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Keywords
UMCCTS funding

Comments
John Bostrom is a medical student at the University of Massachusetts Medical School.

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Burden of Psychosocial and Cognitive Impairment in Patients With Atrial Fibrillation

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Background: Impairments in psychosocial status and cognition relate to poor clinical outcomes in patients with atrial fibrillation (AF). However, how often these conditions co-occur and associations between burden of psychosocial and cognitive impairment and quality of life (QoL) have not been systematically examined in patients with AF.

Methods: A total of 218 patients with symptomatic AF were enrolled in a prospective study of AF and psychosocial factors between May 2013 and October 2014 at the University of Massachusetts Medical Center. Cognitive function, depression, and anxiety were assessed at baseline and AF-specific QoL was assessed 6 months after enrollment using validated instruments. Demographic and clinical information were obtained from a structured interview and medical record review.

Results: The mean age of the study participants was 63.5 ± 10.2 years, 35% were male, and 81% had paroxysmal AF. Prevalences of impairment in 1, 2, and 3 psychosocial/cognitive domains (eg, depression, anxiety, or cognition) were 75 (34.4%), 51 (23.4%), and 16 (7.3%), respectively. Patients with co-occurring psychosocial/cognitive impairments (eg, >1 domain) were older, more likely to smoke, had less education, and were more likely to have heart failure (all P < 0.05). Compared with participants with no psychosocial/cognitive impairments, AF-specific QoL at 6 months was significantly poorer among participants with baseline impairment in 2 (B = −13.6, 95% CI: −21.7 to −5.4) or 3 (B = −15.1, 95% CI: −28.0 to −2.2) psychosocial/cognitive domains.

Conclusion: Depression, anxiety, and impaired cognition were common in our cohort of patients with symptomatic AF and often co-occurred. Higher burden of psychosocial/cognitive impairment was associated with poorer AF-specific QoL.

Key Words: atrial fibrillation, psychosocial impairment, cognitive impairment, multimorbidity, quality of life

Atrial fibrillation (AF) is the most common sustained heart rhythm abnormality, affecting approximately 3–6 million US adults, including almost 1 in 20 people over age 60.1,2 Owing to the aging of the US population, the number of people diagnosed with AF is expected to more than double by the year 2050.3,4 The increasing prevalence of AF has significant personal, clinical, and socioeconomic implications,4 in part due to the fact that patients with AF often also have anxiety, depression, and cognitive impairment (CI) or dementia, even in the absence of ischemic stroke.5,6 Impairments in mood or cognition exert powerful and negative impacts on the prognosis of AF patients.6–9 Specifically, depression and anxiety are associated with poorer AF outcomes, including higher AF recurrence rates, higher mortality rates, worse symptom severity, and greater health care utilization.6,9 Patients with AF who are affected by CI have poorer anticoagulation adherence, more frequent adverse cardiovascular events, and show greater functional impairment compared with nonimpaired AF patients.10

Although individually harmful, psychosocial and/or CIs may in fact confer even poorer outcomes when they occur together, and evidence suggests that these impairments frequently cluster.11 For example, anxiety and depression often co-occur in the general population,11 and their combined presence negatively impacts health outcomes, including somatic symptomatology, treatment response, and suicidality.11,12 Studies also show that patients with even mild CI are vulnerable to mood disorders, including depression.13 Data also show that psychosocial and CIs cluster in patients with coronary artery disease, in whom anxiety and depression occur together commonly.14,15 and in whom the combination of anxiety and depression confers a higher risk for worse cardiovascular outcomes than either anxiety or depression alone.13,16

Despite work highlighting the profound impact of depression, anxiety, or CI individually on the long-term prognosis of patients with AF and data showing clustering of psychosocial and cognitive comorbidities in patients with other forms of cardiovascular disease,6–9,14,16 we know little about patterns of co-occurrence in AF patients. Their joint influence on AF-related quality of life (QoL), or patient factors associated with a greater burden of psychosocial and CIs. To address these knowledge gaps, we conducted the present analysis using data from InRhythm, a prospective study of psychosocial and cognitive factors in AF.

