Research Article

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Impact of an integral assistance model between primary care and cardiology on the management of patients with ischemic heart disease or atrial fibrillation

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Aim: To analyze the impact of implementing a program integrating cardiology and primary care in clinical practice. **Methods:** In the integrated care model, every cardiologist was assigned to each primary care center. **Results & conclusion:** The implementation of the new care model was associated with a significant reduction of 31.2% in requests of first visits. In addition, the delay to the cardiologist consultation significantly decreased by 54.5% for the first visits, and by 57.1% for the follow-up visits. The proportion of patients that achieved recommended low density lipoprotein-cholesterol goals significantly increased from 20.8 to 29.6%. The proportion of patients submitted to anticoagulant therapy significantly increased from 69.3 to 74.2%, as well as the proportion of patients taking direct oral anticoagulants (from 7.9 to 28.4%).

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Cardiovascular disease still remains the leading cause of death in Spain [1]. Despite the development of new therapies and the improvement of cardiovascular risk factor control rates, mortality rates are unacceptably high [1,2]. In addition, due to the aging of the population and the better management of acute cardiovascular events, it is very likely that the prevalence of chronic cardiovascular diseases will increase in the following years [3].

The adequate management of chronic conditions involves a correct coordination between different healthcare levels. Unfortunately, integration between cardiology and primary care is currently far from optimal [4–8]. Current clinical guidelines clearly state that a multidisciplinary approach is necessary to improve cardiovascular outcomes [9–11]. In this context, the coordination between general practitioners and cardiologists is mandatory [4,12]. However, the conventional care model has many limitations, including the inadequate communication and coordination between healthcare levels, delay in first and follow-up visits to the specialist, unnecessary visits to the specialist, different specialists for the same patient, delay to cardiologic complementary tests, and so forth. In this context, a

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change in the healthcare model is mandatory. Different studies have reported that assuring an adequate continuity of care between both healthcare systems may improve the management of patients with chronic cardiovascular conditions [4,8].

On December 2013, a new healthcare model that integrated primary care and cardiology was implemented in the Health Assistance Area of the Hospital Moisès Broggi in Barcelona, Spain. The aim of this study was to analyze the impact of implementing this model in the management of patients with cardiovascular disease, particularly in those with chronic ischemic heart disease or AF.

Methods

The effects of the change of the organizational model from a conventional specialty care to one of integrated care were analyzed. The new model started on December 2013, and was progressively implemented in the entire Health Assistance Area of the Hospital Moisès Broggi (Sant Joan Despi and Hospitalet de Llobregat). This is a regional hospital (level 2) with a total of 360 beds. This hospital is in the south metropolitan area of Barcelona (total area of 100 square kilometers, population density of 4360 inhabitants per square kilometer). This Health Assistance Area attended 424,959 inhabitants in 2013, 422,652 in 2014, 421,743 in 2015 and 421,482 in 2016, distributed in 19 primary care centers. The activity of the cardiology department included 1650 annual discharges, 18,600 ambulatory visits and 15,500 cardiac complementary tests.

Conventional care model

Specialty care in cardiology was performed in a specialized outpatient clinic or at hospital, but not in the primary care center. A total of 19 cardiologists worked in the outpatient clinic, the hospital or both. The cardiologists attended patients in three different outpatient centers that each cover between five and nine primary care centers. As a result, patients had to cover large distances to be attended by cardiologists and general practitioners. The medical histories of patients were recorded in electronic format in both healthcare levels but without any link between them. Communication between the general practitioners and the hospital was performed by means of referral reports.

Integrated care model

In the integrated care model, every cardiologist was assigned to each primary care center. The integrated care model started in the first primary care center January 2014 and progressively was extended to the rest of the Health Assistance Area. The implementation of this model was complete in March 2015. Each cardiologist attended patients every week in the corresponding primary care center. During the visit day, the cardiologist attended an average of seven first visits (one could be an urgent first visit), 11 follow-up visits and three virtual visits (virtual visits could also be performed during the other days of the week). In addition, discussion of clinical cases, ongoing medical education activities, the development of common protocols and periodic visits of the primary care physicians to the hospital were also performed. The electronic clinical history of patients was modified in order to allow a correct coordination between both healthcare levels. As a result, specialty care in cardiology was performed in the primary care center. The remaining days, the cardiologists performed hospital tasks. Since the number of cardiologists remained stable, a reorganization of daily activities at hospital was required. The period of study was from 2013 to 2016.

This study had two end points: to determine the impact of the programs on the visits to cardiology (management end point) and to determine the proportion of patients with ischemic heart disease that achieved low-density lipoprotein (LDL) cholesterol goals and among patients with atrial fibrillation (AF), the proportion of patients submitted to anticoagulant therapy (clinical end points).

