

# A Nurse-Led Limited Risk Factor Modification Program to Address Obesity and Obstructive Sleep Apnea in Atrial Fibrillation Patients

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**Background**—Obesity and obstructive sleep apnea (OSA) are associated with atrial fibrillation (AF), yet these conditions remain inadequately treated. We report on the feasibility and efficacy of a nurse-led risk factor modification program utilizing a pragmatic approach to address obesity and OSA in AF patients.

**Methods and Results**—AF patients with obesity (body mass index  $\geq 30$  kg/m<sup>2</sup>) and/or the need for OSA management (high risk per Berlin Questionnaire or untreated OSA) were voluntarily enrolled for risk factor modification, which comprised patient education, lifestyle modification, coordination with specialists, and longitudinal management. Weight loss and OSA treatment were monitored by monthly follow-up calls and/or continuous positive airway pressure (CPAP) unit downloads. Quality of life and arrhythmia symptoms were assessed with the SF-36 and AF Severity Scale at baseline and at 6 months. From November 1, 2016 to October 31, 2017, 252 patients (age  $63 \pm 11$  years; 71% male; 57% paroxysmal AF) were enrolled, 189 for obesity and 93 for OSA. Obese patients who enrolled lost significantly greater percent body weight than those who declined (3% versus 0.3%;  $P < 0.05$ ). Among 93 patients enrolled for OSA, 70 completed sleep studies, OSA was confirmed in 50, and the majority (76%) started CPAP therapy. All components of quality of life and arrhythmia symptoms improved significantly from baseline to 6 months among enrolled patients.

**Conclusions**—A nurse-led risk factor modification program is a potentially sustainable and generalizable model that can improve weight loss and OSA in AF patients, translating into improved quality of life and arrhythmia symptoms. (*J Am Heart Assoc.* 2018;7:e010414. DOI: 10.1161/JAHA.118.010414.)

**Key Words:** atrial fibrillation • obesity • obstructive sleep apnea • weight loss

Atrial fibrillation (AF) is the most common cardiac rhythm disorder, impacting over 33 million people worldwide.<sup>1</sup> Catheter ablation remains the most effective strategy for restoring sinus rhythm, yet single-procedure efficacy remains  $\leq 70\%$ .<sup>2</sup> Recent studies from Australia have demonstrated improved maintenance of sinus rhythm post-AF ablation through risk factor modification (RFM) addressing obesity, obstructive sleep apnea (OSA), hypertension, diabetes mellitus, hyperlipidemia, smoking, and excess alcohol

consumption.<sup>3,4</sup> These studies utilized frequent in-person, telephonic, and electronic physician-patient encounters to successfully modify risk factors, leading to improved long-term maintenance of sinus rhythm.<sup>3,4</sup> However, this inherently resource-intensive, physician-directed model that comprehensively targets numerous risk factors, which are not equally prevalent in AF patients, has limited generalizability. It remains unexplored whether similar results can be achieved using alternate (nonphysician) healthcare providers and targeting only the more-common risk factors that are found in a US AF population.

In this article, we report on the feasibility and efficacy of a nurse-led RFM program targeting the 2 most common risk factors in our AF patients (ie, obesity and OSA). This initiative, called PENN AF Care, was developed to be a sustainable, reproducible, and pragmatic RFM model for clinical application.

## Methods

Because this was a quality improvement/quality assurance initiative conducted at the Hospital of the University of

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## Clinical Perspective

### What Is New?

- Our article shows, for the first time, the feasibility of a nurse-led limited risk factor modification program in successfully achieving weight loss and improving obstructive sleep apnea care in atrial fibrillation patients within a high-volume cardiac electrophysiology practice at a tertiary care medical center.

### What Are the Clinical Implications?

- The majority of atrial fibrillation patients who participated in this initiative were able to lose weight and/or optimize their sleep apnea care, and this translated into improvement in their quality of life and arrhythmia symptoms.

Pennsylvania, these data, analytical methods, and study materials will not be made available to other researchers for purposes of reproducing the results or replicating the procedure.