METHODS

Study Sample

The InRhythm study is a prospective study of AF and its relationship to psychosocial and CI. Participants with symptomatic AF were recruited and followed at 1 of 3 ambulatory clinics associated with the University of Massachusetts Medical Center AF Treatment Clinic (Heywood Hospital, Marlborough Hospital, and the University of Massachusetts Medical Center University Campus). The present analysis includes 218 InRhythm participants with symptomatic AF.
and available clinical, psychosocial, cognitive, and QoL data. All participants gave informed consent, and all InRhythm protocols were approved by the University of Massachusetts Medical School Review Board.

Data Abstraction

All InRhythm study participants underwent a history, physical examination, and laboratory evaluation as part of their routine clinical evaluation for AF. The demographic, clinical, and treatment characteristics of InRhythm participants were abstracted from the electronic medical record by trained study staff. Information abstracted from the medical record included information about participant’s age, sex, type of AF, cardiovascular comorbidities (eg, myocardial infarction, diabetes, hypertension, and heart failure), noncardiovascular comorbidities (eg, anemia, renal failure), and prior antiarrhythmic drug exposure status. Participants were classified as having AF if the arrhythmia was present on a 12-lead electrocardiogram obtained during an AF Treatment Center clinic visit or an encounter with an outside health care provider, on a Holter or cardiac event monitor, or if AF was noted in any hospital record.

Cognitive Function

Global cognitive function was assessed using the Montreal Cognitive Assessment Battery (MoCA).17 The MoCA is a 10-minute, 30-item screening tool that was designed to assist physicians in detecting mild CI. The MoCA is the currently recommended screening test for CI in patients with cardiovascular disease by the National Institute for Neurologic Disorders and Stroke and the Canadian Stroke Institute.18 A cutoff score of 27 (range, 0–30) has been shown to have a high sensitivity (0.90) and specificity (0.87) for detecting mild CI, and was used as a cutoff to define CI (scores of 26 and below were considered as “impaired”).17

Depression

Depression was assessed using the 9-item version of the Patient Health Questionnaire (PHQ-9).19 Using a cut-point range of ≥10 (range, 0–27), the PHQ-9 has high sensitivity (0.88) and specificity (0.88) for detecting major depression.20

Anxiety

Anxiety was assessed using the Generalized Anxiety Disorder-7 scale, a revised version of the anxiety module from the PHQ that consists of Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) criteria for generalized anxiety disorder over the past 2 weeks.19 The Generalized Anxiety Disorder-7 scale score ranges from 0 to 27 with a score ≥10 having high sensitivity (0.89) and specificity (0.82) for psychiatrist-diagnosed anxiety disorder.21

Atrial Fibrillation-related Quality of Life

Disease-specific QoL was measured during a clinic visit using the Atrial Fibrillation Effect on Quality-of-Life (AFEQT) Questionnaire, which includes subscales for symptom severity, global well-being, AF burden, and impact on health care utilization.22 The AFEQT questionnaire consists of 20 questions separated into 4 domains: symptoms, treatment concerns, daily activities, and treatment satisfaction. Each question is graded on a 1 to 7-point scale, and the total raw score is transformed to a 0–100 scale, with 100 points indicating the best possible AF-related QoL and 0 points indicating the poorest possible AF-related QoL. AFEQT scores correlate to severity of physical symptoms from AF23 and health care utilization.23

Statistical Analyses

We compared the characteristics of InRhythm participants according to number of psychosocial and cognitive comorbidities (count of anxiety, depression, and CI; range, 0–3) and compared baseline patient characteristics by number of comorbidities using analysis of variance for continuous variables and the χ² test for categorical variables. We used a linear regression model to examine associations between baseline burden of psychosocial/cognitive comorbidity and AF-specific QoL score at 6 months, adjusting for all factors associated with psychosocial/cognitive comorbidity (P ≤ 0.2) in univariate analyses. Covariates included in multivariable models included age, sex, white race, education, smoking status, heart failure, prior stroke, anemia, renal failure, and total number of cardiac comorbidities.

RESULTS

A total of 218 adults with symptomatic AF who were willing to complete a study assessment of psychosocial factors and cognition comprised our study sample. The cohort was comprised mostly of middle-aged and older adults with a modest burden of cardiovascular and noncardiovascular risk factors. The cohort was predominantly female (64.9%) and white (93.9%) with an average age of 64 years. The majority of participants had paroxysmal AF (81%) and 68% had a college degree. Most patients carried a diagnosis of hypertension (77%) and the majority were taking an antiarrhythmic medication for rhythm control (82%). Just over one-half of participants used an antiplatelet agent (56%) and 3 out of 4 were prescribed an oral anticoagulant (56% on warfarin, 24% on a target-specific oral anticoagulant).

