

Novel Care Pathway for Patients Presenting to the Emergency Department With Atrial Fibrillation

GOALS AND VISIONS OF THE PROGRAM

The annual cost of care for atrial fibrillation (AF) is estimated to be \$6.65 billion, with nearly three fourth of costs because of hospitalizations¹ and 70% of admissions present through the emergency department (ED).² In an international survey of routine ED AF management from Canada, United States, United Kingdom, and Australia, there were striking differences in ED use of rate control or rhythm control interventions and the likelihood of discharge.³ For example, in Canada, the vast majority of patients with AF in the ED are pharmacologically or electrically cardioverted without cardiology supervision. In the United States, the majority of patients are admitted for further management. Several small US studies have evaluated the use of an ED observation unit with a protocol for pharmacological or direct current cardioversion in selected patients.⁴ However, these studies often rely on specialist consultation in the ED and do not rely heavily on outpatient care coordination, which are critical for improving quality of care. In 2011, the Center for Innovation in Complex Care assessed gaps in care for patients presenting to the health system with AF; identified gaps included a lack of standardization, integration, and information access across the various providers—including ED centers, cardiologists, primary care specialists, nurses, and pharmacists—who comanage AF patients.⁵

To address some of these problems in AF management, the goal of this innovation was to introduce a structured process for AF care, linking the expertise of ED and cardiology practices with the introduction of clinical pharmacists to bridge the gap and coordinate treatment, to reduce unnecessary hospital admissions while improving access to comprehensive AF care.

LOCAL CHALLENGES IN IMPLEMENTATION

According to the Agency for Healthcare Research and Quality, in 2012, hospitalizations associated with the diagnosis of AF in North Carolina accounted for >110 000 patient discharges, and ≈15 000 encounters in which AF was the primary diagnosis. Pilot data from the University of North Carolina (UNC) ED demonstrated that the rate of hospitalization for AF patients was consistently 80% to 85% from 2012 to 2014. In developing a program initiative to address this challenge, there were several problems anticipated. First, there was no standard management protocol for care of AF in the UNC ED with multiple providers varying significantly in their routine for care. Although changing strategies for care among ED providers can be difficult, the ED at our academic medical center is staffed by both resident and attending physicians who are motivated to adopt novel protocols to improve quality of care. To motivate change, ED providers were heavily involved in the development of the new structured management protocol. Frequent educational sessions to key staff in the ED were used to spread information on the new pathway. And

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feedback to referring physicians from the receiving specialty care clinic reinforced the change in practice pattern. This feedback included verification that a referred patient was received and connected and established with ongoing care. Second, developing a smooth transition from the ED to the outpatient setting can be difficult to implement, particularly because patients often present to the ED during evenings and weekends when clinic staff may not be readily available. To streamline the process for care, triage and management protocols were straightforward and could be implemented with little to no specialist involvement. Integrating the workflow into the electronic medical record system and enlisting staff in the ED to troubleshoot the process helped to work out kinks in the new pathway.

DESIGN AND IMPLEMENTATION OF THE INITIATIVE

A protocol for triage of AF patients in the ED was developed through literature review and working group sessions of key UNC experts in cardiology and emergency medicine across various provider categories (ie, physicians, nurses, and clinical pharmacists). Through these working group sessions, a protocol was developed to stratify patients into low-, moderate-, and high-risk categories (Figure). Stratification was based on several criteria, including (1) other comorbidities potentially requiring hospitalization, (2) hemodynamic stability, and (3) severity of AF symptoms. To qualify for potential discharge from the ED with early outpatient follow-up, patients needed to have a primary diagnosis of AF and to meet low- or moderate-risk criteria. Providers in the ED had the opportunity to further discuss individual patients with the receiving outpatient providers or on-call electrophysiologist. A care transition pathway was developed so that patients could be assessed and, when appropriate, discharged from the ED with early (next business day) follow-up ensured. Providers were made aware of the availability of financial assistance and social services at our cardiology clinics so that limitations of social support would not heavily influence disposition planning. An ED evaluation template, order-set, and provider/patient educational material were built into the electronic medical record system to ease implementation of the novel protocol. The AF Transitions Clinic was established in the UNC cardiology faculty clinic to receive discharged ED patients. The AF clinic was staffed by clinical pharmacist practitioners as the primary providers and was supervised by a cardiologist or electrophysiologist. Clinical pharmacist practitioners were trained to provide a protocol for care, including (1) AF guideline-directed management for rate-control and stroke prophylaxis, (2) AF risk factor assessment and modification (eg, hypertension control, screening for obstructive sleep apnea),

(3) AF-specific patient education, and (4) coordination of care across the patient care team including primary care and ED provider communication.

The novel care pathway for ED patients with a primary diagnosis of AF was first implemented at the UNC ED in July, 2015. Before implementation, ED physicians (residents and attendings) and nursing staff were educated on the process for triage and transition of appropriate patients to the outpatient AF Transitions Clinic. Multiple channels for education were used including lectures, handouts, and e-mail reminders. Feedback to referring physicians and staff from the receiving clinic reinforced the novel system of care.

