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THE CANADIAN CARDIOVASCULAR SOCIETY QUALITY INDICATORS E-CATALOGUE

QUALITY INDICATORS FOR ATRIAL FIBRILLATION/FLUTTER

(PRIORITY AND NON-PRIORITY INDICATORS)

A CCS CONSENSUS DOCUMENT

FINAL V2

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The Canadian Cardiovascular Society
222 Queen Street, Suite 1100
Ottawa, Ontario
Canada K1P 5V9
Email: qualityproject@ccs.ca

BACKGROUND

The quality indicators outlined in this document have been selected through a national consensus process as the key quality indicators specific to **Atrial Fibrillation (AF)/Atrial Flutter (AFL)**.

In addition, there is a complementary Atrial Fibrillation/Flutter Data Dictionary Chapter comprising of AF/AFL related data elements and definitions. Visit www.ccs.ca for the latest data dictionary. Several of the quality indicators provide the following types of analysis options:

Cross-sectional Analysis – definition of indicator estimation using existing registries or databases.

Follow-up Analysis – definition of indicator calculation for more precise and detailed analysis using prospective databases including those designed specifically for this purpose.

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PRIORITY INDICATORS

DIAGNOSIS OF NONVALVULAR AF/AFL AND AT HIGH RISK OF STROKE RECEIVING AN ORAL ANTICOAGULANT	
Description	The percentage of patients with a diagnosis of nonvalvular atrial fibrillation/flutter ≥75 years of age OR <75 years of age with a $CHADS_2$ score ≥ 2*, and without a contraindication for anticoagulation, who are receiving an oral anticoagulant (warfarin [or other vitamin K antagonist], dabigatran, rivaroxaban, apixaban). *$CHADS_2$ ≥ 2 in this instance means prior stroke/TIA/Systemic embolus, or at least two of hypertension, heart failure, or diabetes.
Numerator	Is a subset of the denominator: the number of patients in the denominator who are receiving an oral anticoagulant (warfarin [or other vitamin K antagonist], dabigatran, rivaroxaban, apixaban).
Denominator	The number of patients with a diagnosis of nonvalvular atrial fibrillation/flutter who also meet the following inclusion criteria: 1. ≥75 years of age OR <75 years of age with a $CHADS_2$ score ≥ 2, (in this instance either prior stroke/TIA/systemic embolus or at least two of hypertension, heart failure, or diabetes) 2. Without a contraindication for anticoagulation. 3. Patients alive at the end of first encounter from their qualifying episode of nonvalvular AF/AFL 4. Case selection time window to be determined at the time of analysis Cross-sectional Analysis: Patients meeting the above inclusion criteria at the end of first encounter from qualifying episode of nonvalvular AF/AFL. Follow-up Analysis: Patients meeting the above inclusion criteria at the end of first encounter from a qualifying episode of nonvalvular AF/AFL and at each follow-up encountert over a two year period following the end date of their first encounter for their qualifying nonvalvular AF/AFL episode; excluding patients who died, or were lost to follow-up or developed a contraindication for anticoagulation.
Method of Calculation	**Cross-sectional Analysis**: Snapshot in time at the end of first encounter and at one year after the end of first encounter from a qualifying nonvalvular AF/AFL episode. Calculated as the percentage of qualifying nonvalvular AF/AFL patients who are receiving an oral anticoagulant at the time of their index first encounter and at the follow-up encounter closest to one year from the end of their index encounter. The cross-sectional analyses will use data routinely collected for administrative or other purposes. **Follow-up Analysis**: Oral anticoagulant usage at the end of first encounter from qualifying nonvalvular AF/AFL episode and usage attrition at each follow-up encounter over the two years after the end of their index encounter from a qualifying nonvalvular AF/AFL episode. Calculated as the percentage of qualifying nonvalvular AF/AFL patients who are receiving an oral anticoagulant at the end of the index first encounter and at each follow-up encounter over a two-year period from end of the index encounter; excluding those who died, were lost to follow-up or developed a contraindication for anticoagulation. The follow-up analysis will use data specifically collected for this QI analysis
Sources of Data	EMR or Administrative databases, Hospitalization and Physician Billing databases for diagnoses (e.g. Discharge Abstract Database, Ambulatory Care Database, Physicians Claims Database), Provincial formularies for drug information (e.g. Blue Cross) or specific AF/AFL QI database.

Rationale

Patients with a diagnosis of nonvalvular atrial fibrillation/flutter who are at high risk for stroke and without a contraindication should be on an oral anticoagulant for stroke prevention.

Clinical Recommendation(s)

CCS AF Guidelines 2012 Focused Update recommends that patients at high risk of stroke should receive oral anticoagulation therapy (warfarin (or other vitamin K antagonist), dabigatran, rivaroxaban, or apixaban). (Strong recommendation, High Quality Evidence).

Method of Reporting

The reported statistic will be the percentage of patients ***with a clear indication*** for oral anticoagulant and ***without a contraindication*** that are actually on oral anticoagulation therapy at or following the end of the encounter for a qualifying nonvavlular AF/AFL episode.

Challenges to Implementation/Interpretation

- Contraindication to anticoagulation will need to be recorded.
- Reasons for not receiving anticoagulation, such as patient refusal, will not be recorded.

