was either 'somewhat difficult' or 'very difficult' for them. The vast majority of patients (90.9%) would prefer their care for their AF to take place at their local GP.

Medication

Of the 22 patients who completed the questionnaire, 90.9% reported that they were prescribed medication to treat their AF and 90% of these stated that they were on some form of blood thinning tablets. The options provided on the questionnaire were warfarin, Pradaxa, Xarelto or Elquis. For those who were prescribed some form of blood thinning medication, 83.3% reported that they received information on the medication from their GP or practice nurse. For those who were prescribed medication for their AF, 95% reported that it was very important for them to take their medication each day at the correct time.

There only appeared to be eight respondents taking warfarin and those eight all recorded that their INRs were checked at their GP.

Two patients reported that they had difficulties taking their medication for AF with one of these patients indicating that it was difficult for them to remember to take their tablets.

Lifestyle

None of the respondents were current smokers with 31.8% recording themselves as former smokers. Since their diagnosis with AF, 19% indicated that they had taken steps to reduce their alcohol consumption but the majority, 71.4% were non drinkers of alcohol. Regarding diet, 68.2% of respondents noted that they always had a healthy diet but encouragingly 22.7% indicated that since their diagnosis with AF they have taken steps to improve their diet. Half of respondents exercised regularly with 13.6% having taken steps to increase their exercise levels since diagnosis with AF.

Patient Opinion on Screening and Treatment

On the screening for AF, 86.4% of patients reported that screening was very important for them, 4.5% felt it was important while 9.1% indicated that screening was not important. Almost three quarters (72.7%) were very satisfied with the management of their AF with the remaining 27.3% satisfied.

Quality of Life

The survey asked for the patients to comment on their quality of life since their diagnosis with AF and 21 patients provided a response. 42.9% reported that their quality of life was good or very good with a further 38.1% reporting that there was no major change in their quality of life. The comments didn't indicate if the patients' quality of life was good or poor before their diagnosis so it is difficult to qualify the comments of no change. Four patients (19%) recorded that their quality of life had diminished somewhat since their diagnosis and these comments are noted below:

- *"More tired"*
- *"I need to rest more often as it leaves me very tired. I have to go back to bed twice during the daytime. This leaves my quality of life poorer"*
- *"Relying on medication more and the information received with it reasonable"*
- *"Slowed down"*

When asked about anxiety or worry about being diagnosed with AF, 31.8% felt that they were worried about having AF. Six comments were provided to further explain the reasons for their worry and deteriorating health with potential for heart attack or stroke were noted in two of the comments. Worry over general health was mentioned in another two

comments while reference to a patient's mother's death at 60 years of age and the fact that no one else in a patient's family had heart problems were the final two comments.

Feedback from Hospital Sites

The experience of the two hospital sites participating in the study was obtained via a one page questionnaire distributed to each site. The responses were returned by the Chief Cardiac Technician at each site and are outlined in Table 59 below.

Table 59: Feedback from hospital sites

	Galway University Hospital	**Sligo Regional Hospital**
No. of referrals received from practices using study referral form	5	10
No. of requests for Echo received	5 – Echo 1 – Holter 1 – Event (5 day Holter)	10
Did you receive calls from GPs for advice?	Yes	No
Was it feasible for your service to provide GP telephone support	Yes	No

General thoughts and comments were requested in relation to the screening and referral process and on any further extension of the programme nationally.

Galway University Hospital

- "Overall the activity through the department did not reflect the reported incidence of new AF as reported at the Irish Cardiac Society"
- "It will be interesting to see where these patients were routed"
- "A national programme as outlined would need to consider resources to facilitate direct access to cardiac diagnostics for GPs"

Sligo Regional Hospital

- "Low number of echo referrals may be due to the fact that we already had in place 'open access echo for heart failure patients'"
- "One patient referred underwent pacemaker implant for AF with pauses"

- “Received good support from Dr Paula Hickey in reviewing patients in MAU”

Overall, the anticipated volume of referrals to hospital did not materialise with 15 referrals noted by the cardiac diagnostics departments. However, data supplied by GPs reported that there were 24 patients (44%) referred for echocardiography. There were a further eight patients for whom echocardiography results were recorded by the GP but for whom no referral for echocardiography was reported by the GPs. This would imply that 32 patients (59%) required an echo. The mechanism of referral for echocardiography for the 17 patients that were not noted by the cardiac diagnostics department is unclear. These may have been referred during the existing hospital attendance either via the Emergency Department or the Medical Assessment Unit or via the regular outpatient service and not identifiable as patients who were initially diagnosed as having AF in the screening study.

Discussion

The global epidemic of atrial fibrillation is in full swing as documented by the Global Burden of Disease study[29] and Ireland as a nation should have significant concerns with this regard. Atrial Fibrillation is a diagnosis which is particularly common among the elderly with prevalence rates increasing linearly over the age of 65 years[30 31]. Between 2014 and 2017 the Irish population aged 65 and over is expected to increase by 9.9% with an approximate increase of 20,000 persons 65 years and over each year[32]. The lifetime risk of Irish people of European descent developing AF after 40 years of age is 26% for males and 23% for females[33]. Patients with AF have a 5-fold increased risk of stroke and this risk rises with age[4].

Prevalence and Incidence of Atrial Fibrillation

This study demonstrates that in General Practice in Ireland currently there is prevalence of AF of 10.9% among adults 65 years and over which equates to 220 patients per thousand in a year. This is almost double the rate (5.3%) which was detected in The Longitudinal Study of Ageing (TILDA) for over 65's[2]. This increase in prevalence is supported by results from a recent Irish study by Bury et al which reported a prevalence rate of 10.3% in a population of over 70 year olds[34]. Although it would be expected to detect an increase in a health care population compared to a random population sample, it would not be expected to witness an increase to this extent. With our aging population this will increase further annually.

Fifty five new cases of AF were detected during this study. This gives an annual incident rate of 1.7%. Using population data from the Irish national census 2011, this would imply that there would be 8,415 new cases of AF detected in patients over 65 years old each year in General Practice in Ireland if opportunistic screening were introduced.

Demography and Risk Factor Profile of AF Patients

Although internationally the incidence and prevalence of AF is significantly greater in males than in females, this pattern was not evident in this study[29] . Incident AF patients were 49% male (n=27) and 50.9% female (n=28) with incidence rates detected of 0.9% and 0.8% respectively. The mean age was 76.6 (+/- 8.1) with ages of 75.2 (=/- 8.1) and 78.0 (+/- 8.1) for males and females respectively. It is interesting that the greatest proportion of male patients were in the younger cohorts (33.3% aged 64-69 (n=9); 22.2% aged 70-74 (n=6)) with increasing proportions of females in the older cohorts (28.6% aged 80-84 (n=8) and 21.4%

aged 85-89 (n=6)). This could possibly be influenced by poorer risk factor profile in men at a younger age and longer life expectancy in females compared to males.

