

## The Association between Clinical Outcomes and Experienced Quality of Outpatient Care among Patients Treated for Atrial Fibrillation

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| ARTICLE INFO  | ABSTRACT  |
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| <p><i>Article type:</i><br/>Original article</p>  | <p><b>Introduction:</b> Patient-Reported Experience Measures (PREMs) are commonly used to indicate patients' experiences in atrial fibrillation (AF) care. As outcomes are the primary goal in Value-Based Health Care, questions are raised regarding whether those experiences represent AF patients' relevant outcomes. Therefore, this study aims to assess whether a questionnaire concerning AF patients' experienced quality of care is correlated with AF patients' clinical outcomes.</p>  |
| <p><i>Article History:</i><br/>Received: 28-Jan-2019<br/>Accepted: 29-Jul-2019</p>  | <p><b>Materials and Methods:</b> Data of the present study originated from a prospective cohort study performed among outpatient AF patients in the Netherlands. In October 2015, all patients were asked to complete the Consumer Quality Index (CQI) to assess their experiences with the outpatient AF clinic. Analyses are performed to assess the association between patients' experiences and clinical outcomes of AF patients (i.e. EHRA score) after three and six months of follow-up.</p>  |
| <p><i>Key words:</i><br/>Atrial fibrillation care,<br/>Consumer quality index,<br/>Patient-relevant outcomes</p>  | <p><b>Results:</b> A total of 242 AF patients (68.8 years) met the inclusion criteria. Regarding the eight domains of the CQI, only provided information (B=3.10; P=0.01) and the physicians' communication (B=-3.12; P=0.03) were associated with improved EHRA scores at three months. After six months, EHRA score improvements were associated with only one out of eight CQI indicators, namely the information AF patients received from other healthcare providers (B=-5.15; P&lt;0.01).</p> <p><b>Conclusion:</b> An inconsistent correlation between AF patients' clinical outcomes and AF patients' PREMs was found. Although PREMs are relevant in healthcare, they cannot replace outcomes as a measure of medical care quality. For healthcare organizations, it is crucial to identify the required strategy for assessing the various aspects of the quality of services provided.</p> |
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## Introduction

Atrial fibrillation (AF) is the most common arrhythmia and approximately six million patients in Europe are diagnosed with AF (1). Prior research (2-4) has indicated that quality improvements in AF care are a necessity in order to decrease the disease burden for patients and society. To indicate elements for quality improvement, self-administered Patient-Reported Experience Measures (PREMs) are often used (5,6). However, it is questionable whether AF patients' experiences are able to fully represent the quality of care provided by health professionals. According to Porter (7,8), quality of care should be assessed and improved using outcomes that matter most to patients. For that reason, this study aims to assess whether the results of a self-administered questionnaire to identify patient experiences are correlated with the AF patients' clinical outcomes as a measure of quality of care. PREMs have been developed and tested for several domains in healthcare. Even though instruments used to measure the experience of patients are assessed to select the most suitable instrument for specific situations, these instruments face several challenges regarding their reliability, validity (6), and responsiveness in assessing changes in patients' health status (9). One instrument used to assess patients' experiences concerning the quality of Dutch hospital care is the Consumer Quality Index (CQI) (10), which was developed for inpatient hospital care, elderly care, chronic care, and outpatient hospital care (11,12). Previous research (13-15) has reported that the CQI is a reliable instrument to assess patients' perceptions. However, it is not clear whether the patients' experiences represent an objective measure for quality of care (6). Over the last decade, Value-Based Health Care (VBHC) has received a great deal of attention as a strategy to improve healthcare (7,8). Outcome measures, the nominator of the value equation introduced as the overarching goal in healthcare, are used in VBHC to evaluate and improve quality of care. In order to assess clinical outcomes for patient groups with a specific medical condition, outcome measures are selected, measured, published and improved by many initiatives worldwide (16).

