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Editorial

Reducing the Burden of Atrial Fibrillation Cost: Is Integrated Care the Answer?

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See article by Saraswat et al., pages 1142–1148 of this issue.

Atrial fibrillation (AF) is an emerging global epidemic. Incidence and prevalence of the condition continues to exponentially rise and shows no sign of abating. AF is associated with significant morbidity and mortality including an increased risk of all-cause death, a five- to sevenfold increase in the risk of stroke and a threefold increase in the risk of heart failure. Furthermore, the number of hospitalizations due to AF have significantly increased across numerous countries and remain the most costly component of AF care delivery.[1] It is likely that many of these hospitalizations might be preventable with studies demonstrating that factors beyond that of clinical need play a role in AF hospital admissions. In Ontario, Canada, significant geographical variation in admission to hospital for AF from the emergency department has been shown with this ranging from 3% to 91%.[2]

New approaches to care delivery for AF are urgently needed. Several studies have evaluated the use of an integrated care approach in the AF population. Integrated care aims to improve patient outcomes by redesigning care delivery to provide holistic patient care across the healthcare spectrum considering patient preferences and values. The patient is encouraged to take an active role in their care delivery and become effective at self-monitoring and managing their condition. Integrated care has shown enhanced patient outcomes in numerous other chronic conditions including diabetes, heart failure, and asthma.[3] In AF, the first study to examine this approach was a randomized controlled trial undertaken in the Netherlands in which 712 individuals with newly diagnosed AF were enrolled.[4] The intervention involved a nurse-delivered, cardiologist-supported clinic and encompassed several key components to ensure standardized yet tailored care delivery including written material for patient education, protocol-driven diagnostic testing, and a software decision support system to ensure that all decisions made by the health care provider were guideline-adherent. This resulted in a 35% reduction in the primary composite end point of cardiovascular death and hospitalizations (hazard ratio, 0.65; 95% confidence interval [CI], 0.45-0.93; $P = 0.017$).[4] The cost-effectiveness of this clinic has been shown, resulting in 0.009 quality-adjusted life years (QALYs) gained at a reduced cost of 1109 euros per patient and a gain of 0.02 life-years at a reduced cost of 735 euros per patient.[5] However, until now such evidence did not exist to support the cost-effectiveness of this approach elsewhere. A recent review has shown that several different structured care approaches have been developed in AF populations.[6]

A Canadian study,[7] upon which the cost-effectiveness analysis reported on in this issue of the *Canadian Journal of Cardiology* is based, enrolled individuals who presented to 3 emergency departments in Canada with AF. This was undertaken as a "before and after" study in which 228 individuals comprised the usual care or "before" group and 185 individuals took part in the intervention or "after" phase of this study.[7] The intervention included an educational telephone call shortly after discharge from the emergency department, an invitation to attend a group educational session concerning AF and 1 visit to the AF clinic after which care was returned to the family physician. This resulted in a significant 41% reduction in the primary composite end point of death, cardiovascular hospitalizations, and AF-related emergency department visits (odds ratio, 0.59; 95% CI, 0.35-0.997; $P = 0.049$).[7]

Therefore, it is timely that the cost effectiveness of this approach is addressed by Drs Saraswat and colleagues in this edition of the *Canadian Journal of Cardiology*.[8] The cost-effectiveness analysis was performed for this intervention on the basis of study outcomes, including cardiovascular hospitalizations, AF-related emergency department visits, bleeding events (defined as major or minor), medication use (oral anticoagulation only), and the excess staff costs associated with running the AF clinic (on the basis of the salary of the nurse undertaking this clinic).[8] One and 10-year scenarios were

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undertaken for the cost-effectiveness analysis. For the 1-year outcome, the AF clinic was dominant over usual care resulting in a reduction in costs of CAD$210.83 and 0.0007 QALYs gained per patient. Most probabilistic analyses simulations showed the superiority of the AF clinic over usual care in relation to QALYs, cost-effectiveness, and an incremental cost-effectiveness ratio (ICER) below CAD$50,000. In the 10-year scenario, a cost saving of CAD$1969.61 per patient was shown with a gain in QALYs of 0.065 per patient. Probabilistic analyses showed that most scenarios supported the superiority of the AF clinic in relation to an ICER below CAD$50,000, cost-effectiveness, and QALYs gained.

This study adds to the growing body of evidence in support of the use of integrated care as a highly efficacious and cost-effective method of care delivery in the AF population. It is encouraging that, despite the use of extra resources to run and maintain such a clinic, this did not result in higher cost and in most simulations was superior to usual care in this regard. However, there are several limitations to this study that need to be considered before definitive conclusions concerning the cost-effectiveness of this approach can be determined. First, because this was not a randomized controlled study, there are notable differences in the baseline characteristics of participants in the "before" and "after" group. The usual care or "before" group had a higher prevalence of previous myocardial infarction and cardiac surgery. This has important implications for health care resource utilization because unplanned rehospitalizations are known to occur frequently in this population, and the combination of AF and acute coronary syndrome portends a poorer overall prognosis.[9] Second, events were not independently adjudicated in this study and the staff costs factored in to the analysis included a nurse only. An integrated care model is likely to require input from many disciplines for the successful implementation of this approach and will also require multiple visits to an AF clinic to ensure continuity and proactive responses to patient care needs, which are likely to change over time. Finally, it is possible that enhanced surveillance of individuals might result in a greater number of referrals for elective procedures, such as AF ablation. Because these are costly undertakings, it is of importance to consider the use of these and other procedures in examining the overall cost-effectiveness of integrated care clinics.