Smoking, obesity, heavy alcohol consumption and hypertension are risk factors for AF. In this study sample, 80.8% of males (n=22) and 88.9% of females (n=25) were non smokers with only 11.1% of females (n=3) reported as current smokers and 19.2% of males (n=5) reported as smoking in the previous 10 years. This is contrary to the initial TILDA study report which reported 19.1% of adults 65 years and over as smokers. In addition, although the rate of alcohol consumption was 67.7% (n=18) and 46.4% (n=13) respectively for males and females, heavy alcohol consumption was reported only in 5.6% of males and 15.4% of females. Almost 80% of all AF patients were either overweight or obese with over 40% of female AF patients obese. Of the obese female AF patients, one in five is a heavy drinker. This gives cause for concern and reflects the urgent and increased need for focused brief intervention therapies in primary care.

Hypertension gives rise to increased arterial stiffness which causes diastolic dysfunction and atrial volume overload resulting in AF. In the Global Burden of Disease study 2010 hypertension is the leading health risk factor[29]. In addition hypertension was the most prevalent risk factor (62%) in RE-LY registry of AF patients[27]. In study participants, 70% (n=38) reported a history of hypertension. However, on examination only 4% (n=2) of patients reported a systolic blood pressure greater than the recommended 150mmHg[28]. While 70% of patients were recorded as having a medical history of hypertension and with 97% of these patients taking anti-hypertensive medication, 32% of females and 12% of males reported a systolic blood pressure of greater than 140mmHg and 18% of females had a diastolic blood pressure measurement greater than 90mmHg. This highlights the continued need for increased awareness and vigilance with blood pressure control and treatment. Strict blood pressure control decreases mortality and stroke risk[35]. Blood pressure reduction results in a 35%-45% reduction in the risk of ischemic and haemorrhagic stroke. The number of hypertensive patients needed to treat with appropriate anti-hypertensive therapies to prevent one stroke ranges from 52 to 118 for diastolic blood pressure categories of less than or equal to 115mmHG and 90-110mmHg respectively. While this study did not report major lack of blood pressure control amongst participants it is an ongoing area where significant improvements can be made with regard to BP control.

Stroke Risk Assessment of AF patients and Anticoagulation Treatment

The CHA_2DS_2VASc Score is a clinical prediction tool for estimating the risk of stroke in patients with non rheumatic atrial fibrillation. It can be used to determine whether or not oral anticoagulation treatment is required with a score of greater than or equal to two equating to a recommendation to prescribe oral anticoagulation[18]. In this study, 95% of study participants had a score of two or greater which is consistent with the recommendation and assessment for anticoagulation therapy. Between 40-60% of patients are suitable for anticoagulation therapy[14] however our rates have been sub-optimal with Irish rates well below 40%[24 36]. This study demonstrates a change in practice with 61% (33/54) of AF patients commenced on an oral anticoagulant either in general practice or in the hospital setting. This is a very significant improvement and perhaps can be attributed to a combination of strategies; an increased awareness regarding stroke risk and the introduction of the novel oral anticoagulants (NOAC's). Of the patients commenced on an oral anticoagulant, 60.6% were commenced on NOAC's and 39.4% were commenced on warfarin. When further examined, hospital centres appear to be more likely to prescribe NOACs with two thirds of patients commenced on oral anticoagulation in a hospital centre commenced on a NOAC.

Economic Benefits of Opportunistic Screening in Primary Care

This study demonstrates that approximately 8,415 new cases of AF could be identified by opportunistic screening in General Practice each year. The number of AF patients needed to treat with oral anticoagulation to prevent one stroke varies with each anticoagulation agent. Take for example warfarin and one of the NOACs e.g. Dabigatran. Up to 168 strokes could be prevented each year if warfarin was prescribed to suitable patients with new AF[14]. This could be further increased to 192 if NOAC's were used as the anti-coagulation agent[36].

Table 60: Number of strokes prevented by anti-coagulation with warfarin[14]

	Strokes averted by anticoagulants in AF patients (8,415 AF patients, 50% suitable for warfarin = 4,207)
If NNT = 37	113
If NNT = 33	127
If NNT = 25	168

NNT = number needed to treat

Table 61: Number of strokes prevented by anti-coagulation with NOAC[36]

	Strokes averted by anticoagulants in AF patients (8,415 AF patients , 50% suitable for anti-coagulation = 4,207)
If NNT = 167	113 + 24 = 137
If NNT = 167	127 + 24 = 151
If NNT = 167	168 + 24 = 192

NNT = number needed to treat

The cost of an AF stroke is €56,022 to the Irish health system inclusive of inpatient and community costs[37]. The potential cost saving from stroke care of opportunistic screening for atrial fibrillation in General Practice could vary from €7.7 million to €10.8 million annually. This is an initiative that should be strongly considered as a preventative strategy in the elderly.

Burden of Opportunistic Screening for AF on Hospital Centre

In planning this study, a real concern for the hospital centres was the potential increase in referrals from general practice for clinic appointments, cardiac investigations and Emergency Department (ED) referrals. This study showed that while the burden of referrals fell on cardiology departments (diagnostics and outpatients) referrals were lower than anticipated. A quarter of newly diagnosed AF patients were treated entirely in general practice with no referral to secondary care. Forty six percent were referred for cardiac investigations; all but one was referred for Echocardiography with the remaining patient referred for Holter monitor. In addition, it is evident that the majority of patients commenced on oral anticoagulation in general practice were referred directly to a cardiology outpatients clinic or a private cardiology clinic whereas those not commenced on oral anticoagulation in general practice were referred to ED and the Medical Assessment Unit (MAU). However, when the reasons for referral to ED and MAU were interrogated, a reasonable clinical decision was plausible in all but two referrals. This demonstrated that clinical guidelines and the AF care pathway were adhered to throughout this study and the commencement of oral anticoagulation in general practice avoids unnecessary referrals to EDs and MAUs. This further endorses the benefits of an opportunistic screening programme for AF in general practice.

Burden of Opportunistic Screening on General Practice

Opportunistic screening in general practice is a very convenient way to screen patients with little additional effort when compared to systematic screening. However, opportunistic screening in itself increases the workload in general practice. In the six month period of the study, there were 9,713 screening visits recorded. That is the number of times the pulse was palpated. Of those palpated, there were a number of repeat visits by individuals which is to be expected in general practice, therefore in total, 7,262 individuals were screened. This represented 29.5% of the estimated population at risk in a six month period which equates to approximately 60% in a 12 month period. In addition, 12.6% of those screened had an irregular pulse of whom the vast majority were known to the practice. ECG's were carried out on patients with newly detected irregular pulses (0.9% of all screened patients). In total, there were 70 ECGs performed of which 15 did not confirm the presence of AF. This is time consuming and in some instances required an additional visit. Furthermore, all newly diagnosed patients received counselling and education regarding their new diagnosis, treatment options and lifestyle risk factors. This education and relevant materials were made available to all practices at the outset of the study. In addition, the decision to anticoagulate in itself increases the workload further as both warfarin and the NOAC's require regular monitoring of INR and creatinine clearance respectively. It is important that despite the overwhelming benefits of an opportunistic screening for atrial fibrillation in general practice, we are cognisant of the additional workload this demands from general practice.

