Opportunistic pulse checks in primary care to improve recognition of atrial fibrillation

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Abstract

Background
Atrial fibrillation (AF) is an important and modifiable risk factor for stroke. Earlier identification may reduce stroke-related morbidity and mortality. Trial evidence shows opportunistic pulse regularity checks in people aged 65 years or more increases detection of new AF cases. However, this is not currently recommended by the National Screening Programme nor implemented by most Clinical Commissioning Groups (CCGs).

Aim
To evaluate the impact of a systematic programme to promote pulse regularity checks in general practice on their uptake and the prevalence of AF.

Design and setting
Retrospective analysis of electronic primary care patient records in three east London CCGs (City and Hackney, Newham and Tower Hamlets) over 10 years.

Method
Rates of pulse regularity checks and prevalence of AF in people aged 65 years or more were compared for the pre-intervention period 2007-2011 to post-intervention 2012-2017.

Results
Across the three CCGs, rates of pulse regularity checks increased from a mean of 7.3% pre-intervention to 66.4% post-intervention, achieving 93.1% in the final year of the study. Age-standardised prevalence of AF in people aged 65 years or more increased significantly from a pre-intervention mean of 61.4/1000 to a post-intervention mean of 64.5/1000. There was a significant increase in post-intervention trend to a final year mean of 67.3/1000; an improvement of 9.6% (5.9/1000) over pre-intervention prevalence with 790 additional new cases identified.

Conclusion
Organisational alignment, standardised data entry, peer performance dashboards and financial incentivisation rapidly and generally increased opportunistic screening with pulse regularity checks. This was associated with a significant increase in AF prevalence of public health importance.

Keywords
Atrial Fibrillation, Screening, Pulse

How this fits in

Opportunistic pulse regularity checks in people 65 years and over are a cheap and easy method to detect unrecognised atrial fibrillation. A systematic programme rapidly improved the prevalence of atrial fibrillation in three inner city CCGs.

Introduction

Atrial fibrillation (AF) is a leading cause of stroke, resulting in significant morbidity and mortality. Stroke caused by underlying AF is twice as likely to be fatal. [1] Atrial fibrillation is common in the elderly, often in association with cardiovascular co-morbidity, with prevalence of 2% at ages 65-74 years increasing to over 13% in the over 85s. [2] The condition is often asymptomatic and sometimes only identified at the time of acute cerebral infarction. Anticoagulation can significantly reduce the risk of stroke depending on the time spent therapeutically anticoagulated. [3]

Systematic and opportunistic approaches for AF detection have used manual examination of the pulse, modified sphygmomanometers, [4] electrocardiogram (ECG) recording [5] and novel technologies including smart phones. [6] Pulse regularity checks are cheap and sensitive but poorly specific, requiring confirmation of the diagnosis with ECG. A pulse regularity check at a point in time may miss intermittent AF.

Opportunistic screening is more effective and less costly than systematic screening. [7] There is ongoing debate about the benefits of systematic or opportunistic screening. [8] People screened opportunistically are, by the act of GP presentation, more likely than the general population to have a long term condition and as such may have a higher rate of AF. Opportunistic screening was found to be cost-effective in a 2016 Cochrane systematic review [9] with an incremental cost per case detected of £337. Analysis of national annual opportunistic screening for AF by GPs in Ireland concluded this would be cost effective, [10] although screening at influenza vaccination clinics may be a less effective strategy. [11]

In 2011, the UK National Screening Committee reviewed the case for a national AF screening programme for those aged 65 years and over. [12] The committee noted that only a minority of patients eligible for anticoagulation receive treatment and argued that it would therefore be unethical to introduce a screening programme. Since then there has been a substantial increase in anticoagulation and 86% of eligible people with AF were anticoagulated nationally in 2015. [13]

A Health Technology Appraisal in 2017 concluded a national screening programme for AF would probably be cost-effective and that systematic opportunistic screening with pulse checks would be more cost-effective that systematic population screening. [14]

This paper evaluates opportunistic screening for atrial fibrillation by manual pulse regularity checks in primary care, supported by standard data entry templates, performance dashboards, prompts in the electronic patient record and financial incentivisation.