Burden of Psychosocial and Cognitive Comorbidities

Depression was the most commonly observed psychosocial or CI among InRhythm participants, noted in almost half of patients (45%). Nearly one-third (30%) of participants were cognitively impaired and 29% were noted to have anxiety (Fig. 1). Only 35% of...
participants were free from any psychosocial or CI. Psychosocial and cognitive comorbidities clustered frequently. Approximately one-third (34%) of the participants had a single psychosocial or CI, one-quarter (23%) had 2 impairments, and 7% were affected by all 3 impairments (Fig. 1).

Certain groupings of psychosocial/cognitive comorbidities were more common than others (Fig. 1). For example, almost one-fifth (17%) of all participants experienced both depression and anxiety. Anxiety more often co-occurred with depression and/or CI rather than in isolation. CI was most likely to occur on its own, but nevertheless almost half of participants with CI also had impairment in another domain (48%). Seven percent of participants were impaired in all 3 domains.

**Patient Characteristics Associated With Increased Burden of Impairment**

Participants with 1 or more psychosocial or CIs were older ($P < 0.001$), had less formal education ($P < 0.001$), and were more likely to be current smokers ($P = 0.01$). With the exception of heart failure, which was more prevalent among patients with multiple psychosocial and CIs ($P = 0.03$), the prevalence of comorbidities, such as hypertension, diabetes, stroke, etc., did not vary by level of psychosocial comorbidity (Table 1). Women were less likely than men to have multiple impairments ($P = 0.02$).

**Baseline Burden of Psychosocial and Cognitive Impairment in Relation to AF-specific Quality of Life**

Out of the 218 patients who completed baseline interviews, 180 (82.5%) completed the AFEQT questionnaire 6 months after enrolment. Based on their responses, greater burden of psychosocial and CI at baseline was associated with poorer AF-specific QoL at 6 months. In multivariable models adjusting for potential confounders (refferent group = 0 impairments), there was a dose–response relationship between number of impairments and QoL score (Table 2). Impairment in 1 domain was associated with a 5-point ($P = 0.236$) lower score on the 100-point AFEQT, impairment in 2 domains with a 14-point ($P < 0.001$) lower score, and impairment in 3 domains was associated with a 15-point lower AFEQT score ($P = 0.02$).

**DISCUSSION**

In our study of 218 middle-aged and older adults with symptomatic AF, we observed that anxiety, depression, and CI were common comorbid illnesses and frequently co-occurred. Certain patterns of psychosocial and cognitive comorbidity were noted, with