To assess the efficacy of the new care model, the number of visits (first and follow-up visits) was determined, as well as the days of delay to the cardiologist consultation. The reduction of the first and follow-up visits were considered as an objective of the integrated care model, since this was considered the consequence of a better knowledge of management of cardiac disease by general practitioners, the appropriate referral to the specialist, the implementation of common protocols, virtual or on-site visits of cardiologists, better coordination between healthcare levels, and so forth. Other objective of the integrated care model was the reduction of the delay to the first and follow-up visits, as well as the number of outpatient visits at hospital, since this facilitates the adequate attention and the early treatment of patients. In addition, the use of cardiac complementary tests (echocardiogram, exercise stress testing, Holter monitoring) was also examined.

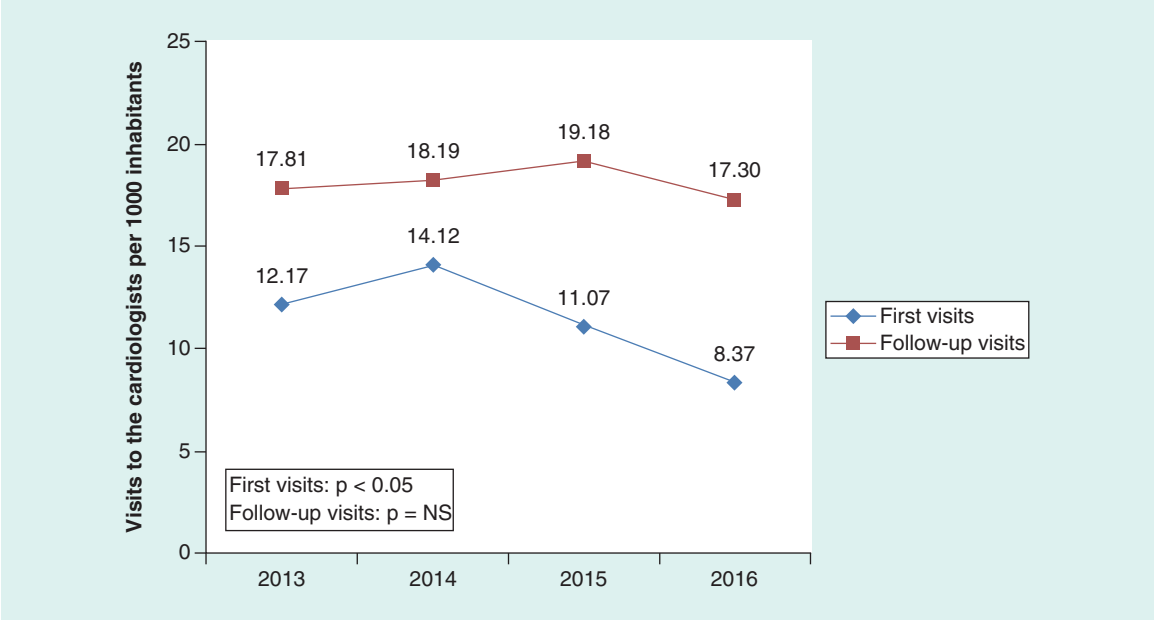

Figure 1. Prevalence of visits to the cardiologist per 1000 inhabitants. p-value between 2016 and 2013.

Moreover, patients attended with chronic ischemic heart disease or atrial fibrillation (AF) was also studied. Data were collected by reviewing the medical record of patients. Among patients with ischemic heart disease, LDL cholesterol levels were determined. Adequate LDL cholesterol control was considered when LDL cholesterol was less than 70 mg/dl, as current guidelines recommend [11]. The proportion of patients with ischemic heart disease and a LDL cholesterol less than 70 mg/dl was considered as a secondary objective of the study.

Among patients with AF, the use of antithrombotic therapy was specifically analyzed (none, antiplatelets or anticoagulants). In addition, the type of oral anticoagulant was also determined (vitamin K antagonists [VKA] vs direct oral anticoagulants [DOACs]). Among patients treated with VKA, the number of INR (International Normalized Ratio) determinations was calculated. To assess patients' INR control, the time within therapeutic range was calculated by the direct method (percent time with INR values within therapeutic range) [13]. The proportion of AF patients treated with oral anticoagulants was also considered as a secondary objective of the study.