In essence, improvements in patient-relevant outcomes should provide an objective indication of the quality of care provided by the involved healthcare professionals. Although prior research has reported mixed findings on potential correlations between Patient-Reported Outcomes Measures (PROMs) and PREMs (17), there is little information on the extent to which clinical outcomes are correlated with PREMs in general, and for AF patients specifically regarding the quality assessment in healthcare. Insight into this correlation would provide opportunities to accelerate quality improvements in healthcare. In AF care, one of the leading and internationally used health outcomes is the European Heart Rhythm Association (EHRA) score (18,19), a measure to assess AF-related symptoms. To assess the relation between patient-relevant outcomes and the PREMs, the present study aims to indicate whether patient experiences regarding quality of care in outpatient AF clinics, measured with the CQI, are correlated with the AF patients' clinical outcome (i.e. EHRA score) at both three and six months.

## Materials and Methods

### Population and design

In the present study baseline, three month, and six month follow-up data of AF patients are used; these patients were included in the AF-NET study between March 2015 and October 2015 when they visited the outpatient AF clinics in one of the four hospitals collaborating in the Netherlands Heart Network (NHN). The NHN (20) is a collaboration of healthcare professionals at four hospitals and four general practitioner organizations in a rural area in the Netherlands (adherence area= 760,000 inhabitants). Moreover, all AF patients who visited one of the outpatient AF clinics received a paper questionnaire from the CQI in order to assess their perceived quality of care at the outpatient AF clinics. Due to privacy legislation, no personal data was mentioned on the questionnaire. Instead a study number was used, which matched with the study number of the AF-NET study. The CQI was only distributed once (i.e. cross-sectional design) and participants were requested to return the questionnaire to their hospital using a self-addressed

envelope after completion. Patients in the present study were included if they met the following criteria: newly or recently (less than two months ago) diagnosed with AF, 18 years or older, returned the self-administered CQI, and signed the informed consent form. Excluded from participation were patients who visited the outpatient AF clinic more than six months after receiving the paper questionnaire.

### AF-NET study

Patients included in the AF-NET study visited an AF nurse in any of the four hospitals. At the first visit, the AF nurse discussed the main AF measures (i.e. onset date of symptoms, type of AF, patient demographics, vital signs), stratification scores (i.e. EHRA, HAS-BLED (major bleeding risk score), and CHA2DS2-VASc (score for stroke Quality Improvement in Medicine Cremers HP et al PSQI J, Vol. 7, No. 3, Sum 2019 3 prediction)). Subsequently, during the first visit the study was explained and written informed consent of the AF patients was obtained. After consultations with the AF nurse the follow-up consultations were performed by the treating cardiologist. The protocol of the AF-NET study (including the procedure for the CQI) was submitted for approval to the Medical research Ethics Committee United (MEC-U) in the Netherlands (reference number: 14,083). The MEC-U confirmed that the Medical Research Involving Human Subjects Act does not apply to the AF-NET study and that therefore an official approval of this study by the MEC-U is not required.

### Measurements

The results in the present study are based on the baseline (T0), three month (T3), and six month follow-up (T6) data of the AF-NET study and the data of the CQI. All AF patients who visited the outpatient AF clinic received the CQI within six months after their first consultation and were requested to assess their perceived quality of care at the outpatient AF clinic. A main patient-relevant outcome in AF care is the EHRA score (18,19). It provides an indication of the AF-related symptoms during an AF episode. Scores range from the following: 1= 'EHRA I No symptoms'; 2= 'EHRA II Mild symptoms,

normal daily activities not affected'; 3= 'EHRA III Severe symptoms, normal daily activity affected'; 4= 'EHRA IV Disabling symptoms, normal daily activity discontinued' (21). For the present study, the EHRA score is dummy coded: 'No Symptoms' (EHRA= 1) is coded by 1 and 'Symptoms' (EHRA>1) is coded by 2. In the AF-NET study, the following patient characteristics, including their coding, are collected: age (based on patients' date of birth), gender (1= male; 2= female), type of AF (1= first diagnosed AF; 2= paroxysmal AF; 3= persistent AF; 4= permanent AF), CHA2DS2-VASc score to estimate stroke risk (indicated by a mean score), and HAS-BLED score to estimate major bleeding risk (indicated by a mean score). Furthermore, the following co-morbidities are indicated (and all measured by 1= Yes; 2= No): Hypertension is defined as systolic blood pressure  $\geq 140$  mm Hg and/or diastolic blood pressure  $\geq 90$  mm Hg measured during two or more consecutive moments (during rest), and/or current use of antihypertensive medication (22). Coronary Artery Disease (CAD) is characterized as previous myocardial infarction (MI) (either ST elevation MI or non-ST elevation MI), percutaneous coronary or surgical coronary revascularization, or evidence of coronary atherosclerosis with the presence of a stenosis in at least one coronary artery (23,24). The stenosis should lead to a reduction of at least 50% diameter or a pressure drop (FFR)  $< 80\%$ .