## Program Description

PENN AF Care was conceptualized as a “single-stop” approach for addressing obesity and OSA in AF patients referred to the cardiac electrophysiology outpatient clinics at the Hospital of the University of Pennsylvania. A registered nurse manages the program under the supervision of a cardiac electrophysiologist and with physician collaboration from Penn Metabolic Medicine (for weight management) and Penn Sleep Medicine (for OSA management). New AF patients are identified by advance schedule review and are called before their appointment for risk factor screening. Electrophysiology providers may also refer already-established AF patients for RFM. Patient participation is voluntary for  $\geq 1$  risk factor as per the following criteria:

1. Obesity (body mass index of  $\geq 30$  kg/m<sup>2</sup>).
2. High risk for OSA (according to the Berlin Questionnaire<sup>5</sup>).
3. Currently untreated OSA diagnosis.

Enrollment occurs during the electrophysiology clinic visit and/or a scheduled telephone encounter and entails nurse-led RFM counseling. Subsequent longitudinal care management by regular telephone encounters provides ongoing RFM counseling. The nurse also maintains a database for all eligible patients.

The University of Pennsylvania Institutional Review Board has approved this project as a quality improvement/quality assurance initiative, so patient consent for participation and/or data publication is not required.

## RFM Strategies

Our pragmatic RFM strategy utilizes patient education and engagement, motivational interviewing, lifestyle modification, coordination with specialists, and longitudinal care management as a part of the overall AF management plan.

### *Obesity management*

The nurse reviews the patient’s typical daily diet, eating habits, alcohol and tobacco use, and exercise routine. Education then focuses on healthy eating habits (according to ChooseMyPlate guidelines from the US Department of Agriculture<sup>6</sup>), increasing fruit and vegetable intake, limiting processed foods and added sugars, improving portion control, understanding nutrition labels, and reducing alcohol intake. To facilitate and reinforce this discussion, patients are provided written material that details each of the above points. Patients who express interest in further exploring a healthy diet are provided the web address of the ChooseMyPlate guidelines from the US Department of Agriculture. Recommendations of 150 minutes per week of moderate-intensity physical activity are discussed, but goals are tailored to each patient’s baseline fitness level and are provided in writing. The nurse and patient collaborate to develop realistic, specific, individualized lifestyle modification goals with the ultimate goal of loss of  $\geq 5\%$  body weight within 6 to 12 months. Patients are also encouraged to maintain a daily food/exercise log as a tool to improve self-awareness. Additional education on obesity management is provided as needed during follow-up telephone calls, which occur every 2 weeks during the first 2 months, once-monthly during months 3 to 6, and every 3 months during months 6 to 12. Based on identified need, follow-up calls may be more frequent. Patients unable to achieve  $\geq 3\%$  weight loss within 3 to 4 months are eligible for referral to collaborating specialists (physician and/or dietician) at Penn Metabolic Medicine for escalated care, including pharmacological management. Patients reporting lack of interest and/or effort for lifestyle modification may withdraw; patients who miss 3 consecutive follow-up attempts are excluded from further participation. Total duration of participation is for 1 year, beyond which patients are offered advice on continued weight loss on an as-needed basis.

### *Obstructive sleep apnea management*

The nurse reviews expectations for a sleep study and/or treatment modalities, including continuous positive airway pressure (CPAP). The nurse coordinates the sleep study and/or Sleep Medicine referral, then calls patients to review study results and reinforce importance of follow-up consultation for treatment initiation. Sleep Medicine assumes all subsequent OSA management and provides regular updates regarding

treatment details to the nurse. To assess the initiative's impact on OSA identification and management, we compared referral volumes to Sleep Medicine and sleep study completion rates among patients from our arrhythmia practices in the 1 year preceding and 1 year following PENN AF Care initiation.

## Program Objectives

Our eventual goal is to assess the impact of limited RFM on the long-term ( $\geq 1$  year after enrollment) maintenance of sinus rhythm by comparing the following *primary objectives* between enrolled and declined patients:

1. *Freedom from atrial arrhythmias*, defined as no AF and/or organized atrial tachyarrhythmia lasting  $>30$  seconds off antiarrhythmic drug therapy (AAD) for patients undergoing

catheter ablation, and on AAD for patients managed by drug therapy alone.