Demographic Risk Factor Profile of Adults 65 years and over

A screening study of this nature provides valuable information regarding the health status of persons 65 years and older. It also allows us to compare a sample attending a GP practice with those in a random population sample in the TILDA study. Firstly, it is interesting that although 55% of the screening sample was female and 45% were male, males represented the greatest proportion of attendees in the age groups 64-69, 70-74, and 75-79 with females taking over with the remaining age groups. This is contrary to what we would expect anecdotally that men are poor attendees in general practice. However, TILDA reported that there was very little difference between male and female utilisation of health services including general practice. TILDA also reported that there was little evidence that age was a major driver of the use of hospital and GP services and that the apparent effect of age arose from a range of other causes such as the presence of disabilities and diseases associated

with older age and some entitlement factors such as free medical card[38]. A subsequent TILDA report looked at the frequency of GP visiting and noted that frequency of attendance increased with age but a similar pattern of attendance was evident[39].

In this study, the prevalence of smoking among those 65 years and over is 8.9%, with 10.5% among men and 7.6 % among women. This is similar to recent results published by HSE which reported that 10.3% of those 65 years and over were current smokers[40]. This is an improvement when compared to the first results from TILDA which reported that 19% of the older population are current smokers with no difference between men and women. However, higher rates of smoking were reported in the younger old (50-64 years) and in adults with lower education attainment[41]. The second report from TILDA reported a prevalence rate for smoking of 16.5% with a large drop in the prevalence of smoking evident around the age of retirement i.e. 65-69 years[42]. There were no differences in smoking status noted between male and females either. A recent report from the HSE National Tobacco Control Office has provided evidence of a further drop in the prevalence rate for smoking overall – down to 19.5% from 21.5% in 2013 and the report also noted that 10.3% of those 65 years and over were current smokers which is similar to the prevalence rate noted in this study[43].

The level of overweight and obesity in the study was worrying with overall 79.2% of participants classified as either overweight or obese with a distinct gender difference evident – 81.4% of newly diagnosed females and 69.4% of newly diagnosed males. The figure of obesity is similar to that reported by TILDA where79% of older Irish adults were classified as overweight or obese[44]. TILDA also reported that obesity in the first wave of participants was strongly associated with cardiovascular disease at the subsequent assessment in wave 2 with a higher prevalence of diabetes amongst men and women, while obese men have a significantly higher prevalence of heart attacks and obese women have a significantly higher prevalence of angina. This again highlights the need for preventative strategies to be implemented across all age groups to address the issue of obesity.

Hypertension (systolic blood pressure ≥150mmHg) was evident in 4% of participants in this study with no difference by gender but 70% of participants reported a medical history of hypertension. According to TILDA, hypertension affects 37% of all older adults in Ireland and increases with age[42]. A recent study by Murphy et al using TILDA data reported a prevalence

rate of 64% for hypertension and that prevalence was higher in males and increased with age[45]. However, this study included patients currently taking antihypertensive medication as having hypertension which was not used for this study or in the TILDA study.

Comparison with prior studies

A recent Cochrane review comparing systematic and opportunistic screening found only one study met inclusion criteria for the review[46]. That study was Fitzmaurice and colleagues UK study in Birmingham and the West Midlands, published in the BMJ in 2007[47]. This showed that whilst systemic screening had a higher response rate amongst younger subjects (65-75 years) there was little difference in subjects >75 years amongst who risk is highest. It also found that systematic screening was substantially more expensive, by a factor of four.
The UK study was performed in a population with a considerably higher population density than in the West of Ireland, in the context of a more highly resourced primary care network and where attendance at primary care was free for all users. Although performed in a neighbouring country, the significant difference in populations and health systems necessitated this study particularly in recognition of the conclusion from the Cochrane review that '*the lack of studies investigating the effect of screening in other health systems and younger age groups means that caution needs to be exercised in relation to the transferability of these results beyond the setting and population in which the included study was conducted*'. It is therefore important that this study has shown that opportunistic screening in this more challenging environment identifies a significant number of individuals with previously unrecognised atrial fibrillation and allows identification and review of therapy in a large number of subjects with known atrial fibrillation for whom anticoagulation may previously have been omitted.

Change in practice amongst GPs and Practice Nurses

Ultimately, one of the aims of the study was to encourage GPs and Practice Nurses to routinely check for an irregular pulse amongst their patients aged 65 year and older and the study appears to have been successful in that with 86.2% of GPs/Practice Nurses indicating that they now routinely checked pulses in all patients aged 65 and over with a further 3.1% indicating that they already checked prior to the study. This demonstrates that change in practice can occur particularly when it is a quick, non-invasive intervention such as this.

Opinions of GPs, Practice Nurses and Patients to Opportunistic Screening

Results from the surveys of GPs, Practice Nurses and patients were encouraging. Participation in the study appears to have improved the confidence of both GPs and Practice Nurses in both detection of an irregular pulse and the diagnosis of AF from an ECG although the levels of confidence varied between GPs and Practice Nurses. Of concern to the project team was the fact that only a quarter of GPs/Practice Nurses reported referring to the HSE AF Care Pathway either 'always' of 'very often' during the study. However, practices were also provided with the ESC AF Pocket Guidelines and practices may have been more familiar with these or they may have been more accessible for practices to use. There may be need for further education sessions regarding the use of the Care Pathway although this was not evident from the responses with only 20% requesting further education on this topic. Education needs were required on interpreting ECG's and anticoagulation therapies.

For the patients, their knowledge of AF prior to their diagnosis was quite limited but most were happy with the information they received at the time of their diagnosis. Encouragingly, 91% of respondents were aware of their increased risk of stroke as a result of their diagnosis with AF. Most were aware of the importance with regard to taking their medication as required and the vast majority wished to receive their follow up care at their local GP as opposed to the local hospital with 37% reporting that attendance at local hospital was difficult for them.

Since diagnosis with AF, patients had taken steps to decrease their alcohol intake, improve their diet and increase their activity to varying degrees which are all important lifestyle adjustments to make as prevention strategies. Most reported that their quality of life was good or hadn't change as a result of their diagnosis. A small number of patients indicated that their quality of life had diminished since diagnosis, mainly reporting fatigue. A third of patients reported that they were worried about their future health after being diagnosed with AF with potential for having a heart attack of stroke in the future noted.

Conclusion

Atrial Fibrillation is one of the major risk factors for stroke and is associated with a five-fold increased risk of stroke and stroke risk increases with age. AF related stroke is likely to be more severe than non-AF related stroke. Irish cardiovascular health policy has prioritised the prevention of stroke in primary care. Stroke prevention is one of the key objectives of the National Stroke Programme.