RATE OF STROKE IN PATIENTS WITH NONVALVULAR AF/AFL	
Description	The annualized rate of stroke (excluding TIA) in patients with diagnosis of nonvalvular atrial fibrillation/flutter.
Numerator	Is a subset of the denominator: the number of patients in the denominator who suffer any stroke (excluding TIA). Patients in the numerator will have their antithrombotic therapy at the end of their index encounter compared to that at the time of stroke (see below in the denominator description).
Denominator	The total number of patients with a qualifying episode of nonvalvular atrial fibrillation/flutter. Case selection window to be determined at the time of analysis. Patients will be further sub-categorized according to CHA_2DS_2-VASc* and antithrombotic therapy at end of the encounter for the qualifying episode of nonvalvular AF/AFL (see below). *Heart failure, Stroke/TIA/systemic embolus, hypertension, age >75, diabetes, atherosclerotic disease, age 65-74, female sex. CHA_2DS_2-VASc Score at the end of encounter for qualifying episode of nonvalvular AF/AFL 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic Therapy: 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only 4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
Method of Calculation	**Cross-sectional Analysis**: A snapshot at one year after a qualifying episode of nonvalvular AF/AFL. Calculated as the percentage of patients with a qualifying episode of nonvalvular atrial fibrillation/flutter who suffer stroke (excluding TIA) within a year after the end of their index encounter. The rates will be calculated as total and also stratified by CHA_2DS_2-VASc* Score and type of antithrombotic therapy at the end of their encounter for qualifying AF/AFL episode. A sub-analysis will compare antithrombotic therapy received at the end of their index encounter to that at the time of their stroke in the numerator. The cross-sectional analyses will use data routinely collected for administrative or other purposes. **Follow-up Analysis**: Annualized risk of stroke (excluding TIA) from a Kaplan-Meier-type analysis of the first two years after a qualifying nonvalvular AF/AFL subcategorized by CHA_2DS_2-VASc Score, and antithrombotic therapy. Calculated as annual rate of [first] stroke (excluding TIA) over a two year period post qualifying episode of nonvalvular AF/AFL and rates by sub-categories according to CHA_2DS_2-VASc* Score and type of antithrombotic therapy at end of the encounter for their qualifying episode of nonvalvular AF/AFL, censoring for death or lost to follow-up. A sub-analysis will compare antithrombotic therapy received at the end of their index encounter to that at the time of their stroke in the numerator. The follow-up analysis will use data specifically collected for this analysis.
Sources of Data	EMR or Administrative databases, Hospitalization and Physician Billing databases for diagnoses (e.g. Discharge Abstract Database, Ambulatory Care Database, Physicians Claims Database), Provincial formularies for drug information (e.g. Blue Cross) or specific AF/AFL QI database.

Rationale

This quality indicator does not correspond directly to one of our chapter's recommendations, but reflects the epidemiology and impact of therapy on the principal outcome we wish to prevent.

Clinical Recommendation(s)

None

Method of Reporting

The reported statistic will be an annualized percentage of patients with nonvalvular atrial fibrillation/flutter who suffer a stroke according to the risk of stroke and antithrombotic therapy.

Challenges to Implementation/Interpretation

- Not all strokes might be related to atrial fibrillation.
- The rarer but equivalent outcome of systemic embolus may not be included.
- The distinction between types of stroke (thrombotic/hemorrhagic/unknown) may not be available.

RATE OF MAJOR HEMORRHAGE IN PATIENTS WITH NONVALVULAR AF/AFL	
Description	The annualized rate of major hemorrhage in patients with diagnosis of nonvalvular atrial fibrillation/flutter.
Numerator	Is a subset of the denominator: the number of patients in the denominator who have a major hemorrhage. Patients in the numerator will have their antithrombotic therapy at index encounter compared to that at the time of major hemorrhage (see below in the denominator description).
Denominator	The total number of patients with a qualifying episode of nonvalvular atrial fibrillation/flutter. Case selection window to be determined at the time of analysis. Patients will be further sub-categorized according to CHA_2DS_2-VASc* Score and Antithrombotic Therapy at the time of their qualifying episode of nonvalvular AF/AFL (see below). *Heart failure, Stroke/TIA/systemic embolus, hypertension, age >75, diabetes, atherosclerotic disease, age 65-74, female sex. CHA_2DS_2-VASc Score at end of encounter for qualifying episode of nonvalvular AF/AFL 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic Therapy: 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only 4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
Method of Calculation	**Cross-sectional Analysis**: A snapshot at one year after a qualifying episode of nonvalvular AF/AFL. Calculated as the percentage of patients with a qualifying episode of nonvalvular atrial fibrillation/flutter who are hospitalized with major hemorrhage within a year after index encounter. The rates will be calculated as total and also stratified by CHA_2DS_2-VASc* Score and type of antithrombotic therapy at end of encounter for qualifying AF/AFL episode. A sub-analysis will compare antithrombotic therapy received at index encounter to that at the time of their major hemorrhage in the numerator. The cross-sectional analyses will use data routinely collected for administrative or other purposes. **Follow-up Analysis**: Annualized risk of major hemorrhage from a Kaplan-Meier-type analysis of the first two years after a qualifying nonvalvular AF/AFL subcategorized by CHA_2DS_2-VASc Score, and antithrombotic therapy. Calculated as annual rate of [first] major hemorrhage, whether or not hospitalized, over a two year period post qualifying episode of nonvalvular AF/AFL and rates by sub-categories according to CHA_2DS_2-VASc* Score and type of antithrombotic therapy at the end of the encounter for their qualifying episode of nonvalvular AF/AFL, censoring for death or lost to follow-up. A sub-analysis will compare antithrombotic therapy received at the end of their index encounter to that at the time of their major hemorrhage in the numerator. The follow-up analysis will use data specifically collected for this analysis.
Sources of Data	EMR or Administrative databases, Hospitalization and Physician Billing databases for diagnoses (e.g. Discharge Abstract Database, Ambulatory Care Database, Physicians Claims Database), Provincial formularies for drug information (e.g. Blue Cross) or specific AF/AFL QI database.