2. *Arrhythmia control*, defined as freedom from AF/organized atrial tachyarrhythmia on or off AADs, and/or  $\leq 6$  self-terminating AF/organized atrial tachyarrhythmia episodes requiring  $\leq 1$  cardioversion per year (for patients with baseline nonparoxysmal AF).

However, as the majority of subjects have participated in RFM for less than 1 year, we are not yet able to report on these findings. Current results focus instead on the impact of limited RFM on the following nonarrhythmic outcomes:

1. *Weight loss* as assessed by percent weight change and absolute body mass index change.
2. *OSA management* as assessed by CPAP data regarding treatment efficacy and compliance.

**Table 1.** Demographics, Comorbidities, AF Type, and Arrhythmia Management Strategies in Patients Who Enrolled Versus Declined Participation

	Enrolled (n=252)	Declined (n=124)	P Value
Basic demographics			
Age, y	62.8 $\pm$ 10.8	66.8 $\pm$ 10.0	<0.05
Baseline BMI	34.0 $\pm$ 7.1	33.8 $\pm$ 6.2	NS
Baseline weight (pounds)	233.1 $\pm$ 54.5	225.6 $\pm$ 45.1	NS
Male (%)	179 (71)	74 (60)	<0.05
Comorbidities (%)			
Obstructive sleep apnea	166 (66)	68 (55)	<0.05
Obesity	192 (76)	103 (83)	NS
Hypertension	169 (67)	82 (66)	NS
Diabetes mellitus	46 (18)	25 (20)	NS
Cardiomyopathy	24 (10)	18 (15)	NS
Coronary artery disease	29 (12)	27 (22)	<0.05
AF type and management strategy (%)			
Paroxysmal AF	144 (57)	51 (41)	<0.05
Nonparoxysmal AF	108 (43)	73 (58)	<0.05
AF management with drug therapy	93 (37)	57 (46)	NS
AF management with catheter ablation	159 (63)	67 (54)	NS
Awaiting first ablation	67 (27)	43 (35)	NS
Awaiting repeat ablation	22 (9)	7 (6)	NS
Postablation with no plan for repeat ablation	70 (28)	17 (14)	<0.05
No previous ablation	160 (63)	100 (81)	<0.05
Postablation (0–3 mo)	26 (10)	4 (3)	<0.05
Postablation (6–12 mo)	18 (7)	6 (5)	NS
Postablation ( $>1$ y)	48 (19)	14 (11)	NS

AF indicates atrial fibrillation; BMI, body mass index; NS, not significant.

3. *Quality of life* (QoL) as assessed by the Rand 36-Item Short Form Survey.
4. *Arrhythmia symptoms* as assessed by the Atrial Fibrillation Severity Scale.

Enrolled patients' weight change data (from follow-up telephone encounters) are compared with obese declined patients' weight change data (from review of subsequent visits in the medical record). There is no control group for OSA management comparison because these data are only available for enrolled patients (from review of Sleep Medicine visits in the medical record and/or CPAP unit downloads). There is also no control group for QoL and arrhythmia symptom comparison because only enrolled patients complete the Rand 36-Item Short Form Survey/Atrial Fibrillation Severity Scale questionnaires. Mean questionnaire results

were compared from baseline to 6 months for all participants together and for the individual risk factor populations separately.

### Management of Patients Undergoing Ablation Procedure

Our AF ablation approach has been previously described<sup>7</sup> and comprises wide-area circumferential antral pulmonary vein isolation and targeting of non-pulmonary-vein triggers identified by standardized stimulation protocol. Postablation clinic visits occur around 6 weeks, 6 months, and 1 year, after which yearly visits are advised. Our routine practice involves a 30-day transtelephonic monitor at discharge, 6 months, 1 year, and if patients report symptoms suggestive of arrhythmia recurrence.<sup>8</sup> In the absence of arrhythmia

**Table 2.** Demographics, Comorbidities, AF Type, and Arrhythmia Management Strategies in Obese Patients Who Enrolled for Versus Declined Weight Management

