Rev Port Cardiol. 2015;34(1):13–15

Revista Portuguesa de
Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

EDITORIAL COMMENT

Can the cost of atrial fibrillation be reduced?☆

É possível reduzir o custo da fibrilhação auricular?

João de Sousa

Serviço de Cardiologia, Hospital de Santa Maria, Centro Hospitalar Lisboa Norte, Lisboa, Portugal

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia; it is responsible for most hospitalizations for cardiac rhythm disturbances and is the most frequent cause of embolic stroke.[1] It also has a significant negative impact on the quality of life of affected patients and increases overall mortality.[2]

The prevalence of AF has been calculated at 0.9% of the population worldwide, increasing with age to 3–5% at age 65 and to over 10% after the age of 80.[3] With the aging of populations in developed countries its prevalence has risen markedly, as have the health costs associated with its treatment.[4] Furthermore, there are considerable losses of productivity to society arising from absenteeism and work disability due to AF.

There have been several studies analyzing the direct and indirect health costs associated with AF.[5–9] The cost of Medicare treatment of AF-related stroke in the USA[5] has been estimated at over two billion dollars, with overall spending on AF calculated at 6.5 billion dollars a year. In the UK,[6] AF-related costs represented nearly 1% of all National Health Service expenditure, mainly due to hospitalizations, which accounted for 60–85% of the overall costs. An analysis of direct medical costs of drugs and complications, particularly stroke, of AF in France[7] showed that the mean yearly cost per patient over five years was €3308, including €1296 for hospitalization, €998 for treatment of heart failure (HF) and €334 for treatment of stroke. The Euro Heart Survey on atrial fibrillation[8] calculated that the annual costs of AF patients in various European countries ranged between €1010 and €3225. As the largest proportion of these costs is for hospitalization, the form of clinical presentation (permanent or recurrent, paroxysmal or persistent) is a crucial factor determining the need for frequent readmissions, as shown by the FRACTAL registry.[9]

In this issue of the *Journal*, Gouveia et al.[10] present a comprehensive analysis of the burden and cost of AF in Portugal, based on population and mortality statistics for 2010, hospital data from 2011 and official Portuguese National Health System prices for 2013. Relative risk was calculated on the basis of data from the Framingham Study. Burden of disease was measured in disability-adjusted life years (DALYs) and costs were measured in health resource use and loss of productivity attributable to AF and its main complication, ischemic stroke. The analysis revealed that 4070 deaths (3.8% of total mortality) were attributable to AF in 2010 and the burden of disease was estimated at 23 084 DALYs due to disability or premature death. Total direct costs were €115 million (€34 million for inpatient care and €81 million for outpatient care), and indirect costs resulting from lost production due to disability were estimated at €25 million. Together, these amounted to €140 million, about 0.08% of Portugal's gross domestic product.

Although these costs are high, they are probably underestimates. For example, the prevalence of AF was estimated on the basis of the FAMA study,[11] which found a prevalence of

DOI of original article:
http://dx.doi.org/10.1016/j.repce.2014.08.006

☆ Please cite this article as: de Sousa J. É possível reduzir o custo da fibrilhação auricular?. Rev Port Cardiol. 2015. http://dx.doi.org/10.1016/j.repce.2014.08.006, 10.1016/j.repc.2014.12.002

E-mail address: jmfrsousa@gmail.com

2.5% in individuals aged 40 and over; however, this study did not identify the majority of patients with recurrent paroxysmal AF, who account for at least 25% of those with AF and who have a similar risk of ischemic stroke to those with permanent AF. Moreover, the mortality and morbidity arising from HF, which is often associated with AF, was not specifically addressed, even though it is clear from both clinical practice and studies that decompensation of AF-related HF is a common cause of readmissions and mortality.

Finally, as the authors acknowledge, they did not consider the costs associated with hemorrhagic stroke resulting from anticoagulant therapy to prevent stroke in AF patients.

The direct costs attributable to AF were significantly greater for outpatient care (€80 985 925) than for inpatient care (€34 503 800). This contrasts with the findings of most studies: in a recent review[12] of 37 studies published between 1990 and 2009, inpatient care accounted for 50–70% of annual direct costs; if indirect costs were included, this increased by up to 20%. In three studies – in the USA,[5] the UK,[6] and France[7] – inpatient care costs accounted for 44–52%, outpatient care for 19–30%, and medication 4–23% of the total. Costs were higher for patients receiving rhythm-control treatment than for those receiving rate-control treatment,[12] for those with recurrent AF, for younger and female patients and in the presence of significant comorbidities. This discrepancy is probably related to differences in the methods used to calculate the costs of outpatient treatment.