Heart failure is characterized by typical symptoms (e.g. breathlessness, ankle swelling, and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) caused by a structural and/or functional cardiac abnormality, resulting in a reduced cardiac output and/or elevated intracardiac pressure at rest or during stress (25). Peripheral Artery Disease (PAD) is indicated by the presence of one of the following: claudicatio intermittens, amputation due to arterial insufficiency, vascular reconstruction (bypass surgery or percutaneous intervention of extremities), or documented aortic aneurysm.

Cardiovascular Disease (CVD) is indicated by the occurrence of symptomatic AF,

decompensation, heart failure, myocardial infarction or coronary artery disease, hypertension, ischemic stroke, Transient Ischemic Attack (TIA), systemic embolism, major bleeding, heart valve disease, syncope, sustained ventricular tachycardia or life-threatening adverse effects of drugs.

Diabetes Mellitus (DM) is characterized by recurring or persistent hyperglycaemia and is diagnosed by demonstrating fasting plasma glucose level  $\geq 7.0$  mmol/L ( $\geq 126$  mg/dl), or plasma glucose  $\geq 11.1$  mmol/L ( $\geq 200$  mg/dl) after two hours of 75 g oral glucose, or symptoms of hyperglycaemia and a plasma glucose of  $\geq 11.1$  mmol/L ( $\geq 200$  mg/dl), or glycosylated hemoglobin (HbA1c)  $\geq 6.5\%$  (26,27). Thyroid disease is measured by the Thyroid Stimulating Hormone (TSH) and indicated to be positive if TSH  $\geq 60$  IE/ml.

### CQI

CQI is a questionnaire developed by the Netherlands Institute for Health Service Research (NIVEL) and is approved to measure 'healthcare quality based on consumer experiences' (28). The CQI is partially based on the Consumer Assessment of Healthcare Providers and Systems and is reconstructed for the Dutch healthcare system. In the present study, the CQI is used to assess the quality of care for the outpatient AF clinic. This self-administered questionnaire (70 items) has been tested for reliability and validity and focuses on eight quality aspects (i.e. reception at the outpatient clinic, treatment by the physician, information provision by the physician, communication by the physician, treatment by another healthcare provider, information provision by another healthcare provider, communication by another healthcare provider, and aftercare with regard to medication) (29). In the present study, the AF nurse is indicated by the term 'another healthcare provider'. Following the instructions of the Netherlands Institute for Health Service Research, combined quality aspects are constructed from the separate items of the CQI (i.e. scale variables) (30). Reception at the outpatient clinic was measured by four items to assess whether the patients felt welcome at the outpatient clinic and questions regarding the reception by the desk employee of the outpatient clinic. The

answer scales ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha = 0.76). Treatment by doctor was measured by three items to indicate whether the physician took time for the AF patient, listened to the AF patient, and took the AF patient seriously. The answer scales for these questions ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.84).

Information provision by doctor was measured by four items to assess whether the AF patients perceived enough information regarding the medical examinations and treatment (i.e. 'Did the doctor tell you in advance why the treatment or the examination was necessary?'). The four-point answer scales for these questions ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.89).

Communication by doctor was measured by three items to indicate whether the received information was tailored to the personal situation of the AF patient, whether the doctor explained the procedure in a clear way, and whether he/she had the possibility to ask the doctor questions. The four-point answer scales for these questions also ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.82).

Treatment by another healthcare provider was indicated by three items assessing whether the healthcare provider took time for the AF patient, listened to the AF patient, and took the AF patient seriously. The (four-point) answer scales for these questions ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.84).