	Enrolled for Weight Management (n=162)	Declined Weight Management (n=59)	P Value
<b>Demographics</b>			
Age, y	62.6±9.8	64.8±9.3	NS
Male (%)	117 (72)	33 (56)	<0.05
Baseline BMI	36.0±5.8	35.9±5.1	NS
Baseline weight (pounds)	246.3±45.1	240.5±38.4	NS
<b>Comorbidities (%)</b>			
Obstructive sleep apnea	103 (64)	29 (49)	NS
Hypertension	114 (70)	44 (75)	NS
Diabetes mellitus	29 (18)	12 (20)	NS
Cardiomyopathy	12 (7)	8 (14)	NS
Coronary artery disease	20 (12)	12 (20)	NS
<b>AF type and management strategy (%)</b>			
Paroxysmal AF	83 (51)	23 (39)	NS
Nonparoxysmal AF	79 (49)	36 (61)	NS
AF management with drug therapy	56 (35)	21 (36)	NS
AF management with catheter ablation	106 (65)	38 (64)	NS
<b>Weight change information</b>			
Change in BMI	-1.0±1.4	-0.1±1.2	<0.05
Change in weight from baseline (pounds)	-7.0±10.1	-0.7±8.3	<0.05
Percent change in weight from baseline	-2.7±3.8	-0.3±3.5	<0.05
Patients who lost weight (%)	126 (78)	29 (49)	<0.05
Patients who gained weight (%)	22 (14)	26 (44)	<0.05
Patients with no weight change (%)	14 (9)	4 (7)	NS
Patients who lost ≥3% body weight (%)	56 (35)	6 (10)	<0.05

AF indicates atrial fibrillation; BMI, body mass index; NS, not significant.

recurrence, AADs are discontinued 6 weeks postablation for paroxysmal AF patients and 3 to 6 months postablation for nonparoxysmal AF patients.

### Management of Patients Not Undergoing Ablation Procedure (Medical Approach)

Medical AF management entails either a rhythm control strategy with AADs or a rate control strategy with atrioventricular nodal blocking agents. Class IC AADs (flecainide or propafenone) are preferred for rhythm management unless the patient has coronary and/or structural heart disease, in which case class III AADs (dofetilide or sotalol) are used.<sup>9</sup> Amiodarone is typically reserved for patients who have failed  $\geq 1$  class IC or III AADs. The treating electrophysiologist ultimately dictates drug choice and long-term follow-up and monitoring of these patients.

### Statistical Analysis

Categorical variables are represented as frequencies and percentages; continuous variables are summarized by mean $\pm$ SD. For comparing continuous variables, the Student *t* test was used, and for dichotomous variables, the chi-square test was used.  $P\leq 0.05$  was considered statistically significant.

### Results

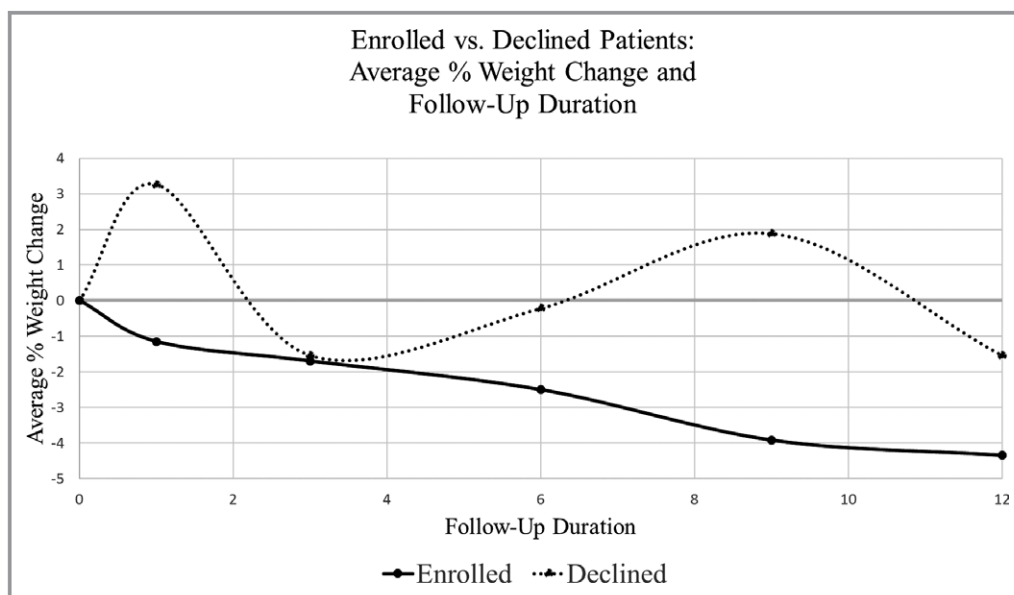
Over 1 year (November 1, 2016 to October 31, 2017), 376 patients were approached for participation and 252 patients