Given the significant burden and costs of AF for society in general, there is a pressing need to find ways to reduce them, which may be achieved by adopting a three-pronged approach.

Firstly, it is important to prevent, control and treat the conditions that most often lead to the development of AF: hypertension, ischemic heart disease, HF and diabetes. Other risk factors that can be modified include smoking, excessive alcohol consumption, obesity and sleep apnea.

Secondly, diagnosis of AF needs to be improved, both by simple pulse palpation and by electrocardiographic screening, since only through correct diagnosis can appropriate therapeutic measures be taken. In the FAMA study only 61.7% of individuals with AF had been previously diagnosed, and of these, only a minority (37.8%) were taking oral anticoagulants to prevent thromboembolic phenomena. The latest guidelines of the European Society of Cardiology[13] recommend pulse palpation as a rapid and easy method to detect possible AF in primary health care.

Thirdly, recently developed therapies that reduce the risk for ischemic stroke and clinical recurrence in AF patients should be more widely implemented, so long as the associated cost-effectiveness ratio is acceptable. The most important of these treatments are the new anticoagulants and catheter ablation.

The new anticoagulants – factor X inhibitors such as rivaroxaban and apixaban, and direct thrombin inhibitors such as dabigatran – are more effective than warfarin in preventing systemic embolism, resulting in reduced mortality and bleeding events. Economic evaluations have shown that these drugs have incremental cost-effectiveness ratios (ICERs) of between €3000 and €15 000/QALY and are therefore cost-effective. Cost-effectiveness studies of two of these drugs (dabigatran[14] and rivaroxaban[15]) compared with warfarin have been published in Portugal, the latter based on data from the ROCKET AF trial[16] and the former on the RELY trial,[17] and obtained ICERs of €3895/QALY for rivaroxaban and €8409/QALY for dabigatran. These favorable results are partly due to the fact that constant INR monitoring is unnecessary with these drugs, unlike with vitamin K antagonists.

Catheter ablation of AF through pulmonary vein isolation is the first-line treatment for paroxysmal or short-duration persistent AF that is refractory to antiarrhythmic drugs.[18] Success rates are around 70–80%, with major complication rates of 2–4%; the procedure needs to be repeated in around a quarter of cases. Although these results are encouraging, there have been no randomized trials demonstrating reduced incidence of ischemic stroke in the long term. The results of published economic evaluations[19–21] are thus less than robust and depend on symptomatic improvement, with reductions in recurrence of the arrhythmia and in hospitalizations. Analysis of the cost-effectiveness of AF ablation in these studies was favorable (less than $50 000/QALY), particularly in younger patients and in those with lower stroke risk. A recent cost-effectiveness analysis[22] based on the MANTRA-PF study (in which catheter ablation was compared with antiarrhythmic drugs on an intention-to-treat basis) showed a gain with ablation of 0.06 QALYs and an ICER of €50 570/QALY. The technique was more cost-effective and efficacious in younger patients (aged <50 years) with paroxysmal AF (ICER of €3434/QUALY) and less cost-effective in those aged over 50 (ICER of €108 937/QUALY).

In conclusion, current evidence indicates that AF and associated complications, particularly ischemic stroke, account for a significant proportion of overall health costs in Portugal, and that these costs are set to rise as the prevalence of AF increases with the aging of populations in developed countries. However, a proactive approach based on preventive measures, improved diagnosis and appropriate treatment, aimed in particular at preventing ischemic stroke and symptomatic recurrence of AF requiring hospitalization, can contribute significantly toward reducing these costs.

Conflicts of interest

The author has no conflicts of interest to declare.

References

1. Fuster V, Ryden LE, Cannom DS, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation–executive summary: a report from the ACC/AHA Task Force on practical guidelines and the ESC Committee for practice guidelines. Eur Heart J. 2006;27:1979–2030.
2. Benjamin EJ, Wolf PA, D'Agostino BB, et al. Impact of atrial fibrillation on the risk of death: the Framingham Heart Study. Circulation. 1998;98:946–52.
3. Feinberg WM, Blackshear JL, Lapacis A, et al. Prevalence, age distribution and gender in patients with atrial fibrillation. Arch Intern Med. 1995;155:469–73.
4. Chugh SS, Havmoeller R, Narayanan K, et al. Worldwide epidemiology of atrial fibrillation: a global burden of disease 2010 study. Circulation. 2014;129:837–47.