Information provision by another healthcare provider was measured by four items to assess whether the AF patients received enough information regarding the medical examinations and treatment (i.e. 'Did the other healthcare provider tell you in advance why the treatment or the examination was necessary?'). The four-point answer scales for these questions ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.88). Communication by another healthcare provider was measured by three items to indicate whether the received information was tailored to the personal situation of the AF patient, whether the healthcare provider explained the procedure in a clear way, and

whether he/she had the possibility to ask the healthcare provider questions. The four-point answer scales for these questions also ranged from '1= No, not at all' to '4= Yes, completely' (Cronbach's alpha= 0.83).

Aftercare with regard to medication was measured with three items to assess whether the AF patients have received information regarding the effects and side effects of their medication. The two-point answer scales for these questions ranged from '1= No' to '4= Yes' (Cronbach's alpha= 0.78). In order to assess the association between AF patients' outcome measures (i.e. EHRA score) and their perceived quality of care, the data of the AF-NET study is merged with the data of the CQI by means of identical study numbers, used for pseudonimization of the included patients.

### Statistical analyses

To describe the sample under study, descriptive statistics were used regarding the data of the AF-NET study (i.e. age, gender, type of AF, co-morbidities, CHA<sub>2</sub>DS<sub>2</sub>-VASc score and HAS-BLED score). In order to assess potential confounders, t-test and chi-square analyses were performed for patients with EHRA=1 and EHRA>1. Subsequently, descriptive analyses were executed to indicate the distribution of the constructed scales of the CQI. In those analyses as well, potential differences between EHRA=1 and EHRA>1 were indicated using t-test analyses. Dummy variables are constructed to indicate improvements of the EHRA score (coded as '1') and no improvements (defined as 'equal score' or 'worsening score') of the EHRA score (coded as '0'). Potential improvements of the EHRA score were indicated after three and six months of follow-up. In order to assess the associations between the scales of the CQI and the potential confounders,

logistic regression analyses were performed on improvements of the EHRA score after three and six months. In the present study, all analyses were performed in the Statistical Package for the Social Sciences 25.0 and differences were indicated to be significant if  $P \leq 0.05$ .

### Results

#### Basic characteristics

A total of 242 AF patients (mean age= 68.7 years; 56.2% male) met the inclusion criteria and were eligible for the analyses (221 AF patients were excluded due to not returning the CQI questionnaire). Most included patients (53.3%) were diagnosed with hypertension and 40.5% had paroxysmal AF. In Table 1 the basic characteristics of the research sample are indicated for AF patients with an EHRA=1 and EHRA>1. AF patients with an EHRA=1 (n=81) are older (70.4 years;  $P=0.05$ ), more often male (72.8%;  $P<0.01$ ), and less often diagnosed with paroxysmal AF (27.2%;  $P<0.01$ ). Moreover, AF patients with an EHRA>1 showed less CVD (7.5%;  $p=0.04$ ) and lower HAS-BLED scores (1.32;  $p=0.03$ ) in contrast to AF patients with no symptoms based on their EHRA score.

#### Self-administered questionnaire (CQI)

In Table 2 the mean scores of the CQI are indicated for both AF patients with EHRA=1 and EHRA>1 at baseline. As shown in the table, AF patients with EHRA=1 at baseline score significantly more positively on the CQI for the following elements: treatment by the doctor (3.91;  $P=0.05$ ), information received from the doctor (3.74;  $P=0.03$ ), communication received from the doctor (3.86;  $P=0.02$ ), and information received from another healthcare provider (3.70;  $P=0.01$ ).