At the time the National Stroke Programme began implementation, new evidence was emerging from other healthcare systems regarding the feasibility of screening for AF in General Practice and new anticoagulant agents were becoming available. The National Stroke Programme, through the AF Project Team, set out an ambitious plan to establish the feasibility of AF screening in General Practice. The work carried out by the National Stroke Programme Atrial Fibrillation Steering Group informed this plan.

This study shows that opportunistic screening for an irregular pulse in General Practice to assist in the detection of AF is both feasible and beneficial. It has the potential to be an extremely important stroke prevention strategy capable of saving society and the health service significant social and economic costs. Almost 11% of Irish adults aged 65 years and over attending general practice have atrial fibrillation. Each GP can expect to diagnose 17 new cases per 1000 patients each year if they practice opportunistic screening by pulse taking.

However, AF is not a condition that exists in isolation. In Ireland we are becoming ever more cognisant of lifestyle risk factors. In this study almost 80% of all AF patients were either overweight or obese with over 40% of female AF patients obese. Of the obese female AF patients, one in five is a heavy drinker. This gives cause for concern and reflects the urgent and increased need for focused brief intervention therapies in primary care.

Anticoagulation reduces the risk of stroke by 67% in AF patients and previous studies in Ireland have demonstrated a sub-optimal rate of anti-coagulation (30%) in AF patients. Refreshingly, this study demonstrates a change in practice with 61% (33/54) of AF patients commenced on an oral anticoagulant either in general practice or in the hospital setting. This is a very significant improvement and perhaps can be attributed to a combination of

strategies; an increased awareness regarding stroke risk and the introduction of the novel oral anticoagulants (NOAC's).

Opportunistic screening in general practice is a very convenient way to screen patients with little additional effort when compared to systematic screening. However, opportunistic screening in itself increases the workload in general practice. It gives rise to repeat visit by patients for ECG, and blood monitoring if patients are commenced on OAC's. It is important that despite the overwhelming benefits of opportunistic screening for atrial fibrillation in general practice, we are cognisant of the additional workload this demands from general practice.

The findings from this study add to the existing body of knowledge on AF incidence and prevalence in the general population; the feasibility of implementing opportunistic screening in general practice and provides a broader view of the chronic disease landscape in general practice.

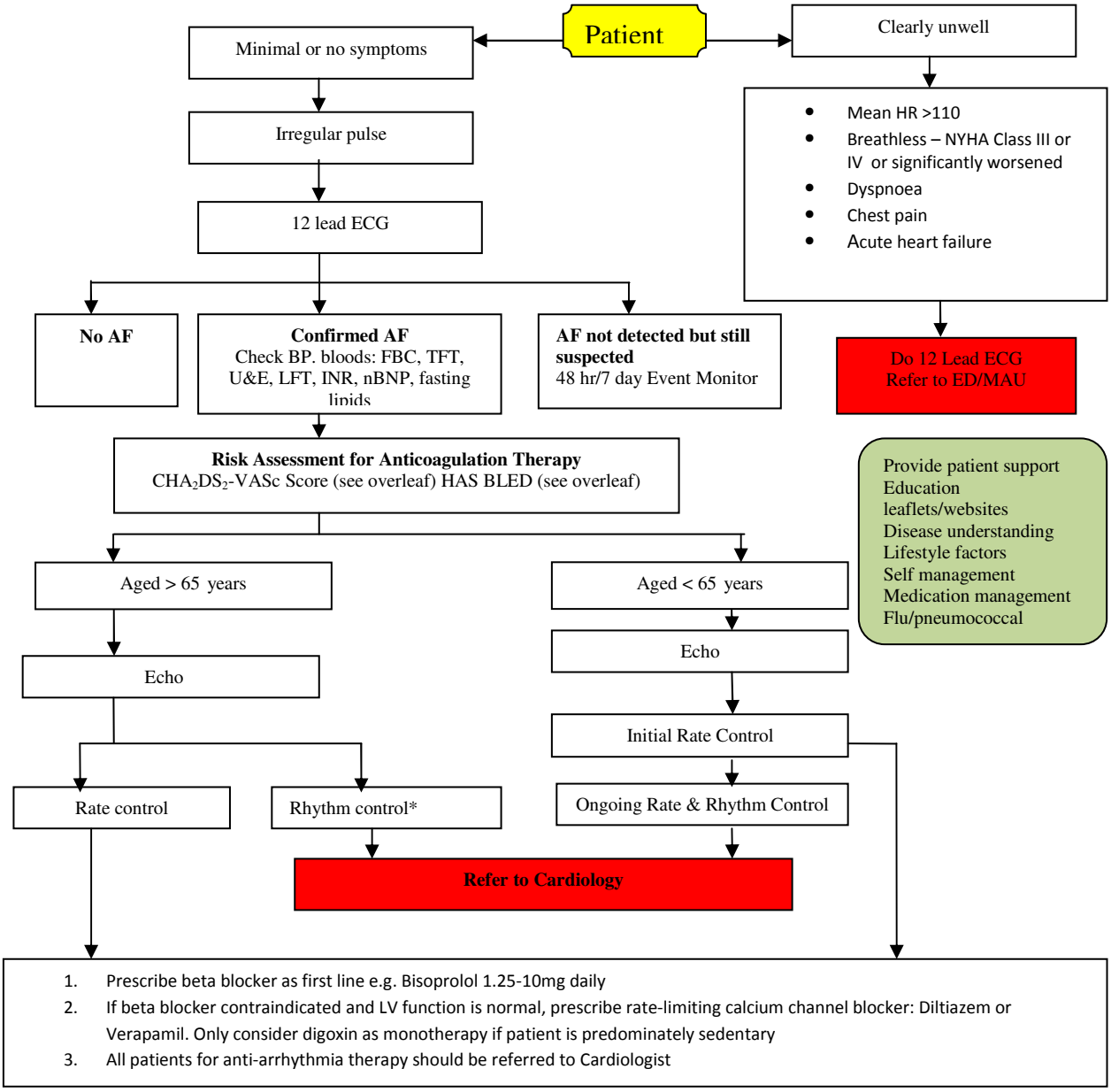
Appendix 1 – Participating Practices

Galway	Sligo/Leitrim
Annaghdown Medical Centre	Ballymote Family Practice
Athenry Surgery	Bayview Family Practice (1)
Briarhill Medical Practice	Bayview Family Practice (2)
Carna Health Centre/Knocknacarra Medical Centre	Blacklion Medical Centre
Castle Medical Centre	Carrick Medical Centre
Clarinbridge Surgery	Carrigallen Health Centre
Clifden Medical Practice	Dromahair Primary Care Centre
Galway Bay Medical Centre	Drumcliffe Family Practice
Kilconnell Health Centre	Easkey Family Practice
Kiltormer Health Centre	Enniscrone Medical Centre
Lower Salthill Medical Practice	Main Street Tubbercurry
Main Street Clinic	The Mall Family Practice
Millenium Medical Centre	Medicentre Sligo
Oran Medical Centre	Primary Health Centre Mohill
Prospect Health Centre	Skreen Family Practice
Renmore Park Surgery	Tubbercurry Health Centre
Roscam Medical Practice	Wine Street Medical Centre
Rosmuc Health Centre	
Seacrest Surgery	
Whitehall Medical Centre	