In recent years, the role of upstream targets and cardiovascular risk factor management has asserted itself as an essential pillar in the holistic management of AF. In a randomized clinical trial, those attending a comprehensive risk factor modification program showed marked improvement in risk factor control and reduction in AF symptom burden.[10] Using this approach, the **Aggr**essive **R**isk Factor R**e**duction **St**udy for **A**trial **F**ibrillation and Implications for the Outcome of Ablation (ARREST-AF) Cohort Study showed a greater likelihood of freedom from AF after catheter ablation in those who attended a comprehensive risk factor modification program compared with those who declined to participate (hazard ratio, 4.8; 95% CI, 2.04-11.4; $P < 0.001$).[11] The **L**ong-Term **E**ffect of **G**oal-Directed Weight Management on **A**trial Fibrillation **C**ohort: A Long-Term Follow-Up Stud**y** (LEGACY) study showed the sustained effects of this approach at 5-year follow-up with stepwise increases in the likelihood of freedom from AF with greater magnitude of weight loss and

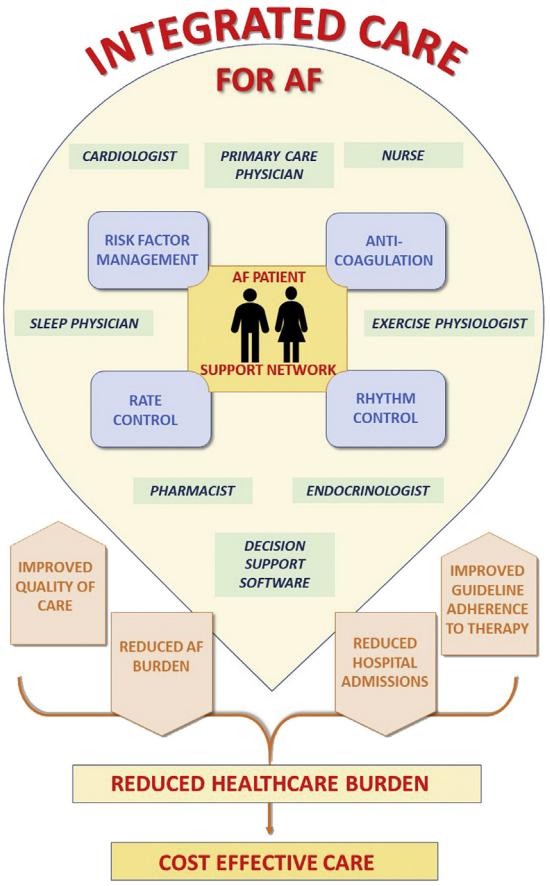

Figure 1. Proposed schematic for the cost effectiveness of integrated care for atrial fibrillation (AF).

risk factor control.[12] In the P**reve**ntion and Reg**res**sive **E**ffect of Weight-Loss and Risk Factor Modification on **A**trial **F**ibrillation (REVERSE-AF) study, such comprehensive management of risk factors has also been associated with the reversal of the AF disease type with a stepwise reversal from persistent to paroxysmal or no AF with better control of weight and risk factors.[13] Despite being a physician-delivered clinic, the cost-effectiveness of this approach has been shown with this approach resulting in reductions in hospitalizations, emergency department visits, specialist visits, cardioversions, and AF ablations.[14] The risk factor management program resulted in an increase of 0.1930 QALYs at a cost saving of AUS$12,094 (ICER of AUS$62,653 saved per gain of QALY). In addition to this, medication use, such as antihypertensive agents, was lower in those who attended the risk factor management clinic.

The comprehensive management of AF as a rhythm control strategy has also been examined in the **Ra**te **C**ontrol versus **E**lectrical Cardioversion for Persistent Atrial Fibrillation Study (RACE) study.[15] In individuals with early persistent AF and concomitant heart failure, a 4-pronged approach, which included angiotensin converting enzyme inhibitor or receptor blockers, mineralocorticoid receptor antagonists, statins, and cardiac rehabilitation, which also included 6 weekly visits with a specialist nurse, resulted in a greater likelihood of freedom from AF after 12 months of follow-up (odds ratio, 1.765; 95% CI, 1.021-3.051; $P = 0.042$).[15] However, the

cost-effectiveness of this approach is yet to be shown. These studies provide compelling evidence for the incorporation of upstream therapies and risk factor management into any holistic AF management clinic.

Overall, the current study adds further evidence that integrated care is the way forward for managing the growing health care burden associated with AF. Building on work undertaken in previous studies, this study provides a basis for the widespread application and ongoing evaluation of this approach. However, future iterations of these models must integrate all aspects of AF management including comprehensive management of risk factors and upstream conditions contributing to AF (Figure 1). In addition, future research is needed to confirm the efficacy of this approach in different countries. As the incidence and prevalence of AF continues to exponentially grow globally, there has never been a more pressing need for the development and implementation of cost-effective strategies to stem the rising tide of AF-related health care resource utilization.

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