Statistical analysis

Categorical variables were expressed as absolute numbers, percentages or rates. Quantitative variables were expressed as mean and standard deviation. Statistical analysis was performed comparing 2016 with 2013 using the $\chi 2$ test or the Fisher test to compare categorical variables and Student *t*-test or Mann–Whitney U test to compare continuous variables as required. Statistical significance was set at 95% and results were expressed as p-value < 0.05 for significant results and p-value = NS for not significant results. To quantify the association between categorical variables, a logistic regression analysis adjusted by sex and age was applied and the results were expressed as odds ratio (OR) and 95% CI. The statistical analysis was performed using the SPSS statistics package, version 17.0 (SPSS, IL, USA).

Results

Before the implementation of the new healthcare model, the number of visits to the cardiologist was 5171 (12.2 visits per 1000 inhabitants) for the first visits and 7568 (17.8 visits per 1000 inhabitants) for the follow-up visits (year 2013). After the new care model started, the number of the first visits decreased by 31.2% to 3230 (8.4 visits per 1000 inhabitants; $p < 0.05$; Figure 1). In addition, the number of outpatient visits at hospital decreased from 1981 in 2013 to 1497 in 2016 and from 2433 to 2349, for the first and follow-up visits, respectively (both $p < 0.05$). After the establishment of the new model, the average delay to the cardiologist consultation significantly decreased from 101 days in 2013 to 46 days in 2016 for the first visits (55 days reduction, 54.5% relative risk

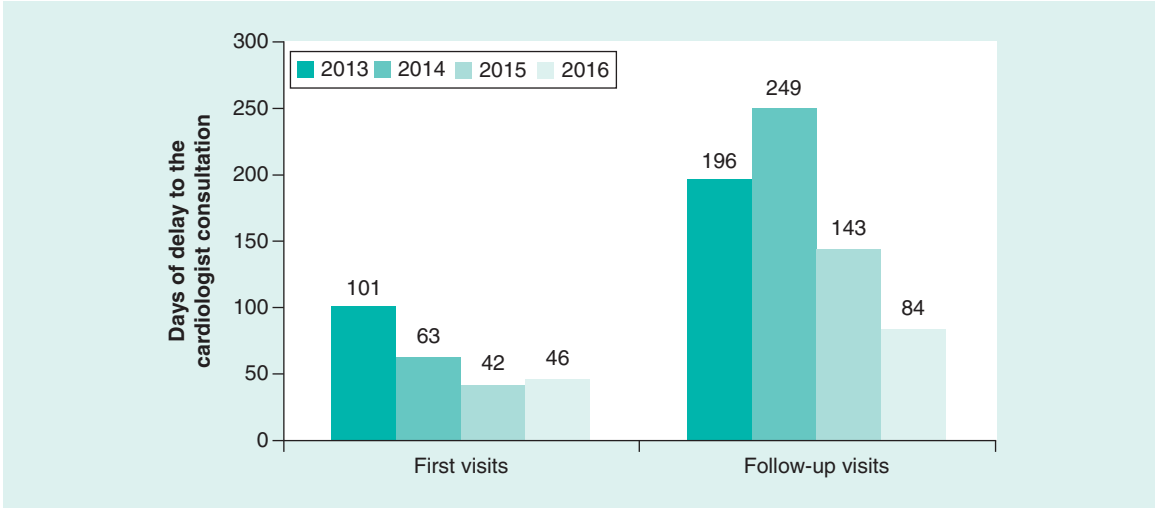

Figure 2. Days of delay until the cardiologist consultation.
First visits: p-value between 2016 and 2013 < 0.05.
Follow-up visits: p-value between 2016 and 2013 < 0.05.

Table 1. Requests for cardiac complementary tests.

Requests for cardiac complementary tests	Conventional care model	Transition to integrated model		Integrated care model	p-value
	2013	2014	2015	2016	
Echocardiogram (number per 1000 inhabitants)					
Primary care + cardiology	9209 (21.67)	9780 (23.14)	9805 (23.25)	9764 (23.17)	< 0.05†
Cardiology	5555 (13.07)	5706 (13.50)	5509 (13.06)	4835 (11.93)	< 0.05†
Primary care	3654 (8.60)	4074 (9.64)	4296 (10.19)	4734 (11.23)	< 0.05†
Ordinary delay (mean of days)	–	78.29	76.78	29.67	< 0.05‡
Urgent delay (mean of days)	–	57.72	15.00	12.00	< 0.05‡
Holter monitoring (number per 1000 inhabitants)					
Primary care + cardiology	2622 (6.17)	2626 (6.21)	2764 (6.55)	2974 (7.06)	< 0.05†
Cardiology	1852 (4.36)	1727 (4.09)	1711 (4.06)	1788 (4.24)	NS†
Primary care	770 (1.81)	899 (2.13)	1053 (2.50)	1186 (2.81)	< 0.05†
Ordinary delay (mean of days)	–	87.94	33.07	56.33	NS‡
Urgent delay (mean of days)	–	40.67	30.07	34.44	NS‡
Exercise stress testing (number per 1,000 inhabitants)					
Primary care + cardiology	1241 (2.92)	1300 (3.08)	1144 (2.71)	1233 (2.93)	NS†
Cardiology	795 (1.87)	815 (1.93)	519 (1.23)	611 (1.45)	< 0.05†
Primary care	770 (1.05)	899 (1.15)	1053 (1.48)	1186 (1.48)	< 0.05†
Ordinary delay (mean of days)	–	78.94	16.39	47.94	< 0.05‡
Urgent delay (mean of days)	–	56.75	14.83	36.25	< 0.05‡