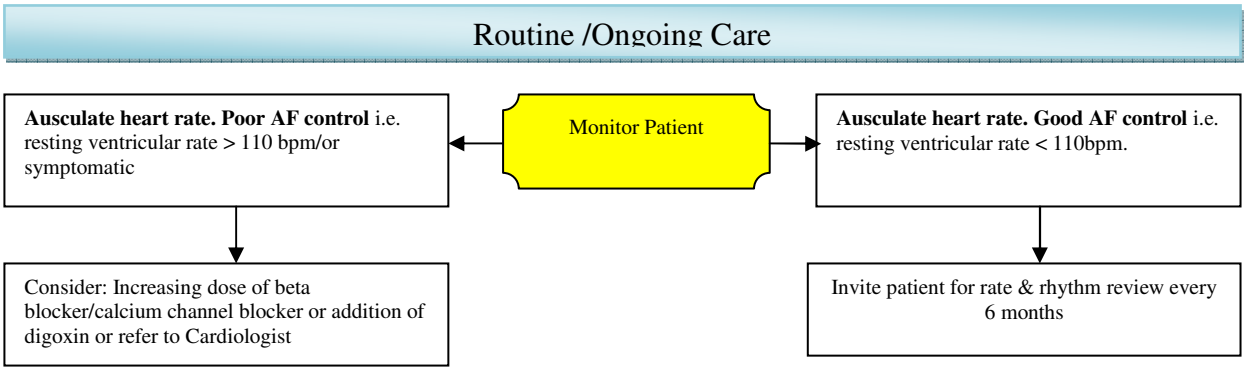
The following practices participated for three months

Medical Centre Ballymote
Gratton Avenue Drumshanbo
Gurteen Family Practice

Appendix 2 – HSE Atrial Fibrillation Care Pathway



*Active and otherwise healthy adults with no co-morbidities (age 65-70) Consider referral to Cardiologist for rhythm control



Patient

CHA_2DS_2VASc Score		
C	Congestive heart failure/LV dysfunction	1
H	Hypertension	1
A_2	Age ≥75 years	2
D	Diabetes mellitus	1
S_2	Prior stroke or TIA or thromboembolism	2
V	Vascular disease[a]	1
A	Age 65-74	1
Sc	Sex category (i.e. female)	1
	Maximum score	9

[a]Prior Myocardial infarction or peripheral arterial disease

Approach to Thromboprophylaxis in Atrial Fibrillation		
Risk category	CHA_2DS_2-VASc Score	Recommended antithrombotic therapy
One 'major risk' factor or ≥2 'clinically relevant non-major' risk factors	≥2	OAC
One 'clinically relevant non-major' risk factor	1	Either OAC or aspirin 75-325mg daily. Preferred: OAC rather than aspirin
No risk factors	0	Either aspirin 75-325mg daily or no antithrombotic therapy. Preferred: no antithrombotic therapy rather than aspirin

1. CHA_2DS_2-VASc = cardiac failure, hypertension, age ≥75 (doubled), diabetes, stroke (doubled) – vascular disease, age 65-74 and sex category (female); INR= international normalized ratio; OAC = oral anticoagulation, such as vitamin K antagonist (VKA) adjusted to an intensity range of INR 2.0-3.0 (target 2.5)
2. Female gender only applies as an additional factor to patients > 65 years
3. In patients with renal failure or prosthetic heart valves, warfarin should be used and not NOACs

HAS-BLED Bleeding Risk Score		
H	Congestive heart failure/LV dysfunction	1
A	Abnormal renal and liver function	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INRs[a]	1
E	Elderly (age ≥65 years)	1
D	Drugs or alcohol (1 point each)	1 or 2
	Maximum score	9

[a]International normalised ratios

1. If warfarin therapy is being considered for a patient risk factors for bleeding include a history of unstable INR's, liver or kidney disease, alcohol excess, bleeding, or hypertension – it is important for blood pressure to be controlled with a target mean systolic measurement of <130mmHg.
2. HASBLED was derived primarily from warfarin data rather than NOACs

Appendix 3 – Dataset

SCREENING

Date of Visit	_____ (dd/mm/yyyy)	**Date of Birth**	_____ (dd/mm/yyyy)	**Study No.** _____

Gender	❒ Male	❒ Female	❒ Unknown

Smoking Status	❒ Current Smoker	❒ Former Smoker in Previous 10 Years	❒ Non-Smoker	❒ Unknown

Alcohol Use	❒ Yes	❒ No	
If Yes	❒ < 14 units/week	❒ >/= 14 units/week	❒>/= 21 units/week

Pulse	❒ Irregular	❒ Regular

A Fib History	❒ New or Untreated A Fib	❒ Known or Treated A Fib	❒ Unsuitable for Treatment

PRESENTATION

ECG Confirms A Fib	❒ Yes	❒ No

ECG Rate	❒ <60	❒ 60 – 110	❒ >110

ECG A Fib undetected but still suspected	❒ Yes	❒ No

Patient Consent	❒ Yes	❒ No

Weight (kg) _____	**Height (m)** _____	**BMI (kg/m^2)** _____

Blood Pressure:	**Systolic** _____	**Diastolic** _____

Reason for Visit	❒ Flu vaccine	❒ Repeat prescription	❒ BP Check	❒ Chronic medical condition	❒ Other

Symptoms	❒ No Symptoms	❒ Palpitations	❒ Dizziness / Light-headedness	❒ Dyspnoea
	❒ Chest Pain	❒ Fatigue	❒ Syncope	❒ Other

Medical History	❒ Hypertension	❒ Diabetes	❒ Stroke – Ischaemic	❒ Intracranial Bleed
	❒ TIA	❒ Previous CVD–MI/CABG	❒ Previous History A Fib	❒ PVD
	❒ Heart Failure	❒ Thyroid Disease	❒ Renal Disease	

Family History Stroke/TIA	❒ Yes	❒ No

Living Independently	❒ Yes	❒ No

Relevant Existing Medication History	❒ ACE	❒ Antiarrythmic	❒ ARB's	❒ Betablocker
	❒ Calcium Channel Blocker	❒ Cholesterol Lowering Agents	❒ Digitalis Preparations	❒ Diuretics
	❒ Oral Antithrombotic Agent		❒ Thyroid Replacement Therapy	

