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THE ROLE OF THE PHARMACY TEAM IN ATRIAL FIBRILLATION DETECTION IN NONCLINICAL SETTINGS

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STUDENT AUTHOR BIO SKETCHES

Brian C. Hazelrigg is an advanced pharmacy practice student in the Doctor of Pharmacy program at Purdue University, graduating in May 2019. Following graduation, Brian will commence his PGY1 residency at IU Health Bloomington Hospital, with interests in cardiology and emergency medicine.

Monica L. Miller is a clinical associate professor at Purdue University, and served as a faculty mentor for this project.

Sotiris Antoniou is a consultant pharmacist in cardiovascular medicine, and the active site lead pharmacist at St. Bartholomew's Hospital in London, UK, where this project originated.

Jagjot Chahal and **Sadeer Fhadil** are highly specialist cardiac pharmacists at St. Bartholomew's Hospital and contributed to the project's design and implementation. In this article, the authors describe their service-learning project aimed at increasing public understanding of atrial fibrillation and identifying potentially high-risk patients in a nonclinical setting.

Atrial fibrillation (AF) is a common cardiac/heart disease that increases a person's risk of death, making early identification significant in overall disease management. Throughout my time in pharmacy school, I [Brian] have developed an interest in cardiology and research. During my last year of pharmacy school, I spent eight weeks at St. Bartholomew's Hospital in London, one of the largest cardiac centers in Europe, on an experiential training experience. While there, I had the opportunity to study specifics about many cardiac illnesses, with a focus on atrial fibrillation, and provide education to patients living with this disease. In addition to working with patients and expanding my knowledge, I participated in an exciting research project that allowed me to connect with

the general population and share my knowledge about arrhythmias, which is something I would like to continue to do after graduation.

Our research project aimed to identify the role pharmacists could play in early detection of arrhythmias, particularly atrial fibrillation, and increase the population's awareness and understanding of this illness. For our project, a pharmacist or student pharmacist was partnered with nursing staff to provide opportunities for heart rate and rhythm monitoring as well as individualized education to help ensure interested patients were more aware of the risks, signs, and symptoms of atrial fibrillation going forward. When patients met with the team, they had

their heart rhythms assessed using the AliveCor Kardia single-lead electrocardiogram (ECG) system. This new technology allows patients to place their fingers on a small strip that is able to accurately assess a person's heart rate and rhythm to identify any irregularities/arrhythmias. Participants were also provided education about atrial fibrillation in hopes of preventing significant morbidity and mortality, raising awareness about this particular disease and connecting patients with care. Part of this education included us showing the patients how to manually take an accurate pulse reading, and how to differentiate between a normal and irregular rate and rhythm. By teaching the patients these skills, they now know what to look for, how to monitor their own pulse, and when to seek help in the event they, or someone they know, experience symptoms of atrial fibrillation.

INTRODUCTION

Pharmacists are health professionals who have widespread access to the general population in community and ambulatory care settings as well as within hospitals. Recent data from Forbes highlights that pharmacists remain one of the most trusted and ethical professions behind nurses and physicians (McCarthy 2019). Given their easy accessibility, connection to the community, and understanding of medications, they are a trusted resource for many people. Pharmacists are able to provide education on a variety of disease states including cardiac conditions such as atrial fibrillation (AF), an irregular heart rhythm, as well as any related medications. They are also a medication resource for other health care professionals such as physicians, physician assistants, and nurses and are often consulted to assist in medication selection and monitoring. Pharmacists are well placed to aid in identifying patients at high risk for certain diseases, given the right technology, and are able to provide appropriate referrals for needed medical management. They are especially well placed to be able to identify patients with asymptomatic diseases who wouldn't have reason to suspect such a serious health issue. Uncovering these conditions early could help patients by preventing a potentially debilitating or fatal consequence of their disease.