Setting

The study was conducted in three Clinical Commissioning Group (CCG) areas of inner east London: City and Hackney, Newham and Tower Hamlets, where 136 GP practices serve a population of over one million registered patients with a high burden of deprivation and multi-morbidity. The population is relatively young and mobile compared to the rest of the UK, with those aged 65 and over constituting approximately 6% of the population, compared to nearly 18% nationally. [15] The large South Asian community which comprises around a third of the population is known to have lower rates of AF than White ethnic groups.[16]

In addition to core funding streams, practices receive payment through locally agreed enhanced services, according to their performance against indicators relating to the management of long term conditions.

The Clinical Effectiveness Group (CEG), based at Queen Mary University of London, has access to pseudonymised data from all practices in this area through universal use of the EMIS Web clinical system. The CEG uses this resource to promote quality improvement through evidence based guidelines, data entry templates and clinical dashboards. Primary care clinicians in the study area use CEG data entry templates when completing annual reviews for long term conditions.

Methods

In 2012, a field for pulse regularity check was added to the data entry templates for people aged 65 years and over with long term conditions such as hypertension, COPD, diabetes, ischaemic heart disease, stroke as well as those attending an NHS Health Check or a new patient check. Clinicians were advised to check pulse regularity in all people 65 years and older every 5 years and annually in those with the conditions above. Clinicians were also reminded about pulse regularity checks through on screen prompts when there was not a record already present. Quarterly dashboards were sent to all practices with funnel plots identifying individual practice trends and the distribution of each practice in the CCG in relation to AF register size. Pre-specified practice searches were available to identify patients who were overdue a pulse regularity check. The new programme was endorsed in educational meetings in each CCG.

Pulse regularity checks for patients with long term conditions were financially incentivised in City and Hackney and Tower Hamlets from April 2013 and in Newham from April 2014. Practices meeting the target threshold were given additional payment which was paid directly to practices in City and Hackney and Newham, but paid to managed groups of practices in Tower Hamlets known as networks, based on network rather than individual practice performance.

In August 2017, pseudonymised coded data was retrospectively extracted from the EMIS Web electronic patient record for each financial year 1 April-31 March for the time period 2007 to 2017. We examined the rates of pulse regularity checks in people age 65 years or more and the prevalence of atrial fibrillation in this age group using a standard code set (see figure 1).

We compared the mean rate of pulse regularity checks in the pre-intervention period (2007-2012) to the post-intervention period (2012-2017). We compared the mean prevalence of AF in the pre- and post-intervention periods using a two-sample t test with equal variances and regression analysis (change in slope and difference in intercept). All analyses were conducted using Stata (version 14). The p-values were two-sided with statistical significance set at 0.05. Final year pulse check and AF detection rates were also reported. The design and reporting of the study conformed to STROBE recommendations. [17]

Results

Table 1 and Figure 2 show the proportion of people aged 65 years or more with a pulse regularity check recorded before and after the introduction of the intervention (black arrow). There was a large increase in patients coded with a pulse regularity check in the previous 5 years, from a mean of 7.3% in the pre-intervention period to a mean of 66.4% in the post intervention period. This rose to 93.1% in 2017, the final year reported.

Table 2 shows changes in AF prevalence in the pre- and post-intervention periods. These were examined by comparing the mean prevalence per 1000 in the pre-intervention period 61.4 (95% CI 60.8 to 62.0) to the post-intervention period 64.5 (95% CI 62.4 to 66.6). This difference between means of 3.1/1000 represents a mean increase of 5.0% in prevalence and 462 new AF cases. Two-sample t test showed a significant difference between the means (T = -4.03, p= 0.01). The final year mean prevalence of AF was 67.3/1000 and represents an increase of 9.6%; 790 new cases of AF, 5.9/1000, in comparison to the pre-intervention mean. The increases in final year prevalence above the pre-intervention mean were 5.6%, 6.4% and 19.1% in Newham, City and Hackney and Tower Hamlets respectively.