5. Coyne KS, Paramore C, Grandy S, et al. Assessing the direct costs of treating nonvalvular atrial fibrillation in the United States. Value Health. 2006;9:348–56.
6. Stewart S, Murphy NF, Walker A, et al. Cost of an emerging epidemic: an economic analysis of atrial fibrillation in the UK. Heart. 2004;90:286–92.
7. Moeremanis K, Alliot E, Chillou C, et al. Second line pharmacological management of paroxysmal and persistent atrial fibrillation in France: a cost analysis. Value Health. 2000;6:407–16.
8. Ringborg A, Neuwalaat R, Lindgren P, et al. Costs of atrial fibrillation in five European countries: results from the Euro Heart Survey on atrial fibrillation. Europace. 2008;10:403–11.
9. Reynolds MR, Essebag V, Zimethbaum P, et al. Healthcare resource utilization and costs associated with recurrent episodes of atrial fibrillation: the FRACTAL registry. J Cardiovasc Electrophysiol. 2007;18:628–33.
10. Gouveia M, Costa J, Alarcão J, et al. Carga e custo da fibrilhação auricular em Portugal. Rev Port Cardiol. 2015;34:1–11.
11. Bonhorst D, Mendes M, Adragão P, et al. Prevalence of atrial fibrillation in the Portuguese population aged 40 and over: the FAMA study. Rev Port Cardiol. 2010;29:331–50.
12. Wolowacz SE, Samuel M, Brennan VK, et al. The cost of illness of atrial fibrillation: a systematic review of the recent literature. Europace. 2011;13:1375–85.
13. Camm AJ, Lip GYH, De Caterina R, et al. 2012 focused update of the ESC Guidelines for the management of atrial fibrillation. An update of the 2010 ESC Guidelines for the management of atrial fibrillation. Developed with the special contribution of the European Heart Rhythm Association. Eur Heart J. 2012;33:2719–47.
14. Miguel LS, Rocha E, Ferreira J. Avaliação económica do dabigatrano na prevenção de acidentes vasculares cerebrais isquémicos em doentes com fibrilhação auricular não valvular. Rev Port Cardiol. 2013;32:557–65.
15. Morais J, Aguiar C, McLeod E, et al. Cost-effectiveness of rivaroxaban for stroke prevention in atrial fibrillation in the Portuguese setting. Rev Port Cardiol. 2014;33:535–44.
16. Patel MR, Mahaffey KW, Garg J, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. N Engl J Med. 2011;365:883–91.
17. Connolly SJ, Ezekowitz MD, Yusuf S, et al. RE-LY Steering Committee and Investigators Dabigatran vs. warfarin in patients with atrial fibrillation. N Engl J Med. 2009;361:1139–51.
18. Calkins H, Kuck KH, Cappato R, et al. 2012 HRS/EHRA/ECAS Expert Consensus Statement on catheter and surgical ablation of atrial fibrillation: recommendations for patient selection, procedural techniques, patient management and follow-up, definitions, endpoints and research trial design. Heart Rhythm. 2012;9:632–96.
19. Chan PS, Vijan S, Morady F, Oral H. Cost-effectiveness of radiofrequency catheter ablation for atrial fibrillation. J Am Coll Cardiol. 2006;47:2513–20.
20. Rodgers M, McKenna C, Palmer S, et al. Curative catheter ablation in atrial fibrillation and typical atrial flutter: systematic review and economic evaluation. Health Technol Assess. 2008;12:1–198, iii–iv, xi–xiii.
21. Reynolds MR, Zimetbaum P, Josephson ME, et al. Cost-effectiveness of radiofrequency catheter ablation compared with antiarrhythmic drug therapy for paroxysmal atrial fibrillation. Circ Arrhythm Electrophysiol. 2009;2:362–9.
22. Aronsson M, Walfridsson W, Janzon H, et al. The cost-effectiveness of radiofrequency catheter ablation as first-line treatment for paroxysmal atrial fibrillation: results from a MANTRA-PAF substudy. Europace. 2014;23 [Epub ahead of print].