One disease state that pharmacists can aid in detecting and managing is atrial fibrillation (AF). AF is a cardiac disease that occurs when the atria of the heart receive disordered electrical impulses, which in turn cause the heart to beat irregularly and pump blood less efficiently (January 2014; National Institute for Health and Care Excellence [NICE] 2014). This irregular heartbeat can cause various symptoms including palpitations,

shortness of breath, tiredness, chest pain, dizziness, and blood clots. The blood clots are often a cause of strokes (Miller 2005; Lin 1996). Patients living with AF are at a fivefold increase of having a stroke and comprise about one third of all ischemic stroke patients (Freedman 2016; Wolf 1991; Kannel 2008). Aside from the increased risk of stroke, AF also triples a patient's risk of heart failure (Stewart 2002) and presents patients with nearly a twofold-increased risk of mortality (Benjamin 1998). All of these illnesses can decrease a person's longevity and increase their overall health care costs.

Globally, atrial fibrillation is the most commonly identified heart rhythm disturbance and its prevalence is predicted to rise in the coming years (Morillo 2017; Chugh 2014). A systematic review published in 2010 analyzed 184 population-based studies published from 1980–2010 from the 2010 Global Burden of Diseases, Injuries, and Risk Factors Study. This analysis showed that in 2010, worldwide prevalence of AF was estimated to be at 33.5 million individuals, with males (20.9 million) being more affected than females (12.6 million) (Chugh 2014). This study also revealed the median percentage change of AF has increased by roughly 5% globally from 1990 to 2010, with the prevalence increasing from 452 to 474 patients per 100,000 (Chugh 2014).

While the global prevalence of AF appears to be growing, it is currently more common in higher-income and more developed countries (Morillo 2017). The United States has the greatest prevalence of AF with approximately 2% of the population under the age of 65 years old and 9% of the population above the age of 65 expected to be affected (Centers for Disease Control and Prevention 2003). By 2030, as the population continues to age, the Centers for Disease Control and Prevention expect this number to increase to 19.6% of people over the age of 65 years old (Centers for Disease Control and Prevention 2003; Morillo 2017; January 2014). While the prevalence of AF in the United Kingdom is lower than in the United States, the U.K. does have the highest percentage of death contributed to AF, with just over 0.9% of deaths being associated with AF and atrial flutter in 2010 (Morillo 2017).

To combat the growing prevalence and associated morbidity and mortality of AF, organizations such as the Atrial Fibrillation Association, the Arrhythmia Alliance, and the International Pharmacists for Anticoagulation Care Taskforce have made coordinated efforts to identify patients at high risk for AF and refer them for appropriate treatment. One method being trialed is the use of mobile, single-lead electrocardiogram (ECG) tools to

Figure 1. AliveCor Kardia system in use.

screen patients before they encounter an adverse event from AF. The AliveCor Kardia (Kardia) system (Figure 1) is one such tool with high rates of accuracy that is also easy to use, less invasive than traditional ECG monitors, and readily available (Koshy 2018). The Kardia system reads heart rate and rhythm from a person's fingertips and sends real-time data directly to a smartphone running the partnered Kardia software application. After 30 seconds, the Kardia program will interpret the reading and provide an evaluation of "Normal," "Possible Atrial Fibrillation" (indicating a rhythm consistent with AF) or "Unclassified," (indicating the potential presence of a non-AF arrhythmia).

In this study, we examined the role pharmacy team members could have using such a system to screen for high-risk patients outside of the hospital. Since many pharmacists interact with patients in a community or ambulatory care, having the ability to accurately screen for AF allows for increased patient access and potentially quicker connection to needed medical care.

METHODOLOGY

This multicenter AF screening study was conducted in various locations in Greater London, England. Data was collected in 2017–2018 during heart awareness and "Know Your Pulse" awareness campaigns at Saint Bartholomew's Hospital, Moorfield Hospital, Redbridge Hospital, and SCCP Hospital (Figure 2). These campaigns consisted of weeklong pulse screenings at stations positioned in the common areas of these facilities and opened to all interested individuals over the age of 18 regardless of their medical history. Pharmacists, cardiology nurses, and pharmacy learners conducted these

Figure 2. Monica and Brian taking part in an AF screening.

screenings with support from the Arrhythmia Alliance, who provided educational material to be distributed to patients.