**Table 1:** Baseline characteristics

|   | Total (N= 242)   | EHRA <sup>1</sup> =1 (n= 81) | EHRA>1 (n= 161)   | P-value* |
|---|------------------|------------------------------|-------------------|----------|
| Age (mean $\pm$ SD <sup>2</sup> )   | 68.74 $\pm$ 9.95 | 70.40 $\pm$ 8.52             | 67.90 $\pm$ 10.52 | 0.05     |
| Gender (% male)   | 56.2             | 72.8                         | 47.8              | <0.01    |
| Type AF <sup>3</sup> (% paroxysmal AF)                                    | 40.5             | 27.2                         | 47.2              | <0.01    |
| Hypertension (% yes)  | 53.3             | 54.3                         | 52.8              | 0.75     |
| Coronary Artery Disease (% yes)   | 8.3              | 7.4                          | 8.7               | 0.73     |
| Heart failure (% yes)   | 2.1              | 3.7                          | 1.2               | 0.20     |
| Peripheral Artery Disease (% yes)   | 4.5              | 6.2                          | 3.7               | 0.38     |
| Cardiovascular Disease (% yes)  | 10.3             | 16.0                         | 7.5               | 0.04     |
| Diabetes Mellitus (% yes)   | 14.9             | 19.8                         | 12.4              | 0.13     |
| COPD <sup>4</sup> (% yes)   | 7.4              | 7.4                          | 7.5               | 0.99     |
| Thyroid disease (% yes)   | 7.9              | 6.2                          | 8.7               | 0.51     |
| CHA <sub>2</sub> DS <sub>2</sub> -VASc score <sup>5</sup> (mean $\pm$ SD) | 2.59 $\pm$ 1.71  | 2.72 $\pm$ 1.60              | 2.53 $\pm$ 1.76   | 0.42     |
| HAS-BLED <sup>6</sup> (mean $\pm$ SD)                                     | 1.40 $\pm$ 0.82  | 1.56 $\pm$ 0.82              | 1.32 $\pm$ 0.80   | 0.03     |

\*significant if  $P \leq 0.05$ ; <sup>1</sup>EHRA= European Heart Rhythm Association; <sup>2</sup>SD= Standard Deviation; <sup>3</sup>AF= Atrial Fibrillation; <sup>4</sup>COPD= Chronic Obstructive Pulmonary Disease; <sup>5</sup>CHA<sub>2</sub>DS<sub>2</sub>-VASc score= score for stroke prediction; <sup>6</sup>HAS-BLED= major bleeding risk score

**Table 2:** Average scores of CQI scales

|   | Total<br>(N=242) | EHRA <sup>1</sup> =1<br>(n= 81) | EHRA>1<br>(n= 161) | P-<br>value* |
|---|------------------|---------------------------------|--------------------|--------------|
| Reception at outpatient clinic (mean ±SD <sup>2</sup> )         | 3.82 ±0.35       | 3.88 ±0.35                      | 3.79 ±0.35         | 0.07         |
| Treatment by doctor (mean ±SD)                                  | 3.85 ±0.36       | 3.91 ±0.25                      | 3.82 ±0.41         | 0.05         |
| Information provision by doctor (mean ±SD)                      | 3.59 ±0.68       | 3.74 ±0.47                      | 3.50 ±0.76         | 0.03         |
| Communication by doctor (mean ±SD)                              | 3.77 ±0.49       | 3.86 ±0.29                      | 3.73 ±0.57         | 0.02         |
| Treatment by another healthcare providers (mean ±SD)            | 3.84 ±0.41       | 3.88 ±0.35                      | 3.82 ±0.44         | 0.38         |
| Information provision by another healthcare provider (mean ±SD) | 3.50 ±0.75       | 3.70 ±0.50                      | 3.36 ±0.86         | 0.01         |
| Communication by another healthcare provider (mean ±SD)         | 2.78 ±0.46       | 2.81 ±0.38                      | 2.76 ±0.50         | 0.46         |
| Aftercare with regard to medication (mean ±SD)                  | 2.96 ±1.17       | 3.05 ±1.12                      | 2.92 ±1.19         | 0.51         |

\*significant if  $p \leq 0.05$ ; <sup>1</sup>EHRA= European Heart Rhythm Association; <sup>2</sup>SD= Standard Deviation

### Association between EHRA and CQI

Of the eight quality aspects of the CQI, only the information (B=3.10; P=0.05) and communication AF patients received from the doctor (B=-3.13; P=0.03) were significantly associated with improvements of the EHRA score after three months of follow-up (Table 3).

