How AI Can Engage Consumers to Reduce Disease Risk: The Case of Atrial Fibrillation

written by Thomas Dent, M.D. | February 6, 2020

In our last article, we assessed how AI could be used to achieve clinical success for individual conditions, and to apply the technology to broad cost reduction efforts and population health interventions.

But here's the real test: Can we effectively apply AI technology to help patients better engage in lifestyle risk reduction—particularly for specific conditions at higher risk?

To examine the feasibility and issues, let's take a closer look at Atrial Fibrillation (AFib), an increasingly common and expensive condition. In AFib, the upper part of the heart (the atrium) has ineffectual contraction, causing sludging of the blood and lessened cardiac output. It is the most common heart rhythm disturbance.

AFib is also a personal issue for me, because I live with it and experience first-hand the intensive process of condition management, the discovery and management of associated personal AFib risks, and treatment costs. While I don't intend to give a comprehensive review

of AFib with respect to Artificial Intelligence, this analysis provides a useful example of how providers can develop condition-specific efforts to improve costs and outcomes through AI.

The High Cost of AFib is Dangerous for Providers under Value-Based Payments

AFib is estimated to account for about one percent of all health care costs in the U.S. About 3.8 million elderly and 1.4 million working age adults have AFib, and nearly 700,000 of both groups were initially undiagnosed. AFib may remain undiagnosed until or even after complications occur. The number of patients will increase as the population ages.

Most outcomes from Atrial Fibrillation are serious and costly:

> Stroke-Nonvalvular AFib increases the risk of stroke five-fold. Thromboembolism associated with AFib creates a greater risk of recurrent strokes, more severe disability, and higher mortality.
> Extracranial Systemic Thromboembolism
> Heart Failure
> Myocardial Infarction
> Mortality—The Framingham Health Study found that AFib is associated with a two-fold increased risk of death. AFib diminished the survival advantage generally enjoyed by women.

Annual medical costs for AFib patients are at least $8,000 higher than for individuals without the condition. AFib adds about $6 billion annually to our national health care costs, with hospitalization as the primary driver, but some estimates are as high as $26 billion. That's because calculating the costs of AFib is complicated by the downstream effect of treatment, especially anticoagulants.

My own greatest expense is the direct-acting anticoagulant Apixaban. It has caused me to burn through my Part D deductible in one month and, with an assist from the antiarrhythmic drug Dofetilide, my entire donut hole. This translates to over $5,000 of out-of-pocket expense. Initiating the Dofetilide required hospitalization for 3 days in a cardiac care unit.

Patient Risk Factors Are a Driving Force, Suggesting Engagement Interventions

There are three AFib categories:
> Paroxysmal, lasting less than seven days,

> Persistent, lasting greater than seven days and less than six months, and
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> Permanent, lasting greater than 6 months .

Currently, treatment is not based on category of AFib but on the [risk factors](). Categorization is important for ICD-10 coding.

There are non-modifiable risk factors:

> Genetics—Identifying genes related to AFib is at an early stage.
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> Advanced age—Aging is the most powerful risk factor for AFib.
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> Male sex—Taller stature in men largely explains the higher AFib incidence in men.
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> European ancestry—This confers a higher risk versus African, Hispanic, and Asian ancestry.

There are also a number of modifiable patient risk factors:

> Smoking
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> Obesity and sedentary lifestyle—The risk goes up 29 percent for every five point increase in BMI; AFib is more severe and more resistant to ablation.
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> Diabetes
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> Obstructive Sleep Apnea (OSA)—I have OSA and believe the epidemiologic , clinical, and mechanistic evidence for the relationship with AFib and the value of CPAP.
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> Hypertension (HTN)—I also have HTN.
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> Alcohol

Successful Patient Risk Reduction Will Need Integrated but Varied Approaches

The patient risk factors for AFib are similar to those for other chronic cardiovascular conditions. Interventions to reduce those risk factors must be integrated into efforts that seek to reduce patient risk for other diseases and to increase patient engagement.

The question is no longer whether it's necessary to successfully address risk factors; rather, we need to learn how best to do so. Intervention programs that attempt to reduce patient risk factors are wide-ranging. At one end of the continuum, an Australian group created a [dedicated risk factor clinic]()—an expensive, staff-intensive effort that they maintain is cost effective. At the other end, decentralized, passive data collection via wearable technology, coupled with AI, provides an appealing starting point.