Upon screening acceptance and before screening, patients completed an informed consent form. Basic demographic information recorded included age and gender as well as identification of common AF symptoms including palpitations, shortness of breath, tiredness, chest pain, dizziness, and irregular pulse. Medical history such as high blood pressure, heart muscle disease, diabetes, peripheral artery disease, stroke, transient ischemic attack, clot in the body (excluding lungs), heart attack, and medication history with a focus on antiplatelet and anticoagulation drugs were documented. Patients were educated on the basic disease state information including presenting symptoms and how to detect their own pulse and heart rate properly. During the screening, each patient's heart rate and pulse were recorded after manual assessment.

Patients were then assessed using the Kardia system to screen for AF and other potential arrhythmias. Patients receiving a "Normal" heart rhythm and an acceptable heart rate were classified as not currently being suspected of AF or further arrhythmia and were permitted to

leave without any need for acute follow up. Patients that displayed an “Unclassified” or “Possible Atrial Fibrillation” heart rhythm were reassessed using the Kardia. If the irregularity was duplicated and the patient remained as “Unclassified” or “Possible Atrial Fibrillation,” the ECGs were reviewed in detail and the patient was referred for a full 12-lead ECG workup via their primary care physician or current hospital site if available. Upon referral, if AF was confirmed, anticoagulation therapy was recommended by the pharmacy team in accordance with national guidelines.

The primary endpoint for this study was to assess the role pharmacy team members could have in providing early detection of AF and subsequent referral to care using the Kardia single-lead ECG system in a nonhospital setting. This was assessed by the number of patients identified as having potentially abnormal ECGs that were screened and referred to further care using the Kardia system. St. Bartholomew’s Health Clinical Effectiveness Unit granted ethical approval for this study.

RESULTS

This study enrolled 1,298 patients, of which 154 were excluded due to incomplete data collection, leaving 1,144 patients available for analysis. Despite exclusions, all 1,298 patients did receive one-on-one arrhythmia counseling and education from a pharmacist, pharmacy learner, or cardiac nurse. Figure 3 highlights the number of patients screened at each location. The 1,144 patients with complete data had a mean age of 55 years, a median age of 57 years, and a range of 18–101 years old. Approximately one third of this population was considered elderly, with 371 (32.4%) being ≥ 65 years old. When assessed by gender, more males were screened (639) compared to females (505), with men making up 55.9% of the patient cohort. The most commonly reported risk factors were hypertension, peripheral artery

Figure 3. Atrial fibrillation screenings by location.

Figure 4. AliveCor Kardia screening results.

disease, and diabetes, which were reported in 29.5%, 15.0%, and 13.1% of the population, respectively.

Figure 4 highlights the results from the Kardia screenings. Of the 1,144 analyzed profiles, 37 patients (3.2%) were identified as potentially or knowingly being in AF. Of these, 25 (67.6%) were ≥ 65 years old at the time of screening, and 23 (62.2%) were previously unaware of their likely AF status. An additional 62 patients (5.4%) were screened and found to potentially have an irregular, but non-AF, heart rhythm. In total, 99 patients were identified as having a potential arrhythmia and referred to further care as a direct result of pharmacist and pharmacy learner led ECG screenings. The remaining 1,045 patients (91.4%) were shown to have a “Normal” heart rhythm interpretation upon screening.

DISCUSSION

The 99 patients identified with an abnormal heart rate represent approximately 3.2% of the total population screened. This result is higher than the 1.6% of the population of England as predicted by NICE in 2013 (National Institute for Health and Care Excellence 2013). The variance could be potentially explained by the high percentage of patients taken from an urban environment, where rates of AF tend to be higher. In addition, a screening site located in one of the largest cardiac centers in Europe could have led to a population more skewed towards having cardiovascular conditions. Furthermore, patients with preexisting heart conditions at this facility accompanied by family members with similar genetic risks may be more likely to be visiting the hospital where a majority of the screenings were held.

COMMUNITY IMPACT

This service-learning project was originally designed to help assess the role pharmacy team members could have in early detection of AF, but by the end of this project much more was accomplished. By this study’s conclusion

nearly 1,300 community members received personal education about a disease state that is predicted to become more common and has the potential to cause significant morbidity and mortality issues for affected patients. In addition to the 1,288 citizens who received this individual education, many more family members and caretakers, who were present with their loved ones at the time of counseling but deferred to take part in the study, learned about AF and will be able to share what they learned with others they care about. This is especially important considering that the United Kingdom has the highest rate of death attributed to AF globally, with nearly 1 in 100 deaths being attributed to the disease. Directly, 37 patients were identified as being potentially in AF, 18 of whom were previously unaware and not receiving appropriate medical care guided at minimizing the potential risks of AF such as stroke and other cardiovascular disorders. More importantly than identifying these patients was the immediate connection to further care that was offered to ensure proper risk reduction strategies could be implemented in this patient group.