Furthermore, improvements of the EHRA score after six months (Table 4) of follow-up are inversely associated with the HAS-BLED score at baseline (B=-1.39; P=0.04) and one quality aspect of the CQI, namely the information AF patients received from another healthcare provider (B=-5.15; P<0.01).

**Table 3:** Improvement on EHRA score after 3 months of follow-up

|  | B <sup>1</sup> | S.E. <sup>2</sup> | P-value* |
|--|----------------|-------------------|----------|
| Age  | 0.01           | 0.04              | 0.72     |
| Gender   | 0.94           | 0.77              | 0.22     |
| Type AF <sup>3</sup> (T0)                            | -0.26          | 0.22              | 0.24     |
| Cardiovascular Disease (T0)                          | 0.06           | 1.06              | 0.96     |
| HAS-BLED <sup>4</sup> (T0)                           | -0.85          | 0.51              | 0.10     |
| Reception at outpatient clinic                       | -1.13          | 1.67              | 0.50     |
| Treatment by doctor                                  | 1.28           | 1.80              | 0.48     |
| Information provision by doctor                      | 3.10           | 1.59              | 0.05     |
| Communication by doctor                              | -3.13          | 1.40              | 0.03     |
| Treatment by another healthcare providers            | -1.16          | 1.84              | 0.53     |
| Information provision by another healthcare provider | -1.50          | 0.93              | 0.11     |
| Communication by another healthcare provider         | 0.62           | 1.30              | 0.63     |
| Aftercare with regard to medication                  | 0.16           | 0.37              | 0.66     |

\*significant if  $p \leq 0.05$ ; <sup>1</sup>B: Unstandardized beta; <sup>2</sup>Standard Error of the unstandardized beta; <sup>3</sup>AF= Atrial Fibrillation; <sup>4</sup>HASBLED= major bleeding risk score

**Table 4:** Improvement on EHRA score after 6 months of follow-up

|  | B <sup>1</sup> | S.E. <sup>2</sup> | P-value* |
|--|----------------|-------------------|----------|
| Age  | <0.01          | 0.04              | 0.99     |
| Gender   | 1.73           | 1.08              | 0.11     |
| Type AF <sup>3</sup> (T0)                            | -0.24          | 0.26              | 0.36     |
| Cardiovascular Disease (T0)                          | -3.96          | 2.46              | 0.11     |
| HAS-BLED <sup>4</sup> (T0)                           | -1.39          | 0.68              | 0.04     |
| Reception at outpatient clinic                       | 1.20           | 2.32              | 0.61     |
| Treatment by doctor                                  | 5.29           | 3.31              | 0.11     |
| Information provision by doctor                      | 2.99           | 1.84              | 0.11     |
| Communication by doctor                              | -1.30          | 2.15              | 0.54     |
| Treatment by another healthcare providers            | -0.27          | 2.25              | 0.91     |
| Information provision by another healthcare provider | -5.15          | 1.95              | <0.01    |
| Communication by another healthcare provider         | -0.16          | 2.17              | 0.94     |
| Aftercare with regard to medication                  | -0.26          | 0.46              | 0.57     |

\*significant if  $p \leq 0.05$ ; <sup>1</sup>B: Unstandardized beta; <sup>2</sup>Standard Error of the unstandardized beta; <sup>3</sup>AF= Atrial Fibrillation; <sup>4</sup>HAS-BLED= major bleeding risk score

## Discussion

### Interpretation of findings

The present study aims to determine whether there is a correlation between patient experiences regarding the outpatient AF clinic and clinical outcomes of AF patients at both three and six months. At baseline, a significant association was found between clinical outcomes and information and communication received by a doctor or other healthcare professionals. However, follow-up results show inconsistent findings, such as a negative correlation between improvements of the EHRA score after six months of follow-up and the perceived communication from the doctor and the information AF patients received from another healthcare provider. Furthermore, the information from the doctor was positively correlated with improvements of the EHRA score after three months of follow-up. In accordance with previous research (31,32), the present study found a significant correlation between AF patients' health outcomes and the information provided by and the communication with the doctor or other healthcare providers (i.e. AF nurse) at baseline. As reported by a review of Stewart (32), providing patients with more in-depth and tailored information is likely to result in improved health outcomes for patients. However, in the current study converse associations were found between communication by the doctor and information by the healthcare provider after three and six months of follow-up. However, this contrasting finding is difficult to explain. It may be that experience measures are strongly related to patients' first impression and do not hold over time. Measures to evaluate the quality of healthcare have been used for almost a century (33). During this period, numerous shifts and developments were reported concerning tools to assess the quality of care. Since prior research (9) has already suggested that experience measures are less susceptible to changes in patients' health status, clinical outcomes may currently be a more valid and reliable representation of healthcare quality.