Regression analysis confirmed that the gradient of the slope after the intervention (coefficient 0.095 95% CI 0.044-0.145) was significantly different from the pre-intervention period (0.020, 95% CI -0.031 – 0.070) (p=0.04).

Figure 3 shows the prevalence of AF in the over 65 age group over the study period, again with the intervention shown with a black arrow.

In the five year pre-intervention period the mean number of cases of AF per year was 3457.6 and in the post intervention period 3919.4; mean increase of 461.8 per year. Assuming these new cases had an average CHA_2DS_2VASC score of 2, and that 10% were ineligible of anticoagulation, it can be estimated that five years of anticoagulation would have prevented stroke in 28 people representing more than 2000 cases over the 209 CCGs in England.

Discussion

Summary

This study shows that a programme to increase detection of atrial fibrillation using opportunistic pulse regularity checks using clinical templates for structured data entry combined with peer performance feedback, financial incentivisation and educational dissemination was associated with rapid adoption of pulse regularity checks in over 75% of the target population within three years and over 90% by five years. Introduction of pulse regularity checks was associated with a significant increase in the trend of the detection of AF and prevalence of AF had increased by 9.6% by the end of the study.

Our methodology was conservative and compared mean prevalence between periods rather than the mean pre-intervention compared to the final post intervention reported rate in year five. The estimated stroke reduction of more than 2000 cases over the 209 CCGs in England is of public health importance. The ease and rapidity with which this intervention was widely adopted suggests that the programme could be feasibly scaled nationally.

Strengths and Limitations

This study retrospectively identified subjects based on cross-sectional samples on the registered practice population on the date the search was conducted. Patients registered at the beginning of the study period who then left the practice would not have been counted. In an area of high population mobility such as east London [18] this may be an important loss to follow-up, though less pronounced in our older study population. This could lead to a possible underestimate of new AF cases. The cross-sectional design precluded following individuals through the whole study period to identify new incident cases per year. We used the same case definition of atrial fibrillation throughout the study including both paroxysmal AF and atrial flutter and relied on GP coding without further validation.

Data from all Tower Hamlets and City and Hackney practices were available for the entire study period, however, four of the 64 practices in Newham only provided information for the final study year. This may have reduced the size of the effect in Newham to a small extent, but not its direction. Some of the increase in register size may be due to demographic change but this does not account for the difference in the trends before and after the intervention. In Newham, the full programme including financial incentives, was not instituted until April 2014 and this may have reduced the effect size which was least in this CCG.

The study area is not representative of the UK overall. The local population is young, socio-economically disadvantaged and ethnically diverse, posing challenges for screening programmes. There is a large South Asian population known to have lower incidence of AF than White populations and our results may underestimate the yield from such a programme in older less ethnically diverse CCGs.

The study examined coded pulse checks which prior to the intervention may have been undocumented or entered as non-coded free text. We were unable to distinguish whether pulse checks were performed manually or using electronic devices, though anecdotally the vast majority were manual with some using automated blood pressure cuffs.

We have analysed changes in AF prevalence and made projections on potential stroke reduction, rather than examining anticoagulation or stroke as end points. Whether treatment of opportunistically detected AF in asymptomatic patients reduces stroke to the same extent as that detected by other means is uncertain, but the thromboembolic risks are similarly increased and the consensus view is to anticoagulate those with screen detected atrial fibrillation. [19] The proportion of patients with AF receiving anticoagulation has increased year on year, so there has been no reduction of anticoagulation performance in association with increased detection. [13] The advent of Direct Oral Anticoagulants (DOACs) may have increased rates of anticoagulation, however this was beyond the scope of our study.

The prevalence of AF has been increasing nationally owing to an ageing population and we are therefore unable to ascribe all the increase in local prevalence to pulse checks. However the increase in trend since the start of intervention is strong evidence for the impact of the intervention.