(67%; age,  $63\pm 11$  years; 71% male; 57% paroxysmal AF) enrolled as follows: 189 (75%) for obesity management and 93 (37%) for OSA management. Advance clinic screening identified 64% of participants, and electrophysiology providers referred the other 36%. AF management involved ablation therapy for 35% of patients and drug therapy for 37% of patients; 28% of patients were enrolled postablation with no repeat procedure plans. Enrolled patients were younger, had a greater prevalence of OSA, a lower prevalence of coronary artery disease, and a greater prevalence of paroxysmal AF than declined patients. Table 1 compares demographics, comorbidities, AF type, and arrhythmia management plans between the 2 groups.

### Impact of PENN AF Care on Individual Risk Factors

#### Obesity

Compared with obese patients who declined RFM, participants achieved significantly greater mean weight loss (0.3% versus 3%;  $P<0.05$ ) and body mass index reduction (0.1 versus 1.0;  $P<0.05$ ), a greater proportion lost weight (49% versus 78%;  $P<0.05$ ), and fewer gained weight (44% versus 14%;  $P<0.05$ ). Among enrolled patients, 72% had failed previous weight loss attempts. Table 2 compares demographics, comorbidities, AF type, arrhythmia management strategies, and weight change data between the 2 groups, and Figure 1 illustrates the average percent weight change over time for each group. Follow-up weight change data were available in 86% of enrolled patients (mean follow-up of



**Figure 1.** Average percent weight change over time for patients who enrolled (solid line) vs declined (dotted line) participation for weight management. Follow-up duration (months) is shown in the abscissa and the average percent weight change in the ordinate.



5.5±4.1 months) and in 51% of patients who declined participation (mean follow-up of 5.2±2.9 months).

### Obstructive sleep apnea

Among the 93 patients referred to Sleep Medicine, 84 were identified as high risk for OSA and required sleep studies, which were completed in 70 (83%) patients. OSA was diagnosed in 71% of patients who completed a sleep study (48% mild OSA, 30% moderate OSA, and 22% severe OSA). The majority of these patients (76%) started CPAP therapy. Of those with CPAP data available, 47% were full users (CPAP usage >4 hours/night for >70% nights) and 23% were partial users (do not meet full-use criteria). Table 3 details OSA management and outcome data in participating subjects. Figure 2 compares the referral and sleep study completion rates in the 1 year preceding (November 1, 2015 to October 31, 2016) and 1 year following (November 1, 2016 to October 31, 2017) initiation of PENN AF Care and shows significant increase in referrals of patients identified as high risk for OSA (n=60 versus n=93;  $P<0.05$ ), as well as improvement in sleep study/referral completion rates (38% versus 86%;  $P<0.05$ ).

### Impact of PENN AF Care on QoL and Arrhythmia Symptoms

The Rand 36-Item Short Form Survey and Atrial Fibrillation Severity Scale were completed at baseline by 171 and 168 patients, respectively, and at 6 months by 93 and 88 patients, respectively. Comparative analysis was specifically performed for patients who completed the questionnaires at 2 time points (enrollment and 6 months into participation), and it revealed significant improvement in all components of QoL (physical and mental) and arrhythmia symptoms (AF frequency, duration, severity, symptom subscale, burden, and global well-being) from baseline to 6 months (see Table 4). Table 5 displays results for each risk factor population separately. Obesity management participants showed significant improvement in both physical and mental QoL and all arrhythmia symptom categories. Conversely, OSA management participants showed significant improvement in mental QoL and 5 of 6 arrhythmia symptom categories.