† p-value between 2016 and 2013.
‡ p-value between 2016 and 2014.

reduction compared with the previous model), and from 196 days in 2013 to 84 days in 2016 for the follow-up visits (112 days reduction, 57.1% relative risk reduction; Figure 2).

The requests for cardiac complementary tests are presented in Table 1. Overall, whereas the requests for complementary tests performed by general practitioners significantly increased, the requests performed by cardiologists significantly decreased during the follow-up. In addition, the ordinary and the urgent delays for performing the echocardiogram and the exercise stress testing were significantly reduced between 2014 and 2016 (data were not available for 2013).

Table 2. Evolution of incidence, prevalence and management of ischemic heart disease.

Variable	Conventional care model	Transition to integrated model		Integrated care model	p-value†
	2013	2014	2015	2016	
Number of patients with IHD	9150	9281	9548	10,122	
New Cases of IHD	669	614	653	617	
Prevalence of IHD per 10,000 inhabitants	221.7	226.4	233.2	260.8	<0.05
Incidence of IHD per 10,000 inhabitants	16.3	14.7	16.1	15.1	NS
Proportion of patients with ≥1 determination of LDL cholesterol levels (%)	55.7	57.5	61.4	62.1	<0.05
Mean LDL cholesterol (mg/dl)	92.5	89.2	89.6	86.8	<0.05
Proportion of patients with LDL cholesterol <100 mg/dl (%)	65.5	69.6	69.3	71.9	<0.05
Proportion of patients with LDL cholesterol <70 mg/dl (%)	21.1	24.7	25.3	29.5	<0.001

† p-value between 2016 and 2013.
IHD: Ischemic heart disease; LDL cholesterol: Low-density lipoprotein cholesterol; NS: Non-significant.

Table 3. Management of antithrombotic therapy in patients with atrial fibrillation.

Variable	Conventional care model	Transition to integrated model		Integrated care model	p-value†
	2013	2014	2015	2016	
Total number of patients with AF (n)	7356	7738	7952	9138	<0.05
New cases of AF (n)	993	1046	1083	1119	<0.05
Number of patients according to antithrombotic treatment, n (%) None Antiplatelets Anticoagulants	 651 (8.8) 1610 (21.9) 5095 (69.3)	 782 (10.1) 1343 (17.4) 5613 (72.5)	 716 (7.7) 1154 (14.5) 6082 (76.5)	 1154 (12.6) 1208 (13.2) 6776 (74.2)	<0.05
Type of oral anticoagulant in anticoagulated patients n (%) VKA DOACs	 4694 (92.1) 401 (7.9)	 4767 (84.9) 846 (15.1)	 4741 (78.0) 1341 (22.0)	 4853 (71.6) 1923 (28.4)	<0.05
Among patients taking VKA Anticoagulation control performed in primary care setting (%) Number of INR determinations performed in primary care setting Proportion of patients with adequate INR control (%)	 59.4 38,834 61.9	 69.7 48,047 61.6	 76.8 54,586 60.3	 88.2 60,755 59.4	 <0.05 <0.05 NS

† p-value between 2016 and 2013.
AF: Atrial fibrillation; DOAC: Direct oral anticoagulant; INR: International normalized ratio; VKA: Vitamin K antagonist.