SUCCESS OF THE INITIATIVE

During the 15-month study period (including 6 months of preintervention period and 9 months of postintervention period), 980 patients with an ECG diagnosis of AF/atrial flutter (including primary or secondary diagnosis of AF and including initial or repeat presentations) presented to the UNC ED. Of the 980 presentations with AF, 198 (20.2%) had a primary ED diagnosis of AF.

To assess the impact of our initiative, the primary outcome of the study was discharge rate of patients presenting to the ED with a primary diagnosis of AF or atrial flutter. Secondary outcomes included 90-day rate of repeat ED presentation for a primary diagnosis of AF/atrial flutter and hospital length of stay.

Statistical Analyses

Among patients with a primary diagnosis of AF included in the study, those in the preintervention period of January–June 2015 were compared with those in the postintervention period of July 2015 to Mar 2016. Continuous variables were summarized by means and SDs and compared with *t* tests. Categorical variables were summarized by counts and percentages and compared with χ^2 tests. Ordinal and highly non-normal variables were tested with the Mann–Whitney *U* test.

To determine whether the likelihood of discharge from the ED was affected by the intervention, a logistic regression model was fit. To control for the possibility of a secular trend in discharges over the same time period, we controlled for the number of months since the study began. To assess whether return ED presentation for AF/atrial flutter after having been discharged was affected by the intervention, repeat presentations to the ED were assessed, and a survival analysis for time to repeat presentation was performed, comparing the time to return for AF by the study period in which they were discharged. To determine whether the intervention affected length of hospital stay, a logistic ordinal regression model was fit. Finally, we fit a series of exploratory logistic regression models to determine which variables

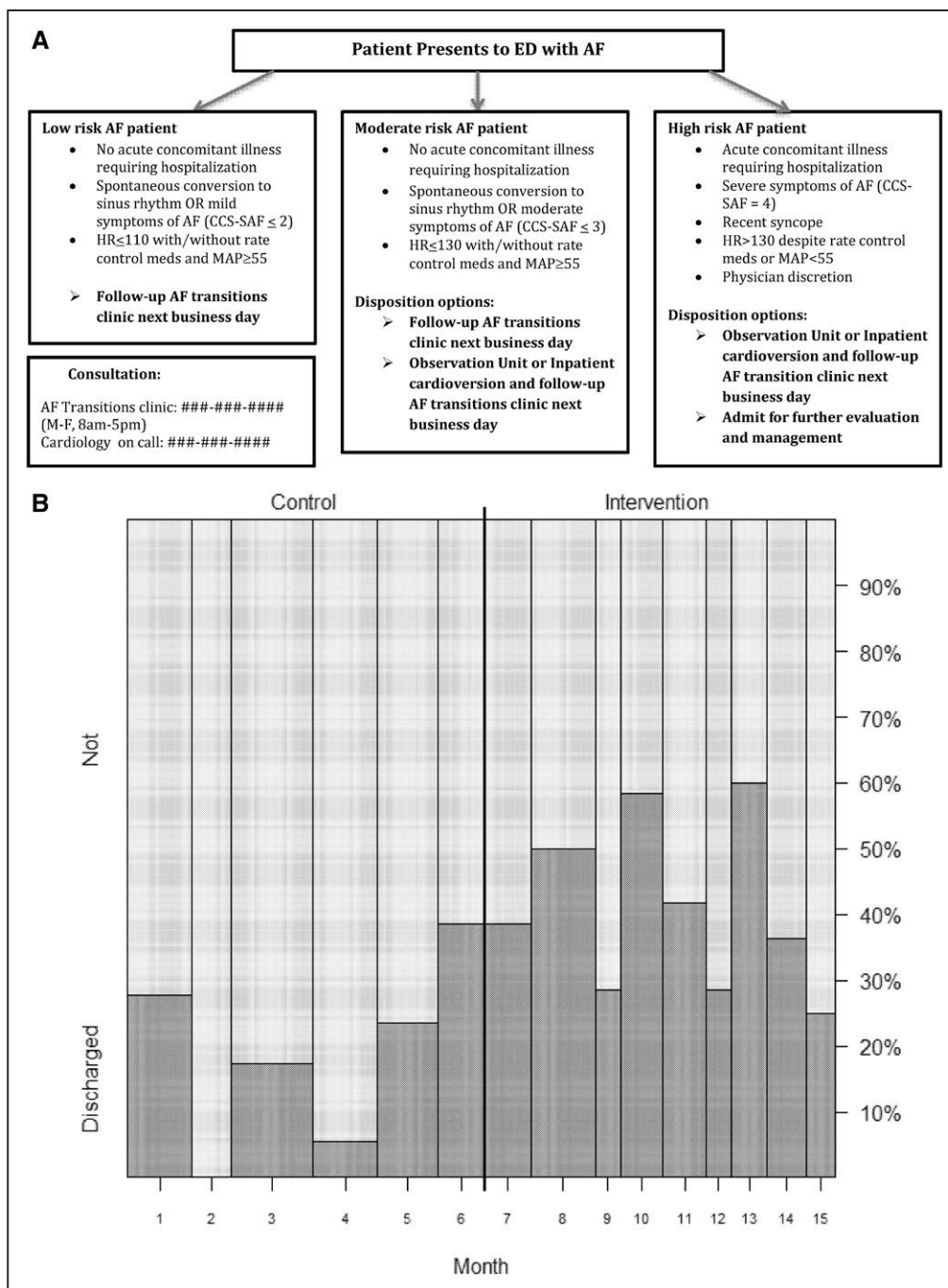


Figure. A, Triage protocol for emergency department (ED) providers. B, UNC Experience with AF Pathway of Care in the ED.