Rationale

This quality indicator does not correspond directly to one of our chapter's recommendations, but provides data on the rate of major hemorrhage, the major risk of antithrombotic therapy, in patients with nonvalvular atrial fibrillation/flutter according to risk of stroke and antithrombotic use.

Rationale

This quality indicator does not correspond directly to one of our chapter's recommendations, but provides data on the rate of major hemorrhage, the major risk of antithrombotic therapy, in patients with nonvalvular atrial fibrillation/flutter according to risk of stroke and antithrombotic use.

Method of Reporting

The reported statistic will be an annualized percentage of patients with nonvavlular atrial fibrillation/flutter hospitalized with major hemorrhage according to the risk of stroke and antithrombotic therapy.

Challenges to Implementation/Interpretation

- Hospitalization for major bleeding (Retrospective Analysis) is an arbitrary definition for bleeding complications.
- Some major bleeding will be missed in the Retrospective Analysis (treated but not hospitalized).
- Some bleeding might be indirectly related to medications (e.g. from a trauma).

RISK STRATIFICATION OF PATIENTS WITH NONVALVULAR AF/AFL FOR STROKE	
Description	The percentage of patients with a newly diagnosed nonvalvular atrial fibrillation/flutter that have a stroke risk prediction score ($CHADS_2$ or CHA_2DS_2VASc) documented in their medical record, or have the relevant elements of such scores recorded in the medical record such that a stroke risk prediction score may be readily calculated.
Numerator	A subset of the denominator who have a $CHADS_2$ or CHA_2DS_2VASc Score documented on their medical record or have all of the risk criteria of these scores documented in their medical record. $CHADS_2$ or CHA_2DS_2VASc Score risk criteria are: stroke/TIA/Systemic embolus, hypertension, heart failure, age >75, diabetes, atherosclerotic disease, age 65-74, female sex.
Denominator	The total number of patients with a newly diagnosis of nonvalvular atrial fibrillation/flutter. Case selection window to be defined at the time of analysis.
Method of Calculation	Snapshot in time at time of entry in database with newly diagnosed AF/AFL. Calculated as the proportion of patients with each of the stroke risk factors defined by $CHADS_2$ or CHA_2DS_2VASc Score or a statement of the actual score recorded in their medical record among newly diagnosed nonvalvular AF/AFL patients.
Sources of Data	The medical record.

Rationale

All AF/AFL patients should have a documented assessment of their stroke risk using an objective tool ($CHADS_2$ or CHA_2DS_2VASc).

Clinical Recommendation(s)

We recommend that all patients with AF or AFL (paroxysmal, persistent or permanent), should be stratified using a predictive index for the risk for stroke (e.g. $CHADS_2$) and for the risk of bleeding (e.g. HAS-BLED), and that most patients should receive antithrombotic therapy. (Strong Recommendation, High Quality Evidence.)

Method of Reporting

The reported statistic will be a percentage of patients with nonvalvular atrial fibrillation/flutter that have stroke risk factors documented using a recommended objective tool ($CHADS_2$ or CHA_2DS_2VASc).

Challenges to Implementation/Interpretation

- Finding all of this data in the medical record is a potential problem.
- Stroke risk is dynamic over time, and this metric may not assay re-evaluation of stroke risk when subjects accrue new risk factors for stroke and their status, per $CHADS_2$ or CHA_2DS_2VASc, changes.

DIAGNOSIS OF AF/AFL AND ECHOCARDIOGRAPHIC ASSESSMENT	
Description	The percentage of patients with newly diagnosed atrial fibrillation/flutter who have had an echocardiography assessment within 12 months (± 6 months from the date of the episode of newly diagnosed AF/AFL.
Numerator	A subset of the denominator who have had an echocardiogram performed ± 6 months from date of their episode of newly diagnosed AF/AFL.
Denominator	The total number of patients with a newly diagnosed episode of AF/AFL. Case selection window to be defined at the time of analysis.
Method of Calculation	A snapshot in time of a one year period, consisting of the six months before and the six months after the date of a newly diagnosed episode of AF/AFL. Calculated as a proportion of patients with a new diagnosed episode of AF/AFL who have had an echocardiogram performed ± 6 months from date of diagnosis.
Sources of Data	EMR or Administrative databases, Hospitalization and Physician Billing databases for diagnoses (e.g. Discharge Abstract Database, Ambulatory Care Database, Physicians Claims Database), Provincial formularies for drug information (e.g. Blue Cross) or specific AF/AFL QI database.

Rationale

Assessment of cardiac function, left atrial size, and ruling out valve disease are important components for management of newly diagnosed AF/AFL.

Clinical Recommendation(s)

We recommend that all patients newly diagnosed with AF/AFL undergo an echocardiogram for assessment of cardiac structure and function.