The total number of patients with ischemic heart disease significantly increased between 2013 and 2016, and from 9150 to 10,122 patients. The incidence of ischemic heart disease remained stable during this period, but the prevalence significantly increased from 221.7 to 260.8 per 10,000 inhabitants, respectively (Table 2). In patients with coronary heart disease, the proportion of patients with ≥1 determination of LDL cholesterol levels increased from 55.7% in 2013 to 62.1% in 2016 ($p < 0.05$). Between 2013 and 2016, mean LDL cholesterol levels significantly decreased from 92.5 mg/dl to 86.8 mg/dl and the proportion of patients that achieved recommended LDL cholesterol goals significantly increased from 20.8 to 29.6%, respectively (OR: 1.61; 95% CI: 1.47–1.75; $p < 0.001$; Table 2). Men achieved LDL cholesterol targets more frequently than women (28.5 vs 19.5%; OR: 1.65; 95% CI: 1.5–1.87; $p < 0.001$). From 2013 to 2016, LDL cholesterol goals increased from 17.1 to 21.4% in women (OR: 1.32; 95% CI: 1.12–1.57; $p < 0.001$) and from 22.5 to 33.4% in men (OR: 1.73; 95% CI: 1.56–1.91; $p < 0.001$). After adjusting by age and sex, the integrated care model increased the probability of achieving the LDL cholesterol targets by 31% at the end of the follow-up ($p < 0.001$).

The prevalence of patients with AF significantly increased between 2013 and 2016 (Table 3). Regarding antithrombotic therapy, the proportion of anticoagulated patients significantly increased during this period, from 69.3% in 2013 to 74.2% in 2016 and the proportion of patients treated with antiplatelets significantly decreased

from 21.9 to 13.2% during this period, leading to a 70% increase in the prescription of oral anticoagulants between 2013 and 2016 (adjusted $OR_{\text{oral anticoagulants vs antiplatelets}}$ 1.70; 95% CI: 1.57–1.85, regardless of age or sex). Among anticoagulated patients, the proportion of patients taking DOACs instead of VKA significantly increased from 7.9% in 2013 to 28.4% in 2016 (adjusted $OR_{\text{DOACs vs VKA}}$ 4.50; 95% CI: 4.01–5.05, regardless of age or sex; Table 3).

Among patients with AF anticoagulated with VKA, although the control of anticoagulation was performed predominantly in primary care setting, this proportion significantly increased from 59.4% in 2013 to 88.2% in 2016 (adjusted $OR_{\text{anticoagulation control in primary care vs other specialists}}$ 5.16; 95% CI: 4.64–5.73, regardless of age or sex). Similarly, the number of INR determinations performed in primary care setting significantly increased between 2013 and 2016. Thus, during this 4-year period, primary care progressively took care of anticoagulation control over other specialists (e.g., hematologist). However, the proportion of patients with adequate INR control remained stable during this period (Table 3).

Discussion

Traditionally, outpatient care of patients with cardiac disease has been based on a model of two separate levels of care. In addition, communication between these levels has been usually very scarce, mainly limited to consultation reports with incomplete information and patients had to visit different offices, usually far from where they lived [4,5,12,14–17]. As a result, new models that enhance the collaboration between different healthcare levels are mandatory to improve the management of patients with chronic conditions [4,6,18].

In our model, a cardiologist was integrated in each specific primary care center. After the implementation of the new healthcare model, the request for first visit significantly decreased by 31.5%, and the delay to the cardiologist consultation significantly decreased in 54.5% for the first visits and 57.1% for the follow-up visits. In addition, the number of outpatient visits at hospital was also reduced. Therefore, the new model favored integration between both healthcare levels and reduced unnecessary visits or delays, not only in the primary care setting but also at hospital. Previous studies have reported that integration between healthcare levels has similar effects [4,6,18,19]. The reduction in the number of visits to the cardiologist allowed a more rational reorganization of the resources in the cardiology department. Remarkably, the cost of implementing this program was low, as the total number of cardiologists was the same and only the number of assistant nurses slightly increased and implementing the computer support connection between primary care-hospital was also required.

Importantly, our study also showed that despite the requests for complementary tests performed by general practitioners significantly increased, the ordinary and the urgent delays for performing cardiac tests were significantly reduced during this period. In this study, only three cardiac tests (echocardiogram, holter monitoring and exercise stress testing) were specifically analyzed because both physicians and primary care physicians were able to ask for these tests. Other tests or procedures, such as coronariography or electrophysiological studies, cannot be performed in our hospital and patients, and have to be referred by a cardiologist to other hospital. Interestingly, during this period, the number of coronariography and electrophysiological studies increased from 550 to 652 (18.5%) and from 27 to 41 (51.9%), respectively.