CHA_2DS_2VASc Score	

INVESTIGATIONS

	Please tick if performed	**If Yes, were they performed in the past week?**	
Investigations	❒ FBC	❒ Yes	❒ No
	❒ U&E	❒ Yes	❒ No
	❒ Fasting Lipids	❒ Yes	❒ No
	❒ Fasting Glucose	❒ Yes	❒ No
	❒ HBA1C	❒ Yes	❒ No
	❒ TFTs	❒ Yes	❒ No
	❒ LFTs	❒ Yes	❒ No
	❒ INR	❒ Yes	❒ No
	❒ BNP	❒ Yes	❒ No

MANAGEMENT IN THE PRACTICE

Telephone Support Requested from Hospital/Centre	❒ Yes	❒ No

Outcome of Telephone Advice	❒ Advised to start treatment	❒ Advised to refer to ED/MAU	❒ Advised to refer to OPD	❒ Other

Did the Telephone Support Avoid a Hospital Visit	❒ Yes	❒ No

Anticoagulation Initiated in Practice	❒ Yes	❒ No	
If Yes, select	❒ Warfarin	❒ Dabigatran	❒Rivaroxaban
	❒Apixaban	❒ Aspirin	❒ Others

If No, select	❒ Not prescribed at this practice	❒ History of major bleeding	❒ Severe Illness	❒ Compliance
	❒ Patient refused anticoagulation	❒ Alcohol excess	❒ History of falls	❒ Extreme fragility
	❒ Liver disease	❒ Other		

Rate/Rhythm Control Agents Initiated in Practice		❒ Yes	❒ No	
If Yes	❒ Beta Blocker	❒ Ca Channel Blocker	❒ Digoxin	❒ Other

Other Meds Initiated in Practice	❒ ACE	❒ Anti-arrythmic	❒ ARB's	❒ Betablocker
	❒ Calcium Channel Blocker	❒ Cholesterol Lowering Agents	❒ Digitalis Preparations	❒ Diuretics
	❒ Oral Antithrombotic Agent	❒ Thyroid Replacement Therapy		

REFERRAL

Referred for Echo		❒ Yes	❒ No
If Yes, Echo Type	❒ Community Based Echo		❒ Hospital Based Echo
Date Referred	_____ (dd/mm/yyyy)		

Referred for Holter		❒ Yes	❒ No
If Yes, Holter Type	❒ 24 hour	❒ 48 hour	❒ 7 Day
Date Referred	_____ (dd/mm/yyyy)		

SPECIALIST REFERRAL

Referral	❒ Yes	❒ No	
If Yes, Referred to:			**If Yes, date referred (dd/mm/yyyy)**
Cardiology OPD	❒ Yes	❒ No	_____
Medical OPD	❒ Yes	❒ No	_____
Geriatric OPD	❒ Yes	❒ No	_____
Other OPD	❒ Yes	❒ No	_____
Cardiology Private	❒ Yes	❒ No	_____
Emergency Dept	❒ Yes	❒ No	_____
MAU	❒ Yes	❒ No	_____

REPORT RESULTS

Lone/Idiopathic AF		❒ Yes	❒ No
If No	**Thyrotoxicosis**	❒ Yes	❒ No
	CAD	❒ Yes	❒ No
	Valvular Heart Disease	❒ Yes	❒ No
	Alcohol Intoxication	❒ Yes	❒ No
	Infection	❒ Yes	❒ No
	Other	❒ Yes	❒ No

Anticoagulation	❒ Yes	❒ No	
If Yes, select	❒ Warfarin	❒ Dabigatran	❒Rivaroxaban
	❒ Apixaban	❒ Aspirin	❒ Others

Other Medications	❒ ACE	❒ Anti-arrythmic	❒ ARB's	❒ Betablocker
	❒ Calcium Channel Blocker	❒ Cholesterol Lowering Agents	❒ Digitalis Preparations	❒ Diuretics
	❒ Oral Antithrombotic Agent	❒ Thyroid Replacement Therapy		

Echo Result Available	❒ Yes	❒ No		
If Yes	**Date of Echo**	_____ (dd/mm/yyyy)		
	Echo Result	❒ Normal	❒ Ejection Fraction %	❒ Moderate Mitral Regurgitation
		❒ Moderate Aortic Stenosis	❒ Atrial Enlargement	❒ Other

Holter Result Available	❒ Yes	❒ No	
If Yes	**Date of Holter**	_____ (dd/mm/yyyy)	
	Holter Result	❒ Normal	❒ Abnormal

A Fib Detected	❒ Yes	❒ Other Arrythmia
A Fib Duration in 24 hours	_____ (hh/mm)	

New Complication A Fib Related	❒ Yes	❒ No	
If Yes	❒ Stroke/TIA	❒ Bleeding	❒ Other

New Diagnosis of Other Disease	❒ Yes	❒ No	
If Yes	❒ CAD MI/CABG	❒ CVD	❒ Heart Failure
	❒ Diabetes	❒ Thyroid Disease	

SPECIALIST FOLLOW UP

Follow Up	❒ Yes	❒ No	
If Follow up, to:			**If Yes, date seen (dd/mm/yyyy)**
Cardiology OPD	❒ Yes	❒ No	_____
Medical OPD	❒ Yes	❒ No	_____
Geriatric OPD	❒ Yes	❒ No	_____
Other OPD	❒ Yes	❒ No	_____
Cardiology Private	❒ Yes	❒ No	_____
Emergency Dept	❒ Yes	❒ No	_____
MAU	❒ Yes	❒ No	_____

CARDIAC INVESTIGATIONS & PROCEDURES

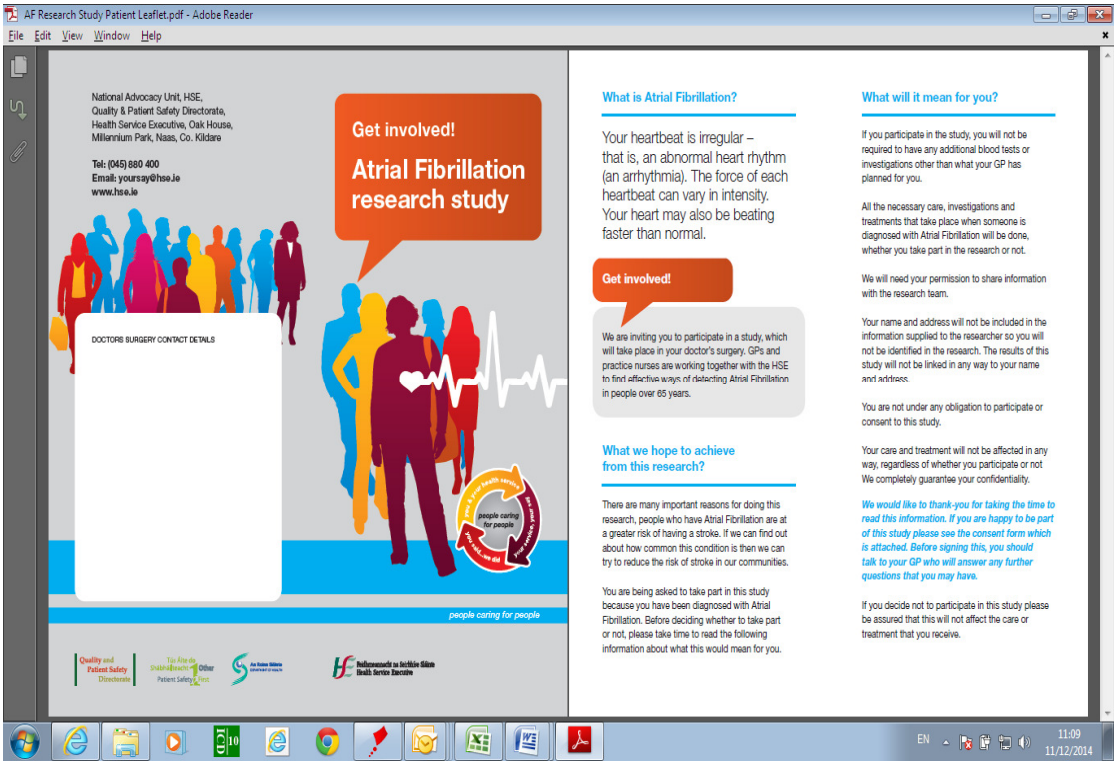
Investigation & Procedures			**If Yes, date (dd/mm/yyyy)**
Cardioversion	❒ Yes	❒ No	_____
EP Studies	❒ Yes	❒ No	_____
Coronary Angiography	❒ Yes	❒ No	_____
Ablation	❒ Yes	❒ No	_____
Pulmonary Venous Isolation	❒ Yes	❒ No	_____
Device Implantation	❒ Yes	❒ No	_____