Method of Reporting

The reported statistic will be a percentage of patients with newly diagnosed atrial fibrillation/flutter who have an echocardiogram within a year of their diagnosis.

Challenges to Implementation/Interpretation

- Echocardiogram availability may vary depending on the geographic location of the patient.
- The statistic does not strictly distinguish between Access (test ordered and completed) vs. Physician performance (test not ordered).

NON-PRIORITY INDICATORS – *developed*

PERCENTAGE OF PATIENTS WITH $CHADS_2$ SCORE OF 2 OR MORE MAINTAINED ON ORAL ANTICOAGULATION POST CATHETER ABLATION FOR NONVALVULAR AF AT ONE YEAR POST-ABLATION

The percentage of patients who have nonvalvular Atrial Fibrillation/Flutter and a $CHADS_2$* score greater than or equal to 2 and without a contraindication for ongoing oral anticoagulation (warfarin (or other vitamin K antagonist), dabigatran, rivaroxaban, apixaban) post-ablation who have a prescription for oral anticoagulation at one year post-ablation.

*$CHADS_2$ ≥ 2 means prior stroke/TIA/Systemic embolus, or at least two of hypertension, heart failure, diabetes, or age >75

Numerator	Number of patients who have undergone catheter ablation and have a CHADS2risk score of 2 or more without a contraindication who have a prescription fororal anticoagulation therapy (warfarin (or other vitamin Kantagonist), dabigatran, rivaroxaban, apixaban) at one year post-ablation.
Denominator	Number of patients who have undergone catheter ablation of nonvalvular Atrial Fibrillation/Flutter and who have a CHADS2score greater than or equal to 2 without a contraindication for oral anticoagulation who have at least one year of follow-up post-ablation. Exclusions: • Contraindication to anticoagulation.
Period of Assessment	One year post-ablation.
Sources of Data	• Electronic medical records, retrospective chartreview, prospective flow sheets, Provincial hospital discharge abstract databases, CIHI hospital database, Provincial formulary and private insurance prescription databases. • Data could also be prospectively collected from the operator at the time of ablation such as "pre-ablation CHADS2score", “contraindication to anticoagulation” and "intent to maintain long-term anticoagulation". Data could also be collected at one year, such as "patient still on oral anticoagulation" ", “contraindication to anticoagulation” and "intent to continue oral anticoagulation beyond one year."

Rationale

Catheter ablation for nonvalvular Atrial Fibrillation/Flutter is an emerging and expanding procedure for the treatment of symptomatic atrial fibrillation. However, it has never been demonstrated to prevent long-term risk of thromboembolic events, thus current recommendations still recommend long-term oral anticoagulation in patients with higher risk of stroke ($CHADS_2$ risk score 2 or more).

Clinical Recommendation(s)

2007 HRS Consensus Statement on Catheter Ablation of Atrial Fibrillation:

- Decisions regarding the use of warfarin more than two months following ablation should be based on the patient's risk factors for stroke and not on the presence or type of AF.
- Discontinuation of warfarin therapy post ablation is generally not recommended in patients who have a $CHADS_2$ score greater than or equal to 2

2010 CCS Guidelines for Atrial Fibrillation and 2012 Focused Update:

- We recommend that the goal of rhythm control therapy should be improvement in patient symptoms and clinical outcomes, and not necessarily the elimination of all AF. (Strong Recommendation, Moderate Quality Evidence)
- We recommend catheter ablation of AF in patients who remain symptomatic following adequate trials of anti-arrhythmic drug therapy and in whom a rhythm control strategy remains desired. (Strong Recommendation, Moderate Quality Evidence)
- We recommend that patients at moderate risk of stroke ($CHADS_2$ ≥ 2) should receive OAC therapy (either warfarin or dabigatran, rivaroxaban and apixaban). (Strong Recommendation, High Quality Evidence)

Method of Reporting

The reported statistic will be a percentage.

Challenges to Implementation/Interpretation

- Identifying every patient who has undergone catheter ablation of nonvalvular atrial fibrillation.
- The $CHADS_2$ risk score is typically recorded for all patients undergoing AF ablation pre-operatively. For those where it is not specifically reported, it may be retrospectively assigned based on medical record history.
- Contraindication to anticoagulation will need to be specifically mentioned.
- Determination of whether patient is still prescribed oral anticoagulation at one year post-ablation based on medical record.

PERCENTAGE OF PATIENTS WITH MAJOR COMPLICATIONS OF CATHETER ABLATION FOR AF OCCURRING WITHIN 30 DAYS POST-ABLATION

The percentage of patients with one or more major complication secondary to catheter ablation for Atrial Fibrillation/Flutter occurring within 30 days of the ablation.

Numerator	Primary Analysis: Number of patients with one or more of pre-specified major complication occurring post-catheter ablation of Atrial Fibrillation/Flutter within 30 days. Major complications include the following: 1. Cardiac perforation/tamponade 2. Thromboembolic complication (stroke, TIA, systemic embolus) 3. Major vascular complication requiring repair or cessation of anticoagulation 4. Atrio-esophageal fistula 5. Death 6. Other, specify _____ Secondary Analysis: Include the possibility to tabulate the percentages with each individual major complication.
Denominator	Total number of patients who have undergone catheter ablation of Atrial Fibrillation/Flutter with at least 30 days follow-up. **Exclusions:** • None.
Period of Assessment	30 days post-AF ablation.
Sources of Data	• Electronic medical records, retrospective chart review, prospective flow sheets, Provincial hospital discharge abstract databases, CIHI hospital database, Provincial formulary and private insurance prescription databases. • Most centers track complications with their own in-house database. • Data could also be prospectively collected as part of an AF ablation database with standardized definitions of complications listed in column K.