### Discussion

Our early experience with PENN AF Care has shown the feasibility of a nurse-led RFM program to achieve weight loss and improve OSA care in AF patients who are undergoing advanced arrhythmia management at a high-volume tertiary care center. In addition to significant weight loss and improved OSA care, patients participating in this program demonstrated improvement in their QoL and arrhythmia symptoms at

≈6 months of enrollment. Although these results are encouraging, the long-term sustainability of our RFM approach and its impact on arrhythmia outcomes remain to be determined.

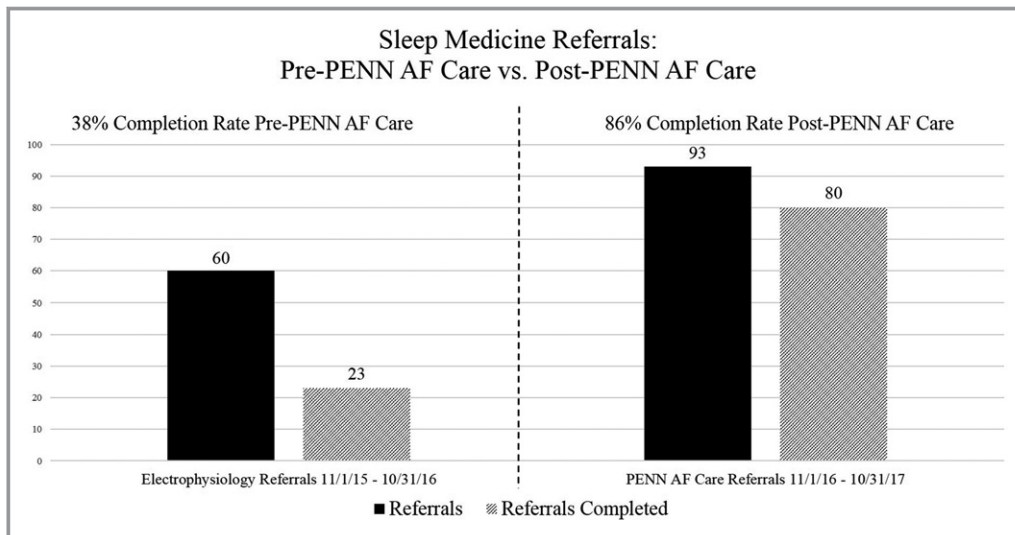
### Pragmatic Approach to RFM

Although the associations between AF and risk factors, including obesity and OSA, are well known,<sup>10,11</sup> only recently has there been an attempt to improve arrhythmia outcomes by addressing these risk factors. Pathak et al have shown, in a series of observational studies, that a comprehensive physician-directed RFM model can improve long-term maintenance of sinus rhythm in AF patients regardless of the management strategy.<sup>3,4</sup> Although quite successful, this RFM approach was fairly labor intensive. It is also unclear whether the improved arrhythmia outcomes were attributable to

**Table 3.** OSA Management Details for Patients Enrolled for this Risk Factor

	First Year of PENN AF Care
	November 1, 2016 to October 31, 2017
Sleep study results (%)	
Patients referred to sleep medicine	93
Referrals completed	80 (86)
Sleep studies ordered	84
Sleep studies completed	70 (83)
Studies with positive OSA diagnosis	50 (71)
Patients with mild OSA (AHI 5–14.9)	24 (48)
Patients with moderate OSA (AHI 15–29.9)	15 (30)
Patients with severe OSA (AHI 30+)	11 (22)
CPAP therapy and compliance in last 30 d	
Started CPAP therapy	38 (76)
CPAP data available	30 (79)
Full users (CPAP usage >4 hours/night for >70% nights)	14 (47)
Partial users (do not meet full-use criteria as above)	7 (23)
Nonusers (no CPAP usage)	9 (30)
Mean % nights with CPAP usage	63.9±44.4
Mean % nights with CPAP usage >4 hours/night	53.6±42.7
Mean CPAP usage on all days (h)	3.99±3.24
Mean CPAP usage on days used only (h)	6.19±1.98
Mean residual AHI (events/hours)	3.80±3.16

AF indicates atrial fibrillation; AHI, Apnea–Hypopnea Index; CPAP, continuous positive airway pressure; OSA, obstructive sleep apnea.