We have not made any economic assessment of the human resources and infrastructure required to undertake the additional work but anecdotal feedback, the speed and extent of adoption indicates that pulse checking fitted into existing routines for blood pressure measurement - pulse palpation is a NICE recommended component of blood pressure measurement. [20]

We have not evaluated the individual components of the intervention and are unable to disaggregate the synergistic effects of local guidance, IT prompts, dashboards and modest financial incentives. These elements follow Michie's COM-B model which addresses the capability, opportunity and motivation behind behavioural change. [21]

Comparison with existing literature

The baseline prevalence of AF was similar to the largest relevant study on pulse regularity checks and AF by Hobbs et al.[7] Our study area showed a higher uptake of opportunistic screening (93.1% vs 69.2%), though this was achieved in five years in our study compared with 12 months by Hobbs. Hobbs et al do not report prevalence but found that the incidence was higher in their intervention group compared with a control group. Our observational study confirms that in routine practice, prevalence of detected AF has increased following the commissioning, promotion and routine provision of opportunistic pulse checks.

Implication for practice

Opportunistic pulse regularity checks were rapidly and widely adopted, promoted by organisational alignment, IT support, peer performance reporting and financial incentives. This was associated with a significant increase in the detection of new atrial fibrillation with a potential impact of public health importance.

Ethical Approval

All data were anonymised and managed according to the UK NHS information governance requirements. Ethical approval was not required for the use of anonymised data in this observational study.

Competing interests

The authors have declared no competing interests.

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Table 1: Age ≥ 65y with pulse check in 5 years

	CH %	(n)	NH %	(n)	TH %	(n)	All CCGs %	(n)	Pre/Post Mean
2007-08	9.0	(1616)	4.9	(1018)	5.0	(850)	6.2	(3484)	
2008-09	9.5	(1705)	6.1	(1305)	4.5	(756)	6.7	(3766)	
2009-10	9.9	(1784)	6.6	(1408)	4.5	(752)	7.0	(3944)	7.3
2010-11	10.9	(1980)	7.3	(1562)	4.6	(756)	7.7	(4298)	
2011-12	12.2	(2290)	7.6	(1671)	6.8	(1138)	8.8	(5099)	
2012-13	23.3	(4526)	22.4	(5029)	25.0	(4156)	23.4	(13711)	
2013-14	58.8	(11715)	36.2	(8234)	54.4	(9108)	48.9	(29057)	
2014-15	86.6	(17959)	68.8	(15928)	75.4	(12723)	76.7	(46610)	66.4
2015-16	89.1	(18825)	84.2	(20048)	86.9	(14755)	86.6	(53628)	
2016-17	96.4	(20603)	90.4	(22142)	92.8	(15977)	93.1	(58722)	

Table 2: AF Prevalence ≥ 65y per 1000

	CH rate/1000	(n)	NH rate/1000	(n)	TH rate/1000	(n)	All CCGs rate/1000	(n)	Pre/Post Mean
2007-08	64.3	(1156)	56.1	(1167)	62.3	(1067)	60.6	(3390)	
2008-09	67.9	(1218)	56.2	(1196)	61.5	(1025)	61.5	(3439)	
2009-10	69.1	(1246)	55.3	(1180)	61.0	(1012)	61.5	(3438)	61.4
2010-11	70.6	(1286)	55.0	(1179)	61.1	(1005)	61.9	(3470)	
2011-12	69.9	(1316)	53.5	(1184)	62.5	(1051)	61.5	(3551)	
2012-13	70.5	(1368)	55.1	(1238)	65.1	(1083)	63.1	(3689)	
2013-14	70.0	(1395)	55.5	(1262)	67.0	(1121)	63.6	(3778)	
2014-15	70.2	(1455)	54.8	(1267)	69.0	(1163)	64.0	(3885)	64.5
2015-16	70.5	(1489)	56.2	(1337)	68.9	(1171)	64.6	(3997)	
2016-17	72.7	(1555)	58.3	(1428)	73.5	(1265)	67.3	(4248)	

CH = City and Hackney; NH = Newham; TH = Tower Hamlets

Figure 1: Read Codes used in search strategy

2431 - O/E - pulse rhythm regular
2435 - O/E - irregular pulse
2433 - O/E - pulse regularly irregular
G573 - Atrial fibrillation and flutter [and child codes]