Rationale

Catheter ablation for Atrial Fibrillation/Flutter is an emerging and expanding procedure for the treatment of symptomatic atrial fibrillation. However, the incidence of complications is important to understanding the real-world risk-benefit ratio of the procedure. To date, complications have only been reported in clinical trials and surveys, but not in larger populations/registries.

Clinical Recommendation(s)

2010 CCS Guidelines for Atrial Fibrillation:

- We recommend that the goal of rhythm control therapy should be improvement in patient symptoms and clinical outcomes, and not necessarily the elimination of all AF. -Strong Recommendation, Moderate Quality Evidence.
- We recommend catheter ablation of AF in patients who remain symptomatic following adequate trials of anti-arrhythmic drug therapy and in whom a rhythm control strategy remains desired. -Strong Recommendation, Moderate Quality Evidence

Method of Reporting

The reported statistic will be a percentage of patients.

Challenges to Implementation/Interpretation

- Identifying every patient who has undergone catheter ablation of atrial fibrillation.
- Tracking all complications that occur within 30 days, particularly for patients who are discharged, then re-hospitalized. Determining if an event within 30 days post-ablation is related to the ablation procedure or not.

PATIENTS UNDERGOING REPEAT CATHETER ABLATION(S) FOR AF WITHIN TWO YEARS OF THE INDEX PROCEDURE

The incidence of repeat procedures for catheter ablation of atrial fibrillation.

Numerator	Primary Analysis: Number of patients who have undergone repeat (1 or more) ablation for Atrial Fibrillation/Flutter within two years of first ablation. Secondary Analysis: Include the possibility of tabulating by category of AF: 1. Only Paroxysmal AF 2. Only Persistent AF 3. Mixed Paroxysmal/Persistent AF 4. Longstanding Persistent AF 5. Unknown/Uncertain
Denominator	Total number of patients who have undergone catheter ablation of Atrial Fibrillation/Flutter with at least two years follow-up. **Exclusions:** • None.
Period of Assessment	Two years post-AF ablation.
Sources of Data	Electronic medical records, retrospective chart review, prospective flow sheets, Provincial hospital discharge abstract databases, CIHI hospital database.

Rationale

Catheter ablation for Atrial Fibrillation/Flutter is an emerging and expanding procedure for the treatment of symptomatic atrial fibrillation. The success rate of the procedure is not 100% and repeat ablation procedures are required in 25-35% of patients with a history of paroxysmal atrial fibrillation, and in 40-60% of patients who have a history of persistent atrial fibrillation. Assessing the number of repeat procedures will be an important surrogate as to the success rate of catheter ablation of atrial fibrillation.

Clinical Recommendation(s)

2007 Consensus Statement on Ablation of Atrial Fibrillation:

- Recurrences of AF or atrial tachycardia after an initial AF ablation procedure lead to a re-ablation procedure in 20% to 40% of patients.
- In general, patients with larger LA size and longer AF duration typically experience a higher incidence of AF recurrence.
- For patients with paroxysmal AF, most series reported a single procedure efficacy of 60% or greater. In contrast, the single procedure success of catheter ablation of patients with persistent AF ranged from 22% to 45%

2010 CCS Guidelines for Atrial Fibrillation:

- We recommend catheter ablation of AF in patients who remain symptomatic following adequate trials of anti-arrhythmic drug therapy and in whom a rhythm control strategy remains desired. -Strong Recommendation, Moderate Quality Evidence

Method of Reporting

The reported statistic will be percentage of patients having a repeat ablation stratified according to type of Atrial Fibrillation/Flutter –specifically only paroxysmal, only persistent, mixed paroxysmal/persistent or (1 or more) long-standing persistent atrial fibrillation.

Challenges to Implementation/Interpretation

- Identifying every patient who has undergone catheter ablation of Atrial Fibrillation/Flutter and the incidence of repeat catheter ablation procedures for AF in those patients.
- Categorization of type of AF

ANTICOAGULATION FOR VALVULAR AF	
The percentage of patients with Atrial Fibrillation/Flutter and mitral valve stenosis or prosthetic heart valve that receive oral anticoagulation (warfarin (or other vitamin K antagonist)	
Numerator	All patients with Atrial Fibrillation/Flutter and mitral valve stenosis or prosthetic heart valve that receive oral anticoagulation (warfarin (or other vitamin K antagonist).
Denominator	All patients with Atrial Fibrillation/Flutter and mitral valve stenosis or prosthetic heart valve. **Exclusions:** • None.
Period of Assessment	Annually.
Sources of Data	The medical record.

Rationale

This quality indicator will measure the proportion of patients with the form of valvular heart disease with the highest Atrial Fibrillation/Flutter associated stroke risk that are anticoagulated with warfarin or another vitamin K antagonist.

Clinical Recommendation(s)

This is standard of care.

Method of Reporting

The reported statistic will be a percentage.

Challenges to Implementation/Interpretation

- It is debatable whether other forms of mitral valve disease should be included here.
- The data may be hard to abstract.