**Figure 2.** Comparison of the number of patients referred to Sleep Medicine (solid bars) and the number of patients whose referral/sleep study were completed (shaded bars) in the 1 year preceding (left of hatched line) and 1 year following (right of hatched line) PENN AF Care initiation. AF indicates atrial fibrillation.

managing all versus some of the more-prevalent risk factors. Pathak et al’s data suggest that weight loss was the most impactful RFM intervention.<sup>3,4,12</sup> Several other studies have also shown the benefit of addressing OSA in the AF population.<sup>3,10,13–15</sup> For these reasons, we developed our RFM model to address only obesity and OSA, which are most commonly found in our AF patients and which may have the greatest potential to improve outcomes.<sup>4,7,10</sup> Also recognizing the involvement of associated care professionals in US healthcare delivery, we chose a nurse to manage this program. Our experience thus far has shown this model to be both feasible and effective.

### Obesity Management Strategy

The objective underlying our obesity management approach is to improve participating patients’ overall lifestyle, including their daily diet, eating habits, alcohol and tobacco use, and exercise routine. However, we did not prescribe specific dietary/caloric restrictions. Participating patients were also not required to maintain or provide a log of their weekly exercise activities. Furthermore, because this was a pragmatic approach to obesity management, we set only modest weight loss goals for patients whose participation in this initiative was voluntary. We are gratified to note that the majority of

**Table 4.** QoL and Arrhythmia Symptom Scores in Enrolled Patients That Completed Questionnaires at Both Baseline and 6 Months

	Baseline	6 Months	P Value
SF-36 (higher score=greater QoL)	n=93	n=93	
Mean physical component summary	69.1±19.7	75.0±19.4	<0.05
Mean mental component summary	72.5±20.5	78.4±18.8	<0.05
AFSS	n=86	n=86	
Mean AF frequency (higher score=greater AF frequency)	4.4±3.3	3.1±2.8	<0.05
Mean AF duration (higher score=greater AF duration)	6.1±3.2	4.3±3.4	<0.05
Mean AF severity (higher score=greater AF severity)	4.8±2.5	4.1±2.4	<0.05
Mean AF symptom subscale (higher score=greater AF symptoms)	7.6±6.4	4.4±4.6	<0.05
Mean global well-being score (higher score=greater well-being)	7.4±1.5	7.8±1.5	<0.05
Mean AF burden (higher score=greater AF burden)	15.3±5.9	11.5±5.8	<0.05

AF indicates atrial fibrillation; AFSS, Atrial Fibrillation Severity Scale; QoL, quality of life; SF, short form.

**Table 5.** QoL and Arrhythmia Symptoms in Enrolled Patients That Completed Questionnaires at Both Baseline and 6 Months; By Risk Factor

