THE CHARACTERISATION OF RISK FACTORS, SUBSTRATE AND MANAGEMENT STRATEGIES FOR ATRIAL FIBRILLATION

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To my parents, Abhay and Suniti

To my sister and brother in law, Devyani and Harshit

In loving memory of my grandparents

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Abstract

The rising global incidence and prevalence of atrial fibrillation (AF) imposes significant burden on health care systems. Recently, several novel risk factors for AF have been identified. However, there remains a need to understand the differential impact of more established predisposing factors for incident AF. Further, there is insufficient knowledge surrounding the atrial changes that occur at the advent of AF and how this arrhythmia is managed on presentation to health care facilities. This thesis seeks to improve our understanding of the risk factors associated with this arrhythmia; to characterise any detrimental changes that occur upon its onset and to identify the AF patients that are most likely to significantly burden the hospital system. To this effect, the focus of each of the chapters is presented forthwith.

Chapter 2 focuses on the independent risk factors for incident non-valvular AF via a systematic literature review and meta-analysis. This study provides the absolute and independent effect of each established risk factor on AF development and estimates the proportion of AF cases that could potentially be prevented if modifiable risk factors were targeted at the population level.

Chapters 3 and 4 characterise the entity of newly diagnosed AF. Chapter 3 determines the existence of structural and electrical remodelling that may be present at an early stage of this arrhythmias' evolution. Detrimental changes were found in the form of electrical substrate in paroxysmal new AF and structural substrate in persistent new AF. Chapter 4 examines the thrombogenic risk associated with new onset AF. This study shows the existence of elevated levels of pro-thrombotic bio-markers and

emphasises the need for appropriate anti-coagulation at this early stage of the AF disease process.

Chapters 5 and 6 focus on the burden that AF confers upon the hospital system by way of hospital admissions and readmissions. Chapter 5 identifies the predictors of hospital admission for AF patients presenting via the emergency department and moreover determines if all admissions are medically warranted. This study ascertained that AF patients presenting with congestive heart failure and a concurrent infection were significantly likely to be admitted to hospital for treatment and a significant proportion of patients who were admitted were low-risk AF and admission was not medically justified. This highlights a need for new management strategies in order to prevent unnecessary hospital admissions.

Lastly, chapter 6 examines the factors that increase the likelihood of readmission to hospital among AF patients. The findings showed that a substantial number of patients with index presentation for AF were readmitted to hospital. Patients who were younger and discharged on rhythm control medications were more likely to burden the hospital system with frequent AF readmissions. This study stressed the need for specialised outpatient clinics and educational interventions that could potentially reduce the increasing numbers of AF patients re-presenting to hospital.

Declaration

I certify that this works contains no material, which has been accepted for the award of any other degree or diploma in any university or other tertiary institution. To the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the explicit permission of the University of Adelaide and if applicable, any other partner institution.

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Chapter Two

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3. Presentation: Presented at the 60th Cardiac Society of Australia and New Zealand the Scientific Meeting, August 2012, Brisbane, Australia and published in abstract form (Heart, Lung and Circulation 2012, 21:S104-5).
4. Presentation: Presented at the 5th Asia-Pacific Heart Rhythm, Society Scientific Sessions, October 2012, Taipei, Taiwan and published in abstract form (APHRS Conference Proceedings 2012).
5. Presentation: Presented at the Heart Rhythm Society 34th Annual Scientific Sessions, May 2013, Denver, United States of America and published in abstract form (Heart Rhythm 2013, 10:5, S218).
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2. Presentation: Presented at the 60th Cardiac Society of Australia and New Zealand the Scientific Meeting, August 2012, Brisbane, Australia and published in abstract form (Heart, Lung and Circulation 2013, 21:S107-8).
3. Presentation: Presented at the School of Medicine Postgraduate Research Conference, August 2012, Adelaide, Australia.
4. Presentation: Presented at the 5th Asia-Pacific Heart Rhythm, Society Scientific Sessions, October 2012, Taipei, Taiwan and published in abstract form (APHRS Conference Proceedings 2012).

Prizes and Awards During Candidature

1. Best poster presentation (PhD) Award, Australian Society for Medical Research (ASMR), South Australian Scientific Meeting, 2014.
2. Best Poster Prize, The University of Adelaide, Faculty of Health Sciences, Department of Medicine, Postgraduate Research Conference, 2012.
3. Finalist, Best poster prize, Heart Foundation National Conference, 2013.