CLINICAL STATUS THREE MONTHS POST DIAGNOSIS

Alive	❒ Yes	❒ No	
If Alive	❒ Clinically Stable	❒ Clinically Unstable	❒ Living Independently

If RIP	**Death Related to A Fib**	❒ Yes	❒ No
	Cause of Death		
	Date of Death	_____ (dd/mm/yyyy)	

Appendix 4 – Participant Information Leaflet



Appendix 5 – Participant Consent Form

Patient Consent Form

Title of Study: To Establish the Incidence and Prevalence of Atrial Fibrillation in General Practice in Ireland

	Please tick as appropriate	
	Yes	**No**
I confirm that I have read and understand the information leaflet and have had the opportunity to ask questions which have been answered to my satisfaction.	❒	❒
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.	❒	❒
I understand that withdrawing from this research will not affect my future medical care.	❒	❒
I give permission that any information collected about me during this research study can be stored and processed electronically for the purposes of this research only and that such data will be anonymised and kept private and confidential by the research team.	❒	❒
I am happy to receive a questionnaire at the end of the research study	❒	❒
I agree to participate in this research study	❒	❒

Participant Name (Block Capitals): _____

Participant Signature: _____

Date: _____

To be completed by the Principal Investigator or his nominee.

I the undersigned, have taken the time to fully explain to the above patient the nature and purpose of this study in a manner that they could understand. I have explained the risks involved as well as the possible benefits. I have invited them to ask questions on any aspect of the study that concerned them.

Name (Block Capitals): _____

Qualifications: _____

Signature: _____

Date: _____

Appendix 6 – GP/Practice Nurse Questionnaire

CONFIDENTIAL

General Practitioner & Practice Nurse

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Feasibility of Atrial Fibrillation Screening in General Practice

General Practitioner & Practice Nurse Follow-Up Questionnaire

The purpose of this follow-up questionnaire is to obtain your views on the Atrial Fibrillation Screening pilot study that you recently participated in.

Please complete all questions as fully as you can by ticking (✔) the appropriate box or by writing your answers in the space provided. The questions should be answered based on your own experience and views of the screening study rather than overall views of the practice.

The questionnaire should take no more than 10 minutes to complete and should be completed by the GP and/or Practice Nurse who were involved in the screening of patients in the study. Please return in the stamped addressed envelope provided by the **18th of July**.

BACKGROUND PROFILE

Q1. Are you:
- ❒ GP
- ❒ Practice Nurse

Q2. How would you describe the location of the practice?
- ❒ Urban
- ❒ Rural

Q3. Approximately how far is your practice from the nearest hospital to which you refer your patients for Emergency Department (ED)/Medical Assessment Unit (MAU)/Outpatients Department (OPD)?
- ❒ <3 miles
- ❒ 3 - 5 miles
- ❒ 6 - 10 miles
- ❒ >10 miles

ATRIAL FIBRILLATION DETECTION

		Before study	**Since start of study**
Q4.	When someone 65 years or over attended your practice how often did you test their pulse?	❒ Always ❒ Very Often ❒ Sometimes ❒ Seldom ❒ Never	❒ Always ❒ Very Often ❒ Sometimes ❒ Seldom ❒ Never

		Before study	Since start of study
Q5.	How confident were you in detecting an irregular pulse?	❒ Confident ❒ Fairly Confident ❒ Not Confident	❒ Confident ❒ Fairly Confident ❒ Not Confident

		Before study	Since start of study
Q6.	How confident were you in diagnosing AF from an ECG?	❒ Confident ❒ Fairly Confident ❒ Not Confident	❒ Confident ❒ Fairly Confident ❒ Not Confident

Q7. How often did you refer to the HSE Atrial Fibrillation Care Pathway in caring for patients with AF?

❒ Always
❒ Very Often
❒ Sometimes
❒ Seldom
❒ Never

SECONDARY CARE

		Before study	Since start of study
Q8.	How often would the practice phone the hospital for advice on interpreting ECGs/clinical advice on patients with an irregular pulse?	❒ Always ❒ Very Often ❒ Sometimes ❒ Seldom ❒ Never	❒ Always ❒ Very Often ❒ Sometimes ❒ Seldom ❒ Never

Q9. During the AF Screening study, can you estimate **how many times** you phoned the hospital to help you interpret ECGs/obtain clinical advice on patients with an irregular pulse?

_____times

Q10. Were you satisfied with your **access to clinical advice and support** from the hospital for your patients during the study?

❒ Yes
❒ No
❒ Did not need to access clinical advice

Q11. Were you satisfied with your **access to diagnostic tests** for your patients during the study?