Proportion of patients presenting to ED with primary diagnosis of AF discharged by month. The width of each month is proportional to the number of AF patients that month. Overall, the discharge rate increased from 19% to 43% when comparing the control to the intervention period ($P < 0.001$). HR indicates heart rate; and MAP, mean arterial pressure.

were associated with ED doctors' decisions to admit patients to the hospital instead of discharging them.

Results

Of the 198 patients with a primary ED diagnosis of AF, 100 patients presented during the 6-month preinter-

vention period and 98 patients presented during the 9-month postintervention period. Overall, patients were elderly (68.5 ± 14.2 years), mostly white (85%), and had a mean (SD) presenting heart rate of 116.2 (26.7) bpm. The majority of patients had either mild (Canadian Cardiovascular Society Severity in Atrial Fibrillation scale 2, 26%) or moderate (Canadian Cardiovascular Society

Severity in Atrial Fibrillation scale 3, 50%) AF symptom severity. No significant difference in baseline demographic or clinical characteristics was detected between patients presenting in the pre- or postintervention period.

The discharge rate was significantly increased by the implementation of the novel care pathway intervention (Figure). Overall, significantly more AF patients were discharged in the intervention period than the control period (43% versus 19%; $P < 0.001$). The odds of a primary AF patient being discharged increased 4.2-fold (95% confidence interval, 1.9–9.8) from the control to the intervention period. Of the 59 patients with AF who were discharged during the study period, only 14 returned to the ER for any reason, and only 3 returned for AF. A log-rank test did not find a significant difference in the time to return comparing the intervention and control period. Overall, among those patients with a primary diagnosis of AF, the hospital length of stay trended lower but was not significantly reduced (mean [SD] 3.0 (4.6) versus 2.5 (4.4) days; $P = 0.56$).

As an exploratory analysis, we examined what variables were significantly associated with a patient being admitted to the hospital. In the control period, only higher systolic BP was significantly associated with admission, but in the intervention period, higher CCS-SAF score, higher heart rate, lower systolic BP, and higher diastolic BP were all significantly associated with admission.

TRANSLATION TO OTHER SETTINGS

Our strategy differs from other ED triage and discharge protocols for AF patients in a variety of ways. First, our simplified ED treatment pathway does not depend on ED cardiology or electrophysiology consultation. We hope that this will make our pathway for care more amenable to being used at community hospitals or nonhospital settings where there may be less access to specialty care services. Second, our ED treatment pathway only allows for potential discharge of patients who do not have severe AF symptoms, which often warrants prompt cardioversion. Therefore, cardioversion may be performed on an outpatient basis. Many patients with AF will spontaneously convert within the time before AF clinic presentation and not need cardioversion. In addition, eliminating cardioversion as a major component of the treatment protocol obviates the need for reliance on the exact duration of AF before presentation to guide treatment strategy or the need of transesophageal echocardiography to exclude intracardiac thrombus in the ED. Third, our ED treatment pathway relies heavily on prompt AF clinic referral, which is critical in the establishment of ongoing care for the AF patients. We feel that an AF clinic staffed by advanced practice providers delivering guideline-directed management

for rate control and stroke prophylaxis, AF risk factor assessment and modification, AF-specific patient education, whereas coordinating care across the patient care team is critical to reduce recurrent ED presentations, improves quality of care, and improves patient satisfaction.

SUMMARY OF THE EXPERIENCE, FUTURE DIRECTIONS, AND CHALLENGES

Our study demonstrates the potential use of a structured care pathway, which risk stratifies ED patients with a primary diagnosis of AF and transitions appropriate patients to the outpatient setting. By introducing this novel care pathway, the likelihood of discharge was increased from 19% to 43%. This change in discharge rate was not associated with an increase in repeat ED presentations for AF. Exploratory analysis suggests that ED providers became more structured in their decisions for admission of AF patients after implementation of the novel pathway of care, likely leading to the change in practice.

Our study demonstrates the potential for reducing unnecessary hospitalizations. In addition, our study demonstrates the potential role of clinical pharmacists who can serve as the receiving provider for these urgent AF clinic referrals. Future studies are underway to understand the potential improvement in quality of care for AF patients presenting to the ED and to explore avenues for expansion of the program demonstrated in this pilot study.

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FOOTNOTES

Circ Cardiovasc Qual Outcomes is available at <http://circoutcomes.ahajournals.org>.

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