While the patients identified as potentially being in a state of arrhythmia likely received the most benefit from this service-learning project, the remaining patients in the “Normal” Kardia screening group also benefitted greatly. Aside from the verbal education, this group had the opportunity to see their ECG being taken in real time, which was a very exciting and interesting experience for many of these patients. This unique screening tool is what initially piqued many patients’ interest, and that initial interest is what opened the door to many of the great discussions and questions that took place. The Kardia’s ability to display the patient’s heart rhythm for them to see was a new and very unique experience for many of the participants. Being able to follow the rhythm and beat of their heart on the spot was a great way for patients to make the connection between the education we provided and themselves, making our efforts much more relevant for many of them. The enjoyment expressed by the patients also lends to the idea of them being more willing to participate in similar public health initiatives in the future.

While this service-learning project was largely successful and benefitted numerous people, there were some barriers that could be better anticipated for similar service-learning events in the future. One improvement to be made for future screening efforts would be to better track patient outcomes after they were identified as potentially arrhythmic and referred on to further care. While the AliveCor Kardia screening system is considered to be quite accurate, being able to confirm

and document a patient’s official diagnosis following their 12-lead screening would be valuable information. As participant names were not recorded and tied to their screening results during this project for anonymity, this information was hard to collect retrospectively. Future versions of this service-learning project will likely see a higher level of follow-up for patients with potential arrhythmias, in order to ensure they receive proper treatment and to better quantify the results of such a screening program. Another target for future screening events would be to have the ability to offer immediate follow-up with a full, 12-lead ECG at all screening locations. While the majority of participants in this study were assessed at St. Bartholomew’s where this service was readily available, being able to offer this convenience to all patients deemed to be at higher risk could help increase the rate of follow-up care in any upcoming screening events.

Another challenge was presented by the fact that multiple parts of the screening and accompanying questionnaire were dependent on patient-reported responses. While interviewing patients, it was easy to see the varying amount of knowledge some participants held regarding their own health, which could impact the quality of the data received from the patient interviews. This was especially apparent for questions regarding less common risk factors or comorbidities such as peripheral artery disease or venous thromboembolisms. This variable would be difficult to eliminate in such a nonclinical setting, but there is potential for screening services similar to this one to be carried out in lower acuity medical settings such as ambulatory care or general practitioners’ offices, where access to more reliable information could be readily available.

STUDENT IMPACT

On a more personal note, I [Brian] joined this service-learning project while on my experiential training experience as a student who was beginning his journey into clinical practice. Being able to start my rotations with such a unique practice site and project helped prepare me for the rest of my clinical requirements. As a new rotation student, the opportunity to educate and interact with such a diverse patient population was a terrific experience for me to have right out of the gate. Being able to personally educate 63 patients in a matter of a few days allowed me to gain a confidence in interacting with patients that I was able to carry with me through the rest of my experiential training. Aside from gaining in my own clinical competency regarding patient counseling, I was also able to contribute as

a core member of an interprofessional team as I collaborated closely with preregistration pharmacists and specialized cardiac nurses throughout the project. Being able to work with other health care team members is a vital skill to have in any capacity as a pharmacist, and this experience will help me acclimate to other health care teams as I continue to advance in my career and ensure patients receive the best outcomes possible as I practice in the future.

CONCLUSION

In summary, this service-learning project was mutually beneficial to both the community and myself [Brian] to a further extent than I would have ever imagined when I was first introduced to the project. I was able to experience an entirely new health care system firsthand, meet and educate patients that were genuinely interested in our project, and learn from fellow health care team members at the top of their fields, all while providing valuable education to members of the community. The authors hope that this article helps to raise awareness regarding atrial fibrillation and its associated morbidity and mortality, while also providing ideas for others to help educate and provide for patients in their own communities.

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