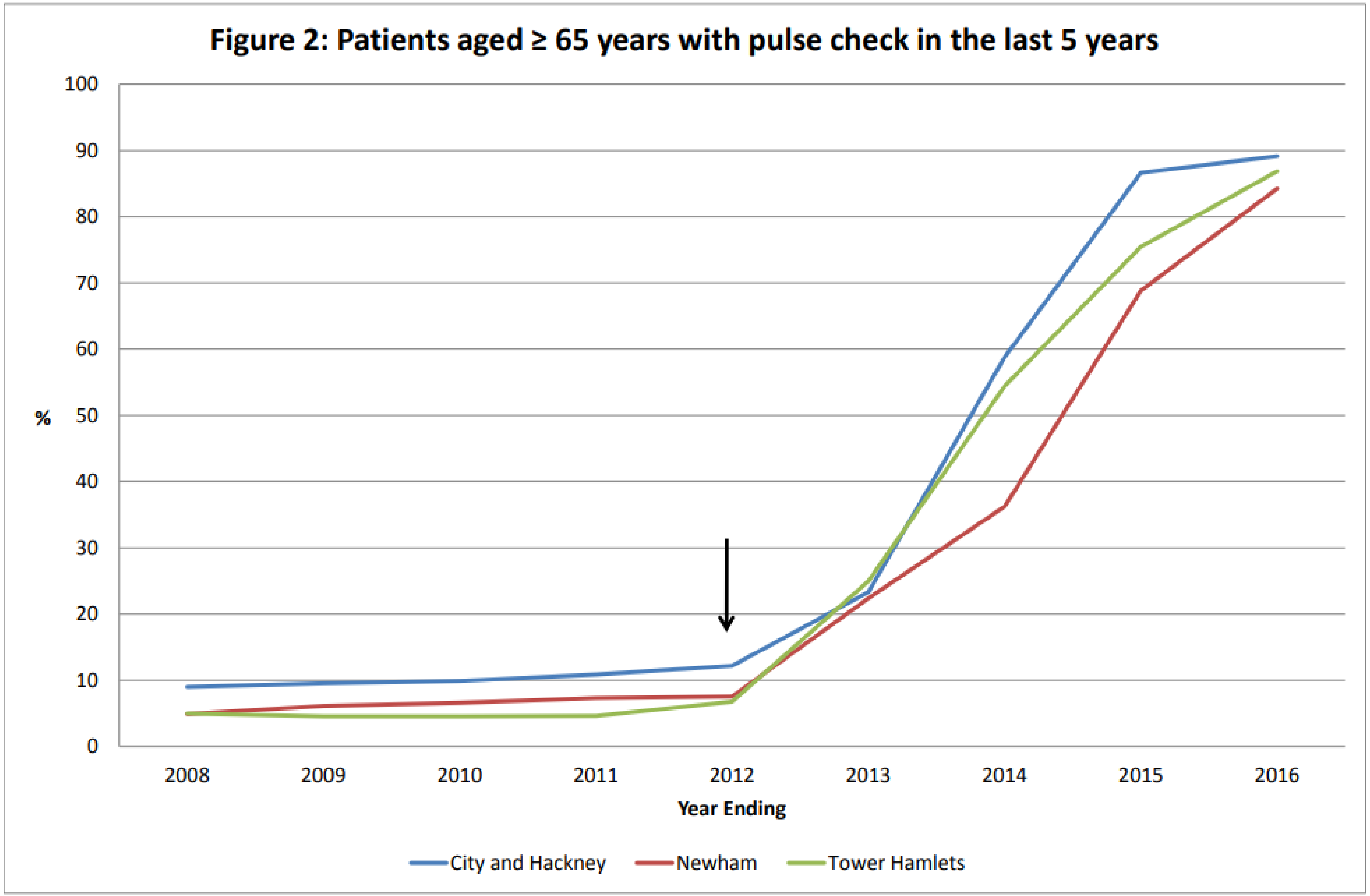
Figure 2: Patients aged ≥ 65 years with pulse check in the last 5 years
100
90
80
70
60
50
40
30
20
10
0
%
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year Ending
City and Hackney
Newham
Tower Hamlets