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yrs, mean (SD)</td>
<td>65 (13)</td>
<td>70 (13)</td>
<td>75 (12)</td>
<td>77 (11)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age, yrs, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65</td>
<td>31 (41)</td>
<td>26 (35)</td>
<td>9 (18)</td>
<td>2 (12)</td>
<td></td>
</tr>
<tr>
<td>65–74</td>
<td>23 (30)</td>
<td>16 (22)</td>
<td>12 (24)</td>
<td>3 (19)</td>
<td></td>
</tr>
<tr>
<td>75–84</td>
<td>17 (22)</td>
<td>23 (30)</td>
<td>19 (37)</td>
<td>7 (44)</td>
<td></td>
</tr>
<tr>
<td>≥ 85</td>
<td>5 (7)</td>
<td>10 (13)</td>
<td>11 (21)</td>
<td>4 (25)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female, N (%)</td>
<td>41 (54)</td>
<td>34 (46)</td>
<td>22 (44)</td>
<td>6 (35)</td>
<td>0.02</td>
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<td>White race, N (%)</td>
<td>66 (87)</td>
<td>68 (91)</td>
<td>45 (88)</td>
<td>13 (82)</td>
<td>0.11</td>
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<td>Education, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>&lt;High school</td>
<td>7 (9)</td>
<td>12 (16)</td>
<td>17 (33)</td>
<td>7 (43)</td>
<td></td>
</tr>
<tr>
<td>High school/some college</td>
<td>24 (32)</td>
<td>33 (44)</td>
<td>19 (37)</td>
<td>6 (38)</td>
<td></td>
</tr>
<tr>
<td>≥ College graduate</td>
<td>46 (60)</td>
<td>30 (40)</td>
<td>15 (30)</td>
<td>3 (19)</td>
<td>&lt;0.001</td>
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<tr>
<td>Current smoker, N (%)</td>
<td>8 (11)</td>
<td>13 (17)</td>
<td>4 (7)</td>
<td>2 (11)</td>
<td>0.01</td>
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<tr>
<td>Medical history, N (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Heart failure</td>
<td>50 (66)</td>
<td>53 (70)</td>
<td>36 (71)</td>
<td>13 (81)</td>
<td>0.03</td>
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<tr>
<td>Coronary artery disease</td>
<td>27 (36)</td>
<td>23 (30)</td>
<td>16 (32)</td>
<td>5 (30)</td>
<td>0.61</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>13 (17)</td>
<td>16 (21)</td>
<td>9 (17)</td>
<td>3 (21)</td>
<td>0.49</td>
</tr>
<tr>
<td>Hypertension</td>
<td>60 (79)</td>
<td>58 (77)</td>
<td>42 (83)</td>
<td>13 (79)</td>
<td>0.44</td>
</tr>
<tr>
<td>Diabetes</td>
<td>27 (36)</td>
<td>24 (32)</td>
<td>18 (36)</td>
<td>6 (38)</td>
<td>0.61</td>
</tr>
<tr>
<td>Stroke</td>
<td>6 (8)</td>
<td>8 (10)</td>
<td>8 (16)</td>
<td>3 (19)</td>
<td>0.15</td>
</tr>
<tr>
<td>Alcohol abuse/dependency</td>
<td>5 (7)</td>
<td>2 (3)</td>
<td>3 (6)</td>
<td>1 (8)</td>
<td>0.69</td>
</tr>
<tr>
<td>Anemia</td>
<td>14 (18)</td>
<td>14 (18)</td>
<td>13 (25)</td>
<td>3 (19)</td>
<td>0.18</td>
</tr>
<tr>
<td>Asthma/COPD</td>
<td>17 (23)</td>
<td>27 (36)</td>
<td>14 (28)</td>
<td>5 (31)</td>
<td>0.06</td>
</tr>
<tr>
<td>Renal failure</td>
<td>21 (27)</td>
<td>26 (34)</td>
<td>19 (38)</td>
<td>6 (39)</td>
<td>0.11</td>
</tr>
<tr>
<td>Implantable cardiac device</td>
<td>10 (13)</td>
<td>6 (8)</td>
<td>6 (12)</td>
<td>2 (15)</td>
<td>0.25</td>
</tr>
<tr>
<td>Total cardiac comorbid conditions, mean (SD)*</td>
<td>3.4 (1.5)</td>
<td>3.4 (1.6)</td>
<td>3.6 (1.5)</td>
<td>3.7 (1.6)</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Cardiac comorbidities include heart failure, coronary artery disease, hypertension, diabetes, stroke, and peripheral vascular disease. COPD indicates chronic obstructive pulmonary disease.
TABLE 2. Linear Regression of AFEQT Score Compared With Psychosocial or Cognitive Burden Reported as Adjusted B Coefficient*

<table>
<thead>
<tr>
<th>Number of Impairments</th>
<th>Adjusted B Coefficient (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (ref)</td>
<td>0 (ref)</td>
<td>—</td>
</tr>
<tr>
<td>1</td>
<td>−4.6 (−12.5 to 3.4)</td>
<td>0.257</td>
</tr>
<tr>
<td>2</td>
<td>−13.6 (−21.7 to −5.4)</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>−15.1 (−28.0 to −2.2)</td>
<td>0.022</td>
</tr>
</tbody>
</table>

*B adjusted for age, sex, white race, education, smoking status, heart failure, prior stroke, anemia, renal failure, and total number of cardiac comorbidities.

CONCLUSIONS

Our findings suggest that cognitive and psychosocial impairments are common among patients with symptomatic AF and often co-occur, imparting risk for poorer AF-specific QoL. Knowledge of psychosocial and CIs may help guide patients, families, and physicians in appropriate screening and making informed AF treatment decisions.

DISCLOSURES

Nothing to declare.

REFERENCES