❒ Yes
❒ No
❒ Did not need to access diagnostic tests

Q12. If you were not satisfied with access to clinical advice or diagnostic tests please comment. _____
_____
_____

TREATING ATRIAL FIBRILLATION PATIENTS

Q13. From your experience can you estimate the number of additional visits to the practice a newly diagnosed AF patient would make in the first six months since diagnosis? _____ Visits

Q14. Did you prescribe an oral anticoagulant for newly diagnosed AF patients?
❒ Yes
❒ No

Q15. If No, please comment:_____
_____
_____
_____

INFORMATION TECHNOLOGY (DATA COLLECTION TOOL)

Q16. How easy or difficult was it for you to use the Microsoft Excel software provided for the collection of study data?
❒ Very Easy
❒ Easy
❒ Somewhat Difficult
❒ Very Difficult
❒ Did not use software

Q17. If you had difficulties with the Microsoft Excel software provided please comment:
_____
_____
_____

Q18. How would you rate the support provided by the study team?
❒ Excellent
❒ Good
❒ Fair
❒ Poor

STUDY INFORMATION SESSION

Q19. Did you, or a member of your practice team, attend the study information day?
❒ Yes
❒ No

Q20.	How useful was the study information received in terms of the following (Please ✔):			
		Too much detail	Sufficient detail	Not enough detail
	Epidemiology of AF			
	HSE AF Care Pathway			
	Checking for irregular pulse			
	Interpreting ECG results			
	Overview of Anticoagulation Therapies			
	Case Histories			
	Using the AF Form and Data Entry			

Q21. How useful was the education in terms of helping you undertake AF screening in your practice?

❒ Very Useful
❒ Useful
❒ Not Useful

Q22. Are there areas in which you would like further training – please ✔ all applicable?

❒ Checking Irregular Pulse
❒ Performing ECG
❒ Interpreting ECG
❒ Anticoagulation Therapies
❒ HSE AF Care Pathway
❒ Other

Q23. If Other, please comment: _____
_____
_____

CHANGE IN PRACTICE

Q24. As a result of this screening study do you now routinely check pulses in all adults over 65 years?

❒ Yes
❒ No
❒ It was always standard practice

Q25. If No, please comment: _____
_____
_____
_____

SUPPORT

Q26. Was there anything further that the study team could have provided or done? ❒ Yes ❒ No

Q27. If Yes, please comment: _____
_____
_____
_____

THANK YOU

Appendix 7 – Patient Questionnaire

CONFIDENTIAL

PATIENT SURVEY

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Feasibility of Atrial Fibrillation Screening in General Practice

Patient Survey

You were diagnosed with Atrial Fibrillation as a result of screening at your GP practice. We are conducting a follow up survey to get your views and opinions.

We would appreciate if you complete all questions as best you can by ticking (✔) the appropriate box or by writing your answers in the space provided.

The questionnaire should take no more than 10 minutes to complete. Please return in the stamped addressed envelope provided by the **18th of July**.

BACKGROUND INFORMATION

Q1. What is your age: _____ Years

Q2. Are you:
- ❒ Male
- ❒ Female

Q3. Approximately how far do you live from your GP practice?
- ❒ less than 3 miles
- ❒ 3 - 5 miles
- ❒ 6 – 10 miles
- ❒ more than 10 miles

Q4. Approximately how far do you live from your local hospital?
- ❒ less than 3 miles
- ❒ 3 - 5 miles
- ❒ 5 - 10 miles
- ❒ more than 10 miles

KNOWLEDGE OF ATRIAL FIBRILLATION

Q5. Did you know about Atrial Fibrillation before your diagnosis?
❒ Yes
❒ No

Q6. When first diagnosed with Atrial Fibrillation, did your GP or Practice Nurse clearly explain to you:

- What is Atrial Fibrillation:
❒ Yes
❒ No

- The health risks associated with Atrial Fibrillation
❒ Yes
❒ No

- What is involved in having an ECG (tracing of your heart)
❒ Yes
❒ No

- Your medication for Atrial Fibrillation
❒ Yes
❒ No
❒ Not prescribed medication

Q7. How much information have you received on Atrial Fibrillation since your diagnosis?
❒ Not enough information
❒ Just the right amount of information
❒ Too much information

Q8. Do you know that there is an increased risk of getting a stroke if Atrial Fibrillation is not treated properly?
❒ Yes
❒ No

Q9. When the GP or Practice Nurse told you that your pulse was irregular, did you have an ECG (tracing of your heart) test?
❒ Yes ❒ No

If Yes
❒ On the same day
❒ At another appointment

HOSPITAL APPOINTMENTS

Q10. Did you attend hospital appointments as a result of your diagnosis with Atrial Fibrillation?
❒ Yes
❒ No

Q11. **If Yes**, how easy or difficult is it for you to attend appointments at the hospital?
❒ Very Easy
❒ Easy
❒ Somewhat Difficult
❒ Very Difficult

Q12. Where would you prefer your care for your Atrial Fibrillation to take place?
❒ Local Hospital
❒ Local GP practice
❒ Nursing Home
❒ Other Hospital _____

MEDICATION

Q13. Have you been prescribed medication to treat your Atrial Fibrillation?
❒ Yes
❒ No

Q14. **If Yes,** are you on blood thinning tablets (for example Warfarin, Pradaxa, Xarelto, Elquis)?
❒ Yes
❒ No

Q15. **If Yes,** did you receive information on your medication for Atrial Fibrillation from your GP or Practice Nurse?
❒ Yes
❒ No

Q16. How important is it for you to take this medicine for Atrial Fibrillation every day at the correct time?
❒ Very Important
❒ Important
❒ Not Important

Q17. If you are taking Warfarin where do you get your INR (warfarin levels) checked?
❒ Hospital
❒ GP
❒ Not on Warfarin

Q18. Have you experienced any difficulties taking your medication for Atrial Fibrillation
❒ Yes
❒ No

Q19. If Yes, what difficulties have you experienced:

_____
_____
_____
_____

LIFESTYLE

Q20. Do you smoke?

- ❒ Current Smoker
- ❒ Former Smoker
- ❒ Never Smoked

Q21. Since your diagnosis with Atrial Fibrillation have you taken any steps to stop smoking?

- ❒ Yes
- ❒ No
- ❒ Do Not Smoke

Q22. Since your diagnosis with Atrial Fibrillation have you reduced your alcohol consumption?

- ❒ Yes
- ❒ No
- ❒ Do not drink alcohol

Q23. Since your diagnosis with Atrial Fibrillation have you made any changes to your improve your diet?

- ❒ Yes
- ❒ No
- ❒ Always had healthy diet

Q24. Since your diagnosis with Atrial Fibrillation have you increased the amount of exercise you take?

- ❒ Yes
- ❒ No
- ❒ Always exercised regularly

PATIENT OPINION

Q25. Your GP practice was part of a screening study that supports the early detection and diagnosis of Atrial Fibrillation.
From your experience how important was this screening for you?

- ❒ Very Important
- ❒ Important
- ❒ Not Important

Q26. Overall how satisfied are you with the way that your Atrial Fibrillation is being treated?

- ❒ Very Satisfied
- ❒ Satisfied
- ❒ Neither Satisfied or Unsatisfied
- ❒ Unsatisfied
- ❒ Very Unsatisfied

Q27. If unsatisfied please comment:_____
_____
_____

Q28. Since your diagnosis with Atrial Fibrillation how would you describe your quality of life? _____
_____
_____

Q29. Are you worried about having Atrial Fibrillation? ❒ Yes
❒ No

Q30. If you are worried, can you say what worries you most about having Atrial Fibrillation: _____
_____
_____
_____

THANK YOU

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