

Chapter 1

Introduction

Heart disease is one of the diseases with a high prevalence of death. According to American Health Association (AHA), there are more than 17.6 million of deaths that were caused by heart disease by 2016 per year and are expected to increase as much as 23.6 million by 2030 (Chen & Patel, 2018). Elderly are also more susceptible to death caused by heart diseases especially if accompanied with other comorbidity. There are different types of heart diseases such as cardiovascular disease, high blood pressure, atrial fibrillation, heart failure, disease from the arteries, and etc. Atrial fibrillation is known as the most common type of cardiac arrhythmias and is especially very susceptible to geriatrics populations (Shah *et al.*, 2018). Atrial fibrillation causes irregular heartbeat and may further put patients at high risk of having blood clot (thrombosis) or stroke. Many different types of pathophysiology of atrial fibrillation have been suspected including structural and electrical abnormalities(Shah *et al.*, 2018). Defects on structural or electrical properties can cause uncoordinated blood flow which further cause abnormal heart rhythm (Shah *et al.*, 2018). Therefore, they can further affect blood pressure and damage on the atrium such as fibrosis, which can further worsen atrial fibrillation. Unfortunately, the exact mechanism of atrial fibrillation hasnot been fully elucidated (Shah *et al.*, 2018). Anticoagulants are used as one of the treatments for atrial fibrillation, however widely used anticoagulants, such as warfarin, have high bleeding risk, low therapeutic index, and more drug interactions compared to Novel Oral Anticoagulant (NOAC) (Chen & Patel, 2018). Therefore NOAC is being evaluated on atrial fibrillation patients to determine whether it is a better treatment option compared to the other types of anticoagulants.

Atrial fibrillation can further cause thrombosis. Thrombosis is the formation of blood clot on the blood vessels and it is one of the leading causes of several types of diseases such as coronary syndromes, stroke, and venous thromboembolism (Bikdeli *et al.*, 2012). Anticoagulant drugs are used to treat these cases. Normal homeostatic body condition maintains the constant of thrombus production and destructions, without normal homeostasis thrombosis may happen (Bikdeli *et al.*, 2012). Since the first discovery of the first anticoagulant, the number of other anticoagulant drug choices increases. Different types of disease may have different anticoagulant drug choices, where low molecular weight heparins are more commonly used for acute coronary syndromes (Bikdeli *et al.*, 2012). On the other hand, warfarin and other vitamin K antagonists are used for oral anticoagulants (Bikdeli *et al.*, 2012). Back in the days, vitamin K antagonists were widely available for human use. However, it has been estimated that there are more than 65,000 patients treated in the United States emergency departments yearly for warfarin related hemorrhage (Harter, Levine & Henderson, 2015). Vitamin K antagonists have high rate of bleeding and narrow therapeutic index thus frequent monitoring is needed (Harter, Levine & Henderson, 2015). Therefore, new anticoagulants are needed with lower side effects with a wide therapeutic index. Novel oral anticoagulant (NOAC), another type of anticoagulant that works by directly binding to factor Xa and factor IIa, is expected to be a safer treatment. Anticoagulants are the main treatment for Atrial fibrillation. Anticoagulants in atrial fibrillation patients are mainly used to prevent further embolic events (Manning, Singer & Lip, 2020). The main anticoagulant that is used is vitamin K antagonist such as warfarin. By using anticoagulants, it is necessary to balance the benefits of preventing thrombosis with the risk of bleeding. However, warfarin has high side effects such as hemorrhage or bleeding and also low therapeutic index (Johnson, 2012). In addition to that, warfarin also needs constant laboratory monitoring, dietary restrictions, and also prone to many drug interactions. To avoid these drawbacks, specialist doctors in the executive polyclinic of the hospital prescribed rivaroxaban for out-patient atrial fibrillation. Rivaroxaban has been shown to have lesser adverse events of excessive bleeding compared to warfarin (Patel, Pandya, & Goldberg, 2017). Furthermore,

rivaroxaban is also stated to have lesser drug interactions with other types of drugs. As the use of rivaroxaban is relatively new, there is a need to perform drug use evaluation not only to avoid the drawbacks mentioned above but also to maintain a low cost and safe medication. Hence, this study aims to evaluate the drug use of rivaroxaban on out-patient atrial fibrillation at Harapan Kita National Heart Centre.