In order to assess the quality of care, previous research used either subjective (i.e. patients' experiences) (34,35) or objective

measures (i.e. hard readings such as mortality, symptom scores, or diagnostic parameters) (36). Results of the present study show that both subjective and objective measures report contrasting findings regarding healthcare quality, especially in the long run. Therefore, it is crucial for organizations, also in healthcare, to identify the best or needed strategy for assessing the results of services provided. Based on the chosen strategy, the most suitable instrument, either objective or subjective, can be selected. Nevertheless, organizations often face difficulties in selecting the best-fitting strategy to assess healthcare quality (37). For that reason, indicators used in VBHC may provide a solution as they contain to indicate both objective (i.e. clinical outcomes) and subjective measures (i.e. PROMS, such as quality of life measures) that are most relevant for a specific medical condition. However, it is advisable for future research to assess whether the subjective indicators used in VBHC are also susceptible to changes over time.

### Implication of findings

The findings of the present study indicate that there is a significant positive correlation between PREMs and AF patients' relevant outcomes at baseline, which implies that AF patients with limited or no AF symptoms at inclusion score higher on patient experiences such as the perceived communication and information. However, the clinical outcomes measured after three and six months of follow-up show inconsistent findings regarding AF patients' PREMs. This contradictory finding may imply that PREMs are only able to measure cross-sectional and are not able to represent clinical measures over time. Nevertheless, it is advisable for future research to assess whether this conclusion holds for other medical conditions or different patient-relevant outcomes.

The major finding of the present study is that patient experiences, measured with PREMs, do not represent AF patients' clinical outcomes over time. This implies that before assessment of quality of care is initiated, organizations should decide which strategy is needed and which instrument is

most suitable to assess healthcare quality (i.e. patient-relevant outcomes or patients' experiences). If determining patients' current perceptions or opinions regarding the quality of care is the primary goal, PREMs can be used. For quality indications that remain valid over time, patient-relevant outcomes are advised.

### Limitations

The presented findings should be interpreted taking into account potential limitations. One limitation was that only one patient-relevant outcome was used (i.e. EHRA score) in the present study. However, the EHRA score is an internationally validated variable in AF care (18,19) and therefore crucial to indicate AF patients' relevant outcomes. A second limitation may be that the CQI was only measured once, while the EHRA score was measured at baseline, three months, and six months of follow-up. This may raise questions regarding the reliability and shelf life of the CQI results. However, the first question in the CQI is whether the patients had visited the outpatient clinic in the past six months. If this question was answered negatively, the patient was excluded from the analyses of the present study. Using this procedure, both AF patients' experiences and their most relevant outcome are assessed within the past six months. Finally, the CQI is a Dutch questionnaire. Therefore, one may wonder whether this questionnaire is comparable with corresponding studies. Prior research showed the CQI to be a valid and reliable (13-15) questionnaire and while the CQI is partially based on the internationally used Consumer Assessment of Healthcare Providers and Systems it is comparable with other perceived quality of care instruments. Although the CQI was not specifically designed for cardiac patients, the questionnaire was tailored for the sample under study (i.e. outpatient population) and therefore is a proper instrument for the present study sample.

### Conclusion

The results of this study indicate an inconsistent correlation between PREMs of AF patients and improvements of AF patients' relevant outcomes in order to

represent the quality of AF care. Although patients' experiences are crucial in healthcare, it is advisable for future research to indicate the best strategy regarding the assessment of results of services provided.

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