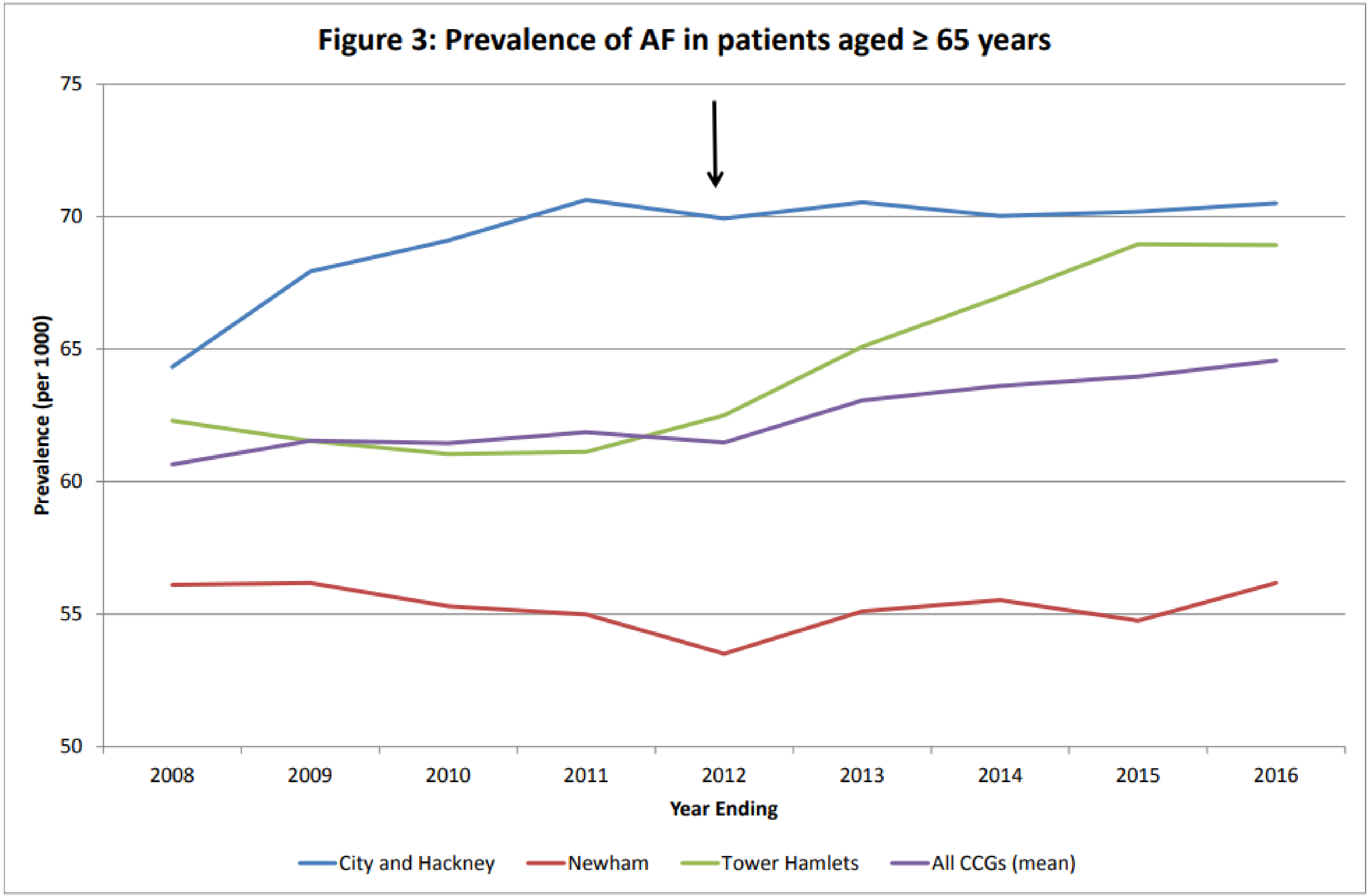
Figure 3: Prevalence of AF in patients aged ≥ 65 years
75
70
65
60
55
50
Prevalence (per 1000)
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year Ending
City and Hackney
Newham
Tower Hamlets
All CCGs (mean)