On the other hand, as our study showed, integrated care allowed greater adherence to clinical guidelines in patients with chronic ischemic heart disease and AF [9–11]. Reducing LDL cholesterol targets to recommended targets (<70 mg/dl) is one of the main goals in the management of patients with chronic ischemic heart disease. In our study, despite the total number of patients with ischemic heart disease significantly increased between 2013 and 2016, the proportion of patients with ≥1 determination of LDL cholesterol levels also increased and mean LDL cholesterol levels decreased. In fact, the probability of achieving LDL cholesterol goals in 2016 was a 61% higher than in 2013 (OR: 1.61). However, despite these improvements, the proportion of patients – in whom a LDL-cholesterol determination was not performed – was unacceptably high and many patients did not attain LDL-cholesterol goals. A recent study that compared two national registries of patients with chronic ischemic heart disease carried out in 2006 and 2014 in Spain have shown that LDL cholesterol control rates have improved only from 9.5 to 27.3%, likely due to an insufficient treatment [2]. Since these patients were treated according to the conventional care model, it is possible that an integrated care model could have improved the management of these patients.

The majority of patients with AF require anticoagulation as antithrombotic therapy to reduce the risk of stroke or systemic embolism [20]. Importantly, current guidelines do not recommend the use of antiplatelets for this purpose [9]. A previous publication has shown that our patients had a mean CHA_2DS_2-VASc of 3.2 and only 5.0%

of our patients had a CHA_2-DS_2-VASc of 0 [21]. As a result, the great majority of our patients had an indication for anticoagulation. In our study, the proportion of anticoagulated patients significantly increased from 69.3 to 74.2%. In addition, compared with antiplatelets, the probability of using oral anticoagulants increased by 70% in 2016 versus 2013 (OR: 1.70). It is likely that with this new integrated model, with the cardiologists attended patients in the corresponding primary care center, virtual visits, discussion of clinical cases as well as ongoing medical education, more physicians took aware about the high thromboembolic risk of this population and the need for anticoagulation for the prevention of stroke.

On the other hand, during the study period, patients with AF were more common, more primary care physicians assumed the control of anticoagulation with VKA and more INR determinations were performed. However, the proportion of patients with adequate INR control remained stable during this period. In fact, in our study, almost 40% of patients had a poor INR control. These numbers are in the line with the results reported in previous studies [22,23]. Consequently, more efforts are needed to improve the quality of anticoagulation. Unfortunately, therapeutic inertia in this context is high [24]. Integrated model should not only be focused on the need for anticoagulation, but also on assuring and adequate anticoagulation with VKA or with new oral anticoagulants, likely through a higher integration of cardiologists on ongoing medical education in the primary care center.

Compared with VKA, DOACs reduce the risk of stroke, intracranial hemorrhage and mortality, and may even reduce major bleeding in different cohorts of patients [25,26]. The DOACs are of particular benefit in patients with a high risk of stroke or bleeding, and also in patients with a poor anticoagulation control with VKA [13,26]. However, physicians must use the appropriate doses for each patient in order to achieve a perfect balance between thromboembolic and bleeding risk [27]. In 2016 compared with 2013, the use of DOACs was 4.5-times more probable than VKA (OR: 4.50), despite there are some restrictions for the reimbursement of DOACs that are limited to some specific conditions in Spain, such as poor anticoagulation control with VKA and high risk of intracranial bleeding [28]. Although it is possible that a higher number of patients could benefit from the use of DOACs instead of VKA, the increase in the use of DOACs reported in our study was clinically relevant. It is likely that the integration of a cardiologist in the primary care center could have an impact on improving knowledge, abilities and the perception of general practitioners about the importance of prescribing DOACs in clinical practice when indicated (i.e., poor anticoagulation control among patients taking VKA, high intracranial bleeding, etc.). In fact, in the last years, it has been reported an increased use of DOACs in Spain [29,30].

This study has some limitations. Since this was an observational and longitudinal study, some factors that could influence the management of these patients during a 4-year period might have not been completely controlled. As a result, the data seen in our study might not be exclusively associated with the implementation of the new care model. As this was a before-after study, the same population before moving to the integral assistance was the control group. In addition, the quality of data recorded was high, and no losses of follow-up occurred. Despite this type of studies may allow generating hypothesis, but not establishing causality with absolute confidence, it seems reasonable to assume that the change of model had a positive and relevant impact on the results of the study and, consequently, our data strongly suggest that implementing an integrated care model has actually improved some clinical end points. In our study, the impact of the programs on the visits to cardiology (management end point) was analyzed. Reducing the delay for visits to the cardiologist may be considered as an intermediate surrogate variable of a better coordination between primary care and cardiology, as it allows reducing unnecessary visits due to a better coordination between healthcare levels. On the other hand, the integrated care model was applied to a particular Health Assistance Area of Barcelona. As a result, this model cannot necessarily be extrapolated to other regions or Health Assistance Areas.