QUALITY OF ANTI-COAGULATION WITH WARFARIN IN ATRIAL FIBRILLATION/FLUTTER PATIENTS

The number of Atrial Fibrillation/Flutter patients on Warfarin (or other vitamin K antagonist) with INR measurement at least 12 times in a calendar year on a maintenance dose of warfarin (or other vitamin K antagonist).

Numerator	The number of patients with 12 or more INR measurements in a calendar year for patients with AFthat are receiving Warfarin (or other vitamin K antagonist) and are more than 30 days from Qualifying AF diagnosis.
Denominator	The number of patients with Atrial Fibrillation/Flutter that are receiving warfarin (or other vitamin K antagonist) and are more than 30 days for Qualifying AF diagnosis. **Exclusions:** • None.
Period of Assessment	One year.
Sources of Data	The medical record.

Rationale

This quality indicator will measure the percentage of patients with a minimum of 12 INR's measured per year once the patient is on a maintenance dose.

Clinical Recommendation(s)

- We recommend that patients at moderate risk of stroke (CHADS2 ≥ 2) should receive OAC therapy (either Warfarin, dabigatran, rivaroxaban or apixaban). -Strong Recommendation, High Quality Evidence.

Method of Reporting

The reported statistic will be a percentage.

Challenges to Implementation/Interpretation

- It is really a surrogate measure for quality of anticoagulation with vitamin K antagonists
- This might be skewed by tests that are low for good reason, such as being held for a major surgery –but that still might be interesting even with that limitation.

NON-PRIORITY INDICATORS – *yet to be developed*

The following indicators have not yet been fully developed.
If any of the indicators are determined to be a priority indicator, it will be expanded.

- Percentage of patients with heart failure diagnosis with an EKG within 3 months of diagnosis
- Percentage of patients with hypertension with an EKG within 3 months of diagnosis
- Percentage of patients with valvular heart disease with an EKG within 3 months of diagnosis
- Percentage of patients with a stroke with an EKG within 3 months of diagnosis
- Percentage of patients with hyperthyroidism with an EKG within 3 months of diagnosis
- Percentage of patients with palpitations with an EKG within 3 months of diagnosis
- Population rate of diagnosis of atrial fibrillation
- Population rate of diagnosis of atrial flutter
- Percentage of patients with new diagnosis of atrial fibrillation with a transthoracic echocardiogram at 3 months
- Percentage of patients with new diagnosis of atrial fibrillation with TSH at 3 months
- Percentage of patients with new diagnosis of atrial fibrillation screened for hypertension (documented blood pressure) at 3 months
- Percentage of patients with new diagnosis of atrial fibrillation with documented resting heart rate < 100 beats per minute at 3 months
- Percentage of patients with diagnosis of atrial fibrillation prescribed an antiarrhythmic drug with follow-up EKG within 3 months
- Percentage of patients with diagnosis of atrial fibrillation prescribed an antiarrhythmic with documentation of IV function
- Percentage of patients with diagnosis of atrial fibrillation prescribed an anti-arrhythmic for more than 1 year with an EKG within 1 year demonstrating normal sinus rhythm

INDICATORS REMOVED

The majority of working group members (>50%) recommend that the following indicators be removed from the list of non-priority indicators list.

- Percentage of patients with new diagnosis of atrial fibrillation with chest x-ray at 3 months
- Percentage of patients with new diagnosis of atrial fibrillation screened for substance abuse

DEFINITIONS

The following are the definitions of terminology and key outcome indicators used throughout the CCS Atrial Fibrillation/Flutter Data Dictionary and are duplicated herein for use with the Quality Indicators Atrial Fibrillation/Flutter E-Catalogue(s).

Terminology	
Term	**Definition**
Atrial Fibrillation (AF)	Atrial fibrillation is a supraventricular tachyarrhythmia characterized by uncoordinated atrial activation with consequent deterioration of atrial mechanical function. On the electrocardiogram (ECG), AF is described by the replacement of consistent P waves by rapid oscillations or fibrillatory waves that vary in size, shape, and timing, associated with an irregular, frequently rapid ventricular response when atrioventricular (AV) conduction is intact. [Modified from Source: J Am Coll Cardiol 2006;45:e155]
Typical Atrial Flutter (AFL)	Atrial flutter in the typical form is characterized by a saw-tooth pattern of regular atrial activation called flutter (f) waves on the ECG, particularly visible in leads II, III, aVF, and V1. In the untreated state, the atrial rate in atrial flutter typically ranges from 240 to 320 beats per minute, often around 300 per minute, with f waves inverted inECG leads II, III, and aVF and upright in lead V1. The direction of activation in the right atrium (RA) may be reversed, resulting in f waves that are upright in leads II, III, and aVF and inverted in lead V1. Atrial flutter commonly occurs with 2:1 AV block, resulting in a regular or irregular ventricular rate of 120 to 160 beats per minute (most characteristically about 150 beats per minute). [Modified from Source: J Am Coll Cardiol 2006;45:e155]
Atypical Atrial Flutter (AFL)	In the atypical form there is regular, organized atrial activity in the ECG in 3 or more leads but not the typical saw tooth pattern in the inferior leads and the rhythm often originates in the left atrium. It is defined as the absence of a typical sawtooth pattern when there was clear evidence of regular, organized atrial activity in other leads (particularly lead V2) within this range of rates and often but not always with a fixed AV conduction (2:1, 3:1, etc.) and a regular ventricular rate. [Modified from Source: Europace 2012;12:804]
Electrocardiographic documentation (ECG)	12-lead ECG, rhythm strip, Holter monitor, intracardiac electrograms or event recorder
Nonvalvular AF/AFL	By convention, the term “nonvalvular AF/AFL” is restricted to cases in which the rhythm disturbance occurs in the absence of rheumatic mitral valve disease, a prosthetic heart valve, or mitral valve repair. [Modified from Source: J Am Coll Cardiol 2006;45:e157]
Valvular AF/AFL	Conversely, “valvular AF/AFL” is used to describe cases in which the rhythm disturbance occurs in the presence of rheumatic mitral valve disease, a prosthetic heart valve, or mitral valve repair.
Rheumatic mitral valve disease	As rheumatic mitral regurgitation cannot be reliably diagnosed without a pathological specimen, “rheumatic mitral valve disease” is defined as mitral stenosis (usually an echocardiographic diagnosis) that is moderate or greater in severity (valve area ≤1.5 cm2[Source: BSEEchocardiography: Guidelines for Valve Quantification]).
Newly Diagnosed AF/AFL	First electrocardiographic documentation occurred within the last 6 months, whether or not there were previous symptoms compatible with AF/AFL AND whether or not there has been more than one electrocardiographic documented episode within the period of time since the first electrocardiographic documentation. Date of Newly Diagnosed AF/AFL (YYYYMMDD)
Qualifying AF/AFL	Episode of AF/AFL that resulted in first entry into the database, regardless of whether or not it is newly diagnosed. Date of Qualifying AF/AFL (YYYYMMDD)