Ultimately, patient risk factors must be focused on the patient rather than the condition.

However, interventions might also be helpful for a population without a condition, as a preventative strategy. Lifestyle changes have the potential to reduce AFib symptoms and also reverse its progression.

AI Can Provide Fuel for Interventions to Reduce Patient Risk

Determining optimal approaches to reduction of patient risks is an ideal task for Artificial Intelligence. AI has already begun to influence the diagnosis of AFib in patients using wearable technology.

Smartwatches provide a powerful and elegant means of tracking heart activity. I have this feature in my Apple Watch. A large study with more than 400,000 participants, who self-reported that they did not have a diagnosis of AFib, examined the impact of monitoring heart health via the [Apple Heart Study](#) app. If the app detected possible atrial fibrillation, the study was designed to initiate a telemedicine visit followed by mailing an electrocardiography (ECG) patch to the participant, to validate AFib values. Although there were few irregular pulse notifications, the majority of participant notifications were concordant with atrial fibrillation, and one-third had atrial fibrillation validated by ECG patch readings

For those individuals with Obstructive Sleep Apnea—at higher risk for AFib—digital data is already captured nightly via prescribed breathing machines (CPAPs). Apnea episodes per hour, usage, and mask seal are data points that could be integrated with other patient data such as blood sugars, blood pressure, and weight changes.

Another excellent example of non-intuitive passive data capture and potential for intervention involves alcohol consumption, an additional high risk factor for AFib. Heavy alcohol intake is an established risk factor for new-onset AFib, and recent evidence points to frequent drinking during the week as a key associated [risk factor.](#) Transdermal sensors are being developed for tracking blood alcohol levels. Integrated with other data from wearable technology, these values could help to form the basis of population health and patient engagement interventions.

AI Applied to Wearable Tech Data Can Help Tailor Population Health Initiatives

Future interventions for population health and patient engagement should recognize how wearable technology could stimulate patients to seek health care. Fitness trackers, smartwatches, and wearable heart monitors provide a natural gateway for a population already engaged with telehealth. Further, passive capture of data offers the best option for tracking

heart activity and evidence of arrhythmias.

What is possible now is but a harbinger of future efforts to capture this information. Once the data is collected, the full power of AI can be utilized to incorporate other data sets and have a significant impact on early identification of health risks. Despite these benefits, however, the use of this data must respect patient privacy concerns and seek their permission for use.

Providers should consider incorporating Population Health interventions for at-risk patients in order to prevent AFib and/or decrease its frequency and duration, as well as to increase the ability to be successfully treated. For instance, patients who have experienced a sudden worsening of financial status or who are under intense stress for other reasons might be good candidates for interventions to monitor blood pressure surges and arrhythmias. These steps will be very important to entities at financial risk.

Preventing and Managing AFib Is Necessary for Provider Survival under Value-Based Reimbursement

Determining how health care costs are influenced by this data is another job for AI, with cost as both an outcome and data point. The presence of AFib can modify the condition severity scores for capitation payments. This will be a significant issue if a practice experiences vast increase in the number of patients with AFib. Avoiding the massive costs of progressive AFib and its complications will demand aggressive risk factor management. Groups will also benefit from documenting the presence of AFib. For MIPS, the documentation of the CHA2DS2-VASc score is an opportunity to improve the quality score if anticoagulation is prescribed for patients with a score greater than 1.

Given current trends in wearable tech, organizations should be alert to the potential influx of new AFib patients, many of whom are likely to be asymptomatic. Their diagnosis will be initiated by smartwatches, not by the provider community. Organizations would be wise to develop a strategy for patient wearable technology that is rapidly evolving.

Atrial Fibrillation should be on the radar of practices and healthcare organizations assuming financial risk under VBHC. Patients will be more involved with the diagnosis of AFib via detection on smartwatches, but patient privacy and consent to use their data appropriately cannot be compromised if they are to engage willingly.

Founded in 2002, Roji Health Intelligence guides health care systems, providers and patients on the path to better health through [Solutions](#) that help providers improve their value and succeed in Risk.

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