Conclusion

Implementing an integrated care model is feasible, reduces the number of visits and the delay to cardiologist consultation and associated with improvements in the management of chronic conditions, such as ischemic heart disease or AF. This new patient-centered care model improves coordination between healthcare levels. It is based on communication and confidence between sanitary professionals and promotes teamwork and the co-responsibility of patients with their cardiovascular disease. In addition, this new care model strengthens the leadership of general practitioners in the management of patients with chronic heart disease with the cardiologist as consultant and allows the cardiologists to be more focused on new diagnoses and more complex cases. Consequently, it is necessary to address care coordination between healthcare levels and to improve integrated disease management through multidisciplinary teams as part of the continuum of care.

Summary points

- Implementing an integrated care model was feasible and reduced the number of visits and the delay to cardiologist consultation.
- Integration was associated with improvements in low-density lipoprotein cholesterol control rates.
- Integration was associated with an increase in the proportion of patients with atrial fibrillation receiving oral anticoagulants.
- Integration was associated with an increase in the proportion of anticoagulated patients with atrial fibrillation taking direct oral anticoagulants.
- Although specific clinical trials are warranted, itis very likely that an integrated care model may be associated with better clinical outcomes.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

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References

Papers of special note have been highlighted as: • of interest; •• of considerable interest

1. National Statistical Institute. Causes of death. www.ine.es
2. Cordero A, Galve E, Bertomeu-Martínez V *et al.* Trends in risk factors and treatments in patients with stable ischemic heart disease seen at cardiology clinics between 2006 and 2014. *Rev. Esp. Cardiol. (Engl. Ed.)* 69(4), 401–407 (2016).

• **Among patients with ischemic heart disease, cardiovascular risk factors control rates are currently far from optimal.**

3. Bansilal S, Castellano JM, Fuster V. Global burden of CVD: focus on secondary prevention of cardiovascular disease. *Int. J. Cardiol.* 201(Suppl. 1), S1–S7 (2015).
4. Falces C, Andrea R, Heras M *et al.* Integration between cardiology and primary care: impact on clinical practice. *Rev. Esp. Cardiol.* 64(7), 564–571 (2011).
5. Cook RI, Render M, Woods DD. Gaps in the continuity of care and progress on patient safety. *BMJ* 320(7237), 791–794 (2000).
6. Falces C, Sadurní J, Monell J *et al.* One-stop outpatient cardiology clinics: 10 years' experience. *Rev. Esp. Cardiol.* 61(5), 530–533 (2008).

• **The one-stop clinic is feasible in clinical practice, highly acceptable to primary care physicians, reduces the need for patients to contact the hospital and, possibly, hospital admissions.**

7. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *BMJ* 327(7425), 1219–1221 (2003).
8. Comín-Colet J, Verdú-Rotellar JM, Vela E *et al.* Efficacy of an integrated hospital-primary care program for heart failure: a population-based analysis of 56,742 patients. *Rev. Esp. Cardiol. (Engl. Ed.)* 67(4), 283–293 (2014).

•• **The implementation of multidisciplinary heart failure management programs that integrate the hospital and the community is feasible and reduces morbidity and mortality.**

9. Kirchhof P, Benussi S, Kotecha D *et al.* ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *Eur. Heart J.* 37(38), 2893–2962 (2016).
10. Ponikowski P, Voors AA, Anker SD *et al.* ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: the task force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur. Heart J.* 37(27), 2129–2200 (2016).
11. Piepoli MF, Hoes AW, Agewall S *et al.* European Guidelines on cardiovascular disease prevention in clinical practice: the sixth joint task force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). *Eur. Heart J.* 37(29), 2315–2381 (2016).
12. Díaz Sánchez S, Lobos Bejarano JM, Gonzalez-Juanatey JR. Atrial fibrillation: from detection to treatment. Role of the family physician, cardiologist and other specialists. New models of clinical management. *Aten. Primaria* 45(Suppl. 1), 18–29 (2013).
13. Therapeutic Positioning Report UT/V4/23122013. Criteria and general recommendations for the use of new oral anticoagulants in the prevention of stroke and systemic embolism in patients with nonvalvular atrial fibrillation. www.aemps.gob.es/medicamentosUsoHumano/informesPublicos/docs/criterios-anticoagulantes-orales.pdf
14. Penm J, MacKinnon NJ, Strakowski SM, Ying J, Doty MM. Minding the gap: factors associated with primary care coordination of adults in 11 countries. *Ann. Fam. Med.* 15(2), 113–119 (2017).