Key Outcome Indicators	
Term	**Definition**
Stroke	Stroke is an acute onset of a focal neurologic deficit of presumed vascular origin lasting for ≥24 hours or resulting in death. Stroke [is] [can be] categorized as ischemic or hemorrhagic or cause unknown (based on computed tomographic or magnetic resonance scanning or autopsy) [but in this instance all strokes are included]. Fatal stroke is defined as death from any cause within 30 days of stroke. [Modified from Source: Am Heart J 2009;157:810.e1] Stroke must be confirmed by imaging of the brain (computed tomographic or magnetic resonance scanning) or by autopsy. Date of Stroke (YYYYMMDD): date of onset of symptoms of stroke CHA_2DS_2VASc score at time of stroke = CHA_2DS_2-VASc Score 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic therapy at time of stroke = Antithrombotic Therapy 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only 4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
Contraindication to Anticoagulation	List of examples from the ROCKET AF Study: • Active internal bleeding • History of, or condition associated with, increased bleeding risk, including: ○ Major surgical procedure or trauma within 30 days before randomization ○ Clinically significant gastrointestinal bleeding within 6 months before randomization ○ History of intracranial, intraocular, spinal, or atraumatic intra-articular bleeding ○ Chronic hemorrhagic disorder ○ Known intracranial neoplasm, arteriovenous malformation, or aneurysm ○ Planned invasive procedure with potential for uncontrolled bleeding, including major surgery [Source: Am Heart J 2010;159:340-7.e1] Date when Contraindication was First Noted (YYYYMMDD)
Systemic Embolus	Systemic embolism is an acute vascular occlusion of the extremities or any organ (kidneys, mesenteric arteries, spleen, retina or grafts) and must be documented by angiography, surgery, scintigraphy, or autopsy. [Modified from Source: Am Heart J 2009;157:810.e1] Date of Systemic Embolus (YYYYMMDD): date of the onset of symptoms of systemic embolus CHA_2DS_2VASc score at time of Systemic Embolus = CHA_2DS_2-VASc 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic Therapy at Time of Systemic Embolus = Antithrombotic Therapy 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist

	b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only 4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
TIA	Same as stroke but symptoms resolve within <24 hours and no imaging evidence of cerebral infarct or hemorrhage. Date of TIA (YYYYMMDD): date of onset of symptoms of stroke CHA_2DS_2VASc score at time of TIA = CHA_2DS_2-VASc Score 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic therapy at time of TIA = Antithrombotic Therapy 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only 4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
Major Hemorrhage	Major hemorrhage is defined by ≥1 of the following criteria: • Overt bleeding associated with reduction in haemoglobin level of at least 2.0 g/L; • Overt bleeding leading to transfusion of at least 2 U ofblood or packed cells; or • Symptomatic bleeding in a critical area or organ such as intraocular, intracranial, intraspinal or intramuscular with compartment syndrome, retroperitoneal bleeding, intra-articular bleeding, or pericardial bleeding. [Modified from Source: Am Heart J 2009;157:810.e2] In the AF Quality Indicators e-Catalogue the Cross-sectional Analysis is based on hospitalization for major hemorrhage as defined above. Date of Major Bleeding (YYYYMMDD) = date of onset of symptoms of bleeding or detection of overt bleeding when asymptomatic CHA_2DS_2VASc score at time of TIA= CHA_2DS_2-VASc Score 1. Score = 0 2. Score = 1 3. Score = 2 4. Score = 3 5. Score = 4 or greater 6. Score Unknown/Uncertain Antithrombotic therapy at time of Major Hemorrhage = Antithrombotic Therapy 1. No antithrombotic therapy 2. Anticoagulation only a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 3. Antiplatelet only

