Aboriginal and Torres Strait Islander guideline-concordance and clinician-patient engagement for non-ST-elevation Acute Coronary Syndromes utilising hospital services administrative data and medical records.

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A thesis submitted in accordance with the requirements for admission to the degree of Doctor of Philosophy

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October 2015

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Abbreviations used in this thesis (in alphabetical order):

ABS	Australian Bureau of Statistics
ACACIA	Acute Coronary Syndromes Prospective Audit
ACE	Angiotensin-converting enzyme (inhibitors)
ACS	Acute coronary syndrome
AMI	Acute myocardial infarction
ALO	Aboriginal Liaison Officer
AOR	Adjusted odds ratio
ARB	Angiotensin-receptor blocking agent
AS	Age-standardised
ASR	Age-standardised rate
ASRR	Age-standardised rate ratios
ATSICCHS	Aboriginal and Torres Strait Islander community controlled health service
CABG	Coronary artery bypass graft
CAD	Coronary artery disease
CASPA	The Central Australian Secondary Prevention of Acute Coronary Syndromes Study
CF	Case fatality
CHD	Coronary heart disease
CR	Cardiac rehabilitation
CVD	Cardiovascular disease
EBC	Evidence-based care
EBP	Evidence-based prescription
ECG	Electrocardiogram
ED	Emergency department
EET	Exercise electrocardiography testing
EST	Exercise stress test
HPPS	Heart Protection Partnership Study
HR	Hazard ratio
IHD	Ischaemic heart disease
IR	Incidence rate

MI	Myocardial infarction
NDI	National mortality data linkage systems
NHMD	National Hospital Mortality Database
NT	Northern Territory
NSTEACS	non-ST-segment elevation acute coronary syndrome
NSTEACS-HR	non-ST-segment elevation acute coronary syndrome – high risk
NSW	New South Wales
NSWAPDC	New South Wales Admitted Patients Data Collection
OCPD	Chronic obstructive pulmonary disease
OR	Odds ratio
PAARS	Perth Aboriginal Atherosclerosis Risk Study
PCI	Percutaneous Coronary Intervention
PHC	Primary health care
Qld	Queensland
RDH	Royal Darwin Hospital
RR	Risk ratio
SA	South Australia
STEMI	ST-segment elevation myocardial infarction
T2DM	Type 2 Diabetes Mellitus
WA	Western Australia
WADLS	Western Australia Data Linkage System
WHO	World Health Organisation

Abstract

Introduction: Acute coronary syndrome (ACS) represents one of the most common causes of acute medical admissions to Australian hospitals. The incidence of ACS has increased and the outcomes of care have shown modest improvement for non-Indigenous Australians, compared to their Indigenous counterparts. The studies that compare Indigenous and non-Indigenous patients with acute myocardial infarction and chest pain are inconclusive about the reasons for in-hospital treatment disparities.

Aim: To ascertain if Indigenous status is a predisposing factor that impacts the cardiac care of patients who present to hospital with non-ST-elevation ACS and who are at high-risk of a secondary coronary event.

Design: A descriptive audit of Indigenous patients admitted to hospital emergency departments with high-risk clinical features without ST-segment-elevation using administrative hospital data and medical records.

Methods: A mixed-method was used in this research. Study 1 and 2 used an epidemiological framework to measure some features of health care access. The focus was on identifying co-morbidities that may impact on presentation, the care process and the outcomes in a cohort of Indigenous and non-Indigenous adults presenting to hospital. For Study 3 a descriptive content analysis was used to review the patient medical records to identify indicators of clinician-patient engagement.

Setting: The research drew data from two settings. The research described in Study 1 drew data from a prospective nation-wide multi-centre registry involving 39 Australian hospitals over the period November 2005-July 2007. Studies 2 and 3 are based on data from a retrospective case note review of patients admitted through two Adelaide public tertiary hospital emergency departments from 2007-2009.

Results: Indigenous patients were significantly younger, presented later in the disease process and had a higher burden of cardiovascular risk factors, when compared to non-Indigenous patients. After adjusting for age and gender, Indigenous patients were just as likely to access angiography as eligible non-Indigenous patients (RR 1.03, 95% CI 0.85 -1.25). In the research described in the second study, Indigenous patients were 54% more likely to receive angiography (RR 1.54; 95% CI 1.31-1.81) than non-Indigenous patients. However this difference disappeared after adjustment for age, gender and propensity score. In addition, Indigenous patients were 20% more likely to receive the recommended medications (RR 1.19, 95% CI 1.01-1.40) than non-Indigenous patients. Women were almost 20% less likely to receive an angiogram (RR 0.81, 95% CI 0.66-0.99) and 20% less likely to receive the recommended medications (RR 0.80, 95% CI 0.71-0.91), when compared to men. This gender differential has not been reported in other ACS studies with an Indigenous cohort. The comorbidity burden that can exclude patients from eligibility for angiography was higher among Indigenous study participants. The likelihood of receiving medications on discharge was significantly influenced by age, gender, Indigenous status, comorbid burden and revascularisation.

A content analysis found that the medical records reviewed contained some evidence of the three key themes of communication, compliance and cultural competency, yet overall, they did not prove to be an appropriate source to comprehensively assess clinician-patient engagement. The study contributes rich descriptive data of the patient journey and highlights the importance of communication and cultural competency as a building block to establishing a trusting and engaging clinician-patient relationship. All clinician-patient communication was in English only, in spite of the fact that a quarter of patient records identified language or communication problems as an issue. However, when families were included in the health care, important clinical information was exchanged that assisted to inform the treatment and care provided. Less than half (46%) of the Indigenous patients accessed the Aboriginal Liaison Officer (ALO), implying a lack of system wide protocols for utilising the ALO.

Conclusions: Whilst there are many factors contributing to less than optimal health outcomes for Indigenous patients that originate outside the health system, these studies have provided evidence that Indigenous status alone was not a significant contributor influencing access to cardiac care. Rather, access to specific cardiac interventions such as angiography and evidence-based prescriptions on discharge appears to be influenced more strongly by the excessive burden of illness associated with a life-time accrual of risk factors experienced by individuals. The clinician-patient engagement is about establishing and nurturing relationships which are pivotal to the treatment process and which impact on patient outcomes. The difference in treatment and outcomes may be the result of more

subtle systemic practices, not necessarily ill-intentioned, but still discriminatory and almost invisible, within an individual clinician-patient interaction.

Declaration

I declare that this thesis presents work carried out by myself and does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; to the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text; and all substantive contributions by others to the work presented, including jointly authored publications, is clearly acknowledged.

23 October 2015

Statement of other contributors

I would like to acknowledge and thank the following scholarship providers whose generous support helped me and my family during my PhD candidature: Building Indigenous Community