

Oral Anticoagulation Therapy in Atrial Fibrillation Patients Managed in the Emergency Department Compared to Cardiology Outpatient: Opportunities for Improved Outcomes



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Introduction

Recent registry data suggests oral anticoagulation (OAC) usage remains suboptimal in atrial fibrillation (AF) patients. The aim of our study was to determine if rates of appropriate use of OAC in individuals with AF differs between the emergency department (ED) and cardiac outpatient clinic (CO).

Methods

This was a retrospective study of consecutive AF patients over a 12-month period. Data from clinical records, discharge summaries and outpatient letters were independently reviewed by two investigators. Appropriateness of OAC was assessed according to the CHA₂DS₂-VASc score.

Results

Of 455 unique ED presentations with AF as a primary diagnosis, 115 patients who were treated and discharged from the ED were included. These were compared to 259 consecutively managed AF patients from the CO. Inappropriate OAC was significantly higher in the ED compared to the CO group (65 vs. 18%, $p < 0.001$). Treatment in the ED was a significant multivariate predictor of inappropriate OAC (odds ratio 8.2 [4.8–17.7], $p < 0.001$).

Conclusions

This patient level data highlights that significant opportunity exists to improve disparities in the use of guideline adherent therapy in the ED compared to CO. There is an urgent need for protocol-driven treatment in the ED or streamlined early follow-up in a specialised AF clinic to address this treatment gap.

Keywords

Atrial fibrillation • Oral anticoagulation • Emergency department • Stroke prevention • Specialist care

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Introduction

The prevalence of atrial fibrillation (AF) in Australia has been estimated at 1.4 to 5%, and this is expected to rise sharply over the coming decades [1]. Stroke remains one of the most devastating complications of AF. Strokes related to AF have a greater propensity for disability, poorer long-term prognosis and an increased likelihood of fatality [2]. As a result, AF related strokes burden the health care system with substantially higher costs for acute hospitalisations and longer-term rehabilitation [3]. Stroke prevention is an integral component of AF management yet current usage of oral anticoagulation (OAC) remains suboptimal, with substantial rates of inappropriate anticoagulation seen in a contemporary AF registry [4]. Several recent reports have also highlighted the gap in appropriate OAC in AF patients who have presented to the emergency department (ED) [5,6]. Here, we sought to evaluate the use of OAC in the ED and cardiac outpatient (CO) clinic of a tertiary teaching hospital.

Methods

This study included consecutive patients presenting to the ED for treatment of AF as a primary diagnosis (ICD-code I-48), and consecutive CO patients with AF between 1 August 2014 and 31 July 2015. From a total of 455 unique ED presentations for AF, the following patients were excluded: $n = 219$ were hospitalised; $n = 85$ with code errors; $n = 10$ with first presentation AF; $n = 10$ with insufficient information; $n = 9$ with end-stage renal failure and $n = 7$ with contraindications to OAC. The final cohort of 115 ED patients was compared with 259 consecutive patients with AF managed in the CO over the same 12-month period. This study has approval from the institutional research ethics committee.

Oral anticoagulation usage was determined after each respective health care encounter. The following criteria were used to classify patients as 'appropriately anticoagulated' in accordance with 2012 American Heart Association (AHA) atrial fibrillation (AF) guidelines [7] and CHA₂DS₂-VASc score (one point for congestive heart failure, hypertension, age 65–74 years, diabetes mellitus, vascular disease and female gender; two points for age ≥ 75 years and previous stroke):

- CHA₂DS₂-VASc = 0: no OAC;
- CHA₂DS₂-VASc = 1: OAC or no treatment;
- CHA₂DS₂-VASc ≥ 2 : OAC unless contraindicated.

The following factors were considered contraindications: high falls risk, previous haemorrhagic stroke or major bleeding, uncontrolled hypertension, unexplained anaemia, heavy alcohol use, and patient refusal. Oral anticoagulation used in those with a CHA₂DS₂-VASc score of 0 in the context of a planned elective procedure, e.g. cardioversion or ablation, was considered appropriate.

Differences between ED and CO cohorts were analysed with a one-way ANOVA for continuous data or chi-squared comparisons for count data. Univariate and multivariate models were considered. Only predictors that satisfied a p -value

criterion of $p < 0.05$ in univariate models were included in the multivariate analysis. Relationships were described using odds ratio and 95% confidence intervals. Each variable entered into the multivariate analysis was adjusted for all other variables in the analysis to obtain the final results. Calculations were performed using PASW (Version 21, IBM, Armonk, NY) with statistical significance set at $p < 0.05$.

Results

Baseline demographic characteristics were similar between the groups including age, gender and rates of hypertension ($p = \text{NS}$). Congestive heart failure (27% vs 7%, $p < 0.001$) and diabetes mellitus (22% vs 8%, $p = 0.001$) were more frequent in the cardiology outpatient cohort. The mean CHA₂DS₂-VASc score was higher in the CO group (3.1 ± 1.9 vs 2.2 ± 1.7 , $p = 0.001$). Emergency department patients were more likely to be inappropriately anticoagulated than CO patients (65% vs 18%, $p < 0.001$). This was evident in both rates of under and over-anticoagulation (55% vs 15%, $p = 0.001$; 10% vs 3%, $p = 0.004$ respectively for CO vs ED; Table 1). Over-anticoagulation occurred most frequently with the use of antiplatelet agents such as aspirin or clopidogrel without indication (CHA₂DS₂-VASc = 0, no vascular disease), with a smaller proportion over-anticoagulated with warfarin (Table 1). Contraindications to the use of oral anticoagulation occurred in a small proportion of our study cohort, with documented reasons including falls (2.2%), prior major bleeding (1.1%) and patient refusal (2.7%). Univariate predictors of inappropriate OAC were hypertension, heart failure, diabetes mellitus and ED treatment ($p < 0.05$). Treatment in the ED remained the only significant multivariate predictor of inappropriate OAC (odds ratio 8.2, $p < 0.001$) (Table 2).