	4. Anticoagulation and antiplatelet a. Warfarin or other vitamin K antagonist b. Dabigatran c. Rivaroxaban d. Apixaban 5. Unknown/Uncertain
CV Hospitalization	Primary reason for hospitalization was cardiovascular categorized by reason(s) for hospitalization (Check all that apply): 1. Rhythm management of AF/AFL 2. Bleeding 3. Acute HF 4. MI 5. Other Acute Coronary Syndrome 6. Rhythm management for other 7. SVT 8. Bradycardia Management 9. Rhythm management for VT/VF/SCD 10. Other, specify Date of CV Hospitalization (YYYYMMDD)
Non-CV Hospitalization Only	Primary reason for hospitalization was non-cardiovascular and no secondary CV problem during hospitalization Date of Non-CV Hospitalization (YYYYMMDD)
Non-CV Hospitalization with Secondary CV Problem	Primary reason for hospitalization was non-cardiovascular but a secondary cardiovascular problem developed during hospitalization categorized by CV problem(s) (Check all that apply): 1. Rhythm management for AF/AFL 2. Bleeding 3. Acute HF 4. MI 5. Other Acute Coronary Syndrome 6. Rhythm management for other SVT 7. Bradycardia Management 8. Rhythm management for VT/VF/SCD 9. Other, specify Date of Non-CV Hospitalization with Secondary CV Problem (YYYYMMDD)
CV Emergency Department Visit (whether or not followed by hospital admission)	Primary reason for Emergency Department Visit was cardiovascular categorized by reason(s) for ER Visit (Check all that apply): 1. Rhythm management for AF/AFL 2. Bleeding 3. Acute HF 4. MI 5. Other Acute Coronary Syndrome 6. Rhythm management for other SVT 7. Bradycardia Management 8. Rhythm management for VT/VF/SCD 9. Other, specify Date of CV Emergency Department Visit (YYYYMMDD)
Lost to Follow-up	Patient is permanently lost to any further follow-up due to moving or any other administrative or other reason they are no longer included in the database. Date of Last Contact (YYYYMMDD)
Death	Patient died and no longer available for follow-up. Date of Death (YYYYMMDD)

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Quality Indicators Atrial Fibrillation Chapter Working Group
Jafna Cox (Chair), Cardiovascular Health Nova Scotia
Allan Skanes (Vice-Chair), University of Western Ontario
Clare Atzema, Sunnybrook Heath Sciences Centre
Jennifer Cruz, St. Michael's Hospital
Marc Deyell, St. Paul's Hospital
Noah Ivers, University of Toronto
Laurie Lambert, Institut national d'excellence en santé et en services sociaux
Derek Lefebvre, Canadian Institute for Health Information
Robert McKelvie, St. Joseph's Health Care
Garth Oakes, CorHealth Ontario
Kathy Rush, University of British Columbia
Roopinder Sandhu, University of Alberta
Stephen Wilton, APPROACH Foothills Medical Centre
Rodney Zimmerman, Regina General Hospital

Atrial Fibrillation Sub-theme group – Therapies
Roopinder Sandhu (Chair), University of Alberta
Jafna Cox, Cardiovascular Health Nova Scotia
Allan Skanes, University of Western Ontario
Stephen Wilton, APPROACH Foothills Medical Centre
Rodney Zimmerman, Regina General Hospital

Atrial Fibrillation Sub-theme group – Access
Kathy Rush (Chair), University of British Columbia
Clare Atzema, Sunnybrook Heath Sciences Centre
Jafna Cox, Cardiovascular Health Nova Scotia
Jennifer Cruz, St. Michael's Hospital
Laurie Lambert, Institut national d'excellence en santé et en services sociaux
Robert McKelvie, St. Joseph's Health Care
Allan Skanes, University of Western Ontario

Atrial Fibrillation Sub-theme group – Outcomes
Stephen Wilton (Chair), APPROACH Foothills Medical Centre
Clare Atzema, Sunnybrook Heath Sciences Centre
Jafna Cox, Cardiovascular Health Nova Scotia
Derek Lefebvre, Canadian Institute for Health Information
Garth Oakes, CorHealth Ontario
Roopinder Sandhu, University of Alberta
Allan Skanes, University of Western Ontario

Quality Project Steering Committee
Paul Dorian (Chair), St. Michael's Hospital
Andrew Krahn (CCS President), University of British Columbia
Catherine Kells (CCS Past-President), Dalhousie University
Marc Ruel (CCS Incoming President), University of Ottawa Heart Institute
James Abel, St. Paul's Hospital
Anita Asgar, Institut de Cardiologie de Montréal
Sean Connors, Memorial University of Newfoundland
Jafna Cox, Cardiovascular Health Nova Scotia
Ansar Hassan, Saint John Regional Hospital
Karin Humphries, University of British Columbia
Laurie Lambert, Institut national d'excellence en santé et en services sociaux
Sandra Lauck, St. Paul's Hospital
Robert McKelvie, St. Joseph's Health Care
Blair O'Neill, Alberta Health Services
Paul Oh, University Health Network/CorHealth Ontario
Stephanie Poon, Sunnybrook Hospital
Normand Racine, Institut de Cardiologie de Montréal
Neville Suskin, London Health Sciences Centre
Robert Welsh, University of Alberta

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Kendra MacFarlane, Coordinator, Health Policy and Advocacy, Canadian Cardiovascular Society