15. Rich MW, Chyun DA, Skolnick AH *et al.* Knowledge gaps in cardiovascular care of older adults: a scientific statement from the American Heart Association, American College of Cardiology, and American Geriatrics Society: executive Summary. *J. Am. Geriatr. Soc.* 64(11), 2185–2192 (2016).

16. Azad NA, Mielniczuk L. A call for collaboration: improving cardiogeriatric care. *Can. J. Cardiol.* 32(9), 1041–1044 (2016).

17. Vickery AW, Bell D, Garton-Smith J, Kirke AB, Pang J, Watts GF. Optimising the detection and management of familial hypercholesterolaemia: central role of primary care and its integration with specialist services. *Heart Lung Circ.* 23(2), 1158–1164 (2014).

18. Hernández-Afonso J, Facenda-Lorenzo M, Rodríguez-Esteban M, Hernández-García C, Núñez-Chicharro L, Viñas-Pérez AD. New model of integration between primary health care and specialized cardiology care. *Rev. Esp. Cardiol. (Engl. Ed.)* 70(10), 873–875 (2017).

19. Gonzalez-Cocina E, Perez-Torres F. Electronic medical records. A review and analysis of the current situation. Diraya: electronic medical records in Andalusia, Spain. *Rev. Esp. Cardiol. Supl.* 7(Suppl. C), 37–46 (2007).

20. Barrios V, Escobar C, Calderón A, Rodríguez Roca GC, Llisterri JL, Polo García J. Use of antithrombotic therapy according to CHA2DS2-VASc score in patients with atrial fibrillation in primary care. *Rev. Esp. Cardiol. (Engl. Ed.)* 67(2), 150–151 (2014).

• **A significant proportion of atrial fibrillation (AF) patients at high risk of stroke do not receive the appropriate antithrombotic treatment.**

21. Freixa-Pamias R, Blanch Gracia P, Rodríguez Latre ML, Basile L, Sánchez Chamero P, Lupón J. Improving the medical attention through an integral assistance model in patients with ischemic heart disease or atrial fibrillation. *Rev. Esp. Cardiol.* (2018). doi: 10.1016/j.recesp.2018.09.011

22. Barrios V, Escobar C, Prieto L *et al.* Anticoagulation control in patients with nonvalvular atrial fibrillation attended at primary care centers in Spain: the PAULA study. *Rev. Esp. Cardiol. (Engl. Ed.)* 68(9), 769–776 (2015).

•• **Approximately 40% of patients with nonvalvular AF anticoagulated with vitamin K antagonists in primary care in Spain have a poor anticoagulation control.**

23. Bertomeu-González V, Anguita M, Moreno-Arribas J *et al.* Quality of anticoagulation with vitamin K antagonists. *Clin. Cardiol.* 38(6), 357–364 (2015).

24. Escobar C, Barrios V, Prieto L. Therapeutic behavior of primary care physicians in patients with atrial fibrillation taking vitamin K antagonists not adequately controlled. *Eur. J. Intern. Med.* 30, e17–e18 (2016).

25. Ruff CT, Giugliano RP, Braunwald E *et al.* Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis of randomised trials. *Lancet* 383(9921), 955–962 (2014).

•• **Compared with vitamin K antagonists, direct oral anticoagulants have a favorable risk–benefit profile in patients with AF.**

26. Martínez-Rubio A, Martínez-Torrecilla R. Current evidence for new oral anticoagulants in the treatment of nonvalvular atrial fibrillation: comparison of substudies. *Rev. Esp. Cardiol.* 68(3), 185–189 (2015).

27. Martínez-Rubio A, Dan GA. Are low doses of direct-acting oral anticoagulants justified and appropriate in patients with nonvalvular atrial fibrillation? *Eur. Cardiol. Rev.* 11(2), 115–117 (2016).

28. Therapeutic Positioning Report UT_ACOD/V5/21112016. Criteria and general recommendations for the use of direct oral anticoagulants in the prevention of stroke and systemic embolism in patients with nonvalvular atrial fibrillation. www.aemps.gob.es/medicamentosUsoHumano/informesPublicos/docs/criterios-anticoagulantes-orales.pdf

29. de la Figuera M, Cinza S, Marín N, Egocheaga I, Prieto MA. Clinical characteristics of patients with atrial fibrillation treated with direct oral anticoagulants attended in primary care setting. The SILVER-AP study. *Aten. Primaria* 50(6), 359–367 (2018).

30. de la Figuera M, Prieto MA, Marín N, Egocheaga I, Cinza S. Differences in the management of patients with atrial fibrillation according to whether primary care or the specialist initiates treatment with direct oral anticoagulants. The SILVER-AP and BRONCE-AP studies. *Semergen* 44(5), 323–334 (2018).