Discussion

This study demonstrated a high rate of inappropriate OAC in AF patients who were treated and discharged from the ED compared to those managed in the CO clinic. Our data is in keeping with previous work demonstrating high rates of at-risk AF patients discharged from the ED without OAC [5]. These 'missed opportunities' for OAC may have implications on long-term outcomes with higher cardiovascular event rates and substantial health care burden. Moreover, it is also likely that persistence of initial appropriate OAC may decline over time and it has been shown that eligible patients who are prescribed appropriate OAC in the ED are more likely to remain on therapy in the long term [8].

The high rate of inappropriate OAC could be attributed to the acute care setting, whereby ED physicians are focussed primarily on dealing with the most pressing medical issues and facilitating timely patient flow. The complexity of AF care and considerations needed for appropriate OAC are other likely contributors [9]. A protocol-driven approach either in the ED, or with streamlined transition to early

Table 1 Patient characteristics.

	Emergency Department (n = 115)	Cardiac Outpatient Clinic (n = 259)	p value
Age, years (mean ± SD)	65 ± 14	68 ± 14	0.06
Female gender (n, %)	58 (48%)	127 (49%)	0.9
Hypertension (n, %)	54 (47%)	138 (53%)	0.2
Congestive heart failure (n, %)	8 (7%)	70 (27%)	<0.001
Diabetes mellitus (n, %)	9 (8%)	58 (22%)	0.001
CHA ₂ DS ₂ -VASc Score (mean ± SD)	2.2 ± 1.7	3.1 ± 1.9	0.001
CHA ₂ DS ₂ -VASc Score = 0, (n, %)	18 (15%)	22 (9%)	
CHA ₂ DS ₂ -VASc Score = 1, (n, %)	31 (25%)	40 (16%)	0.002
CHA ₂ DS ₂ -VASc Score ≥ 2, (n, %)	73 (60%)	190 (75%)	
Inappropriate anti-coagulation (n, %)	75 (65%)	47 (18%)	<0.001
Under-anticoagulated (n, %)	64 (55%)	40 (15%)	0.001
Over-anticoagulated (n, %)	11 (10%)	7 (3%)	0.004
• Antiplatelet agents	10 (91%)	6 (86%)	0.8
• Warfarin	1 (9%)	1 (14%)	0.5
• NOAC	0 (0%)	0 (0%)	–

follow-up in a specialised AF clinic may help to narrow this gap in OAC therapy [10]. The use of protocol driven pathways for AF in the acute care setting has been associated with numerous benefits including reduced hospital admission rates, and shorter length of stay [12]. Furthermore, this approach has also been shown to improve quality of life and enhance patient satisfaction in short-term follow-up [13]. The use of protocol driven care in the ED to facilitate early discharge in an appropriately selected AF population can be both safe and effective [14], provided that appropriate follow-up care is provided. The use of a specialised multi-disciplinary AF clinic can assist in ensuring appropriate use of OAC, in addition to other aspects of holistic AF care, and has demonstrated enhanced patient outcomes including

reductions in cardiovascular mortality and hospitalisations [10]. Reducing the missed opportunities for OAC in the ED may prevent unnecessary thromboembolic complications and subsequent long-term sequelae in at-risk AF patients.

Author Contributions

GR, CG, GRW and DHL conceptualised and designed the study. GR, CG GRW and SR collected and analysed the data, while DHL supervised this process. JMLH, MEM, AGB, AE, RM, PS provided advice on study design, statistical data analysis and manuscript preparation. GR drafted the manuscript, and AE, RM, PS and DHL revised the various drafts. All authors contributed substantially to its finalisation.

Table 2 Univariate and multivariate predictors of inappropriate OAC.

	Odds Ratio (Univariate Analysis)	p value	Odds Ratio (Multivariate Analysis)	p value
Age (>75 yrs)	0.8 [0.7–1.1]	0.4	–	–
Female gender	0.9 [0.6–1.5]	0.8	–	–
Hypertension	0.6 [0.4–0.9]	0.03	0.6 [0.4–1.0]	0.09
Congestive heart failure	0.5 [0.3–0.9]	0.02	0.9 [0.4–1.8]	0.9
Diabetes mellitus	0.5 [0.2–0.9]	0.02	0.8 [0.4–1.7]	0.6
Treatment location (ED vs CO)	8.4 [5.1–14.0]	<0.001	8.2 [4.8–17.7]	<0.001

Abbreviations: OAC, oral anticoagulation; ED, emergency department; CO, cardiac outpatient clinic.

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Not applicable.

Conflicts of Interest

Dr Mahajan reports having served on the advisory board of Boston Scientific. Dr Mahajan reports having received research funding from Medtronic and St Jude Medical. Dr Sanders reports having served on the advisory board of Biosense-Webster, Medtronic, CathRx and St Jude Medical. Dr Sanders reports having received lecture and/or consulting fees from Biosense-Webster, Medtronic, St Jude Medical, and Boston Scientific. Dr Sanders reports having received research funding from Medtronic, St Jude Medical, Boston Scientific, Biotronik and Sorin. Dr Lau reports having received lecture and/or consulting fees from St Jude Medical and Pfizer.

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