	Baseline	6 Months	P Value
SF-36 (higher score=greater QoL)	n=81	n=81	
Enrolled for weight management			
Mean physical component summary	68.9±18.6	74.6±17.9	<0.05
Mean mental component summary	72.1±20.3	78.2±18.3	<0.05
SF-36 (higher score=greater QoL)	n=33	n=33	
Enrolled for OSA management			
Mean physical component summary	75.1±18.7	80.4±17.0	NS
Mean mental component summary	71.0±22.2	79.6±18.1	<0.05
AFSS	n=75	n=75	
Enrolled for weight management			
Mean AF frequency (higher score=greater AF frequency)	4.5±3.5	3.2±2.9	<0.05
Mean AF duration (higher score=greater AF duration)	6.3±3.3	4.5±3.4	<0.05
Mean AF severity (higher score=greater AF severity)	4.7±2.6	4.1±2.4	<0.05
Mean AF symptom subscale (higher score=greater AF symptoms)	7.7±6.6	4.3±4.4	<0.05
Mean global well-being score (higher score=greater well-being)	7.3±1.6	7.8±1.5	<0.05
Mean AF burden (higher score=greater AF burden)	15.5±6.1	11.7±6.1	<0.05
AFSS	n=32	n=32	
Enrolled for OSA management			
Mean AF frequency (higher score=greater AF frequency)	4.2±3.4	3.0±2.8	<0.05
Mean AF duration (higher score=greater AF duration)	6.5±2.9	5.1±3.2	<0.05
Mean AF severity (higher score=greater AF severity)	4.9±2.9	4.1±2.3	NS
Mean AF symptom subscale (higher score=greater AF symptoms)	6.4±4.8	4.0±4.6	<0.05
Mean global well-being score (higher score=greater well-being)	7.3±1.7	7.8±1.4	<0.05
Mean AF burden (higher score=greater AF burden)	15.6±5.3	12.2±4.8	<0.05

Results are shown separately for patients enrolled for obesity management and OSA management. AF indicates atrial fibrillation; AFSS, Atrial Fibrillation Severity Scale; NS, not significant; OSA, obstructive sleep apnea; QoL, quality of life; SF, short form.

participating patients that failed previous weight loss attempts were able to lose weight through our program. We recognize that our approach is different from the resource-intensive models that have been previously utilized to address obesity in AF patients.<sup>3,4,16</sup> We also acknowledge that our initiative has achieved a lesser magnitude of weight loss than other programs.<sup>3,4,16</sup> However, sustaining weight loss in such rigorous programs can be challenging.<sup>16,17</sup>

### OSA Management Strategy

Instead of sending all our AF patients for sleep studies, we opted to screen for OSA risk using the Berlin Questionnaire, which has been previously validated.<sup>6,18</sup> This questionnaire is also well suited for telephone screening encounters. The significant increase in the referral rates of patients to Sleep Medicine through our initiative supports the utility of this

questionnaire for identifying AF patients who are at risk for OSA. Whereas it is possible that we may have overlooked some AF patients with OSA, our approach targets resources more efficiently. Consistent with our strategy of optimizing resource utilization, we deferred the subsequent OSA care of all the referred patients to our colleagues in Sleep Medicine. In our opinion, this approach is sustainable and may also be generalizable for addressing OSA in AF patients.

### Limitations

As we have previously discussed, the impact of this limited RFM strategy in improving arrhythmia outcomes remains to be seen. We also acknowledge that the absence of a control population prevents us from determining whether improvements in patients' QoL and arrhythmia symptoms were the result of enrollment in this program. We recognize that there



were differences in patients who were enrolled versus those that declined participation in PENN AF Care. However, given that this is a clinical initiative and not a study, such differences are to be expected. Also, the overall enrollment rate among eligible AF patients was 67%. Patients declined participation for numerous reasons, including disinterest in weight loss and OSA management, issues with traveling for required follow-up visits because of long commute, etc. We were also unable to screen some patients despite making  $\geq 2$  attempts. Last, we acknowledge that the availability of follow-up data were not always consistent between groups. Thus, weight loss data were not available in 14% of enrolled patients and 49% of declined patients. These patients either did not return follow-up calls (for the enrolled group) and/or attend any subsequent clinic visits (both the enrolled and the declined group) during our analysis time frame. Similarly, rates of completion of the Rand 36-Item Short Form Survey and Atrial Fibrillation Severity Scale varied among participants. All patients were informed at enrollment about the necessity of completing the QoL and arrhythmia symptom questionnaires thrice during participation (enrollment, 6, and 12 months). Additionally, 3 separate electronic reminders were sent at each time frame with instructions and survey link. Despite this, completion rates remained inadequate.

## Conclusion

A nurse-led RFM program is a potentially sustainable and generalizable model for achieving weight loss and improving OSA care among AF patients. Participants demonstrated improved QoL and arrhythmia symptoms after 6 months. However, the long-term sustainability of this limited RFM strategy and its impact on arrhythmia outcomes remain to be seen.

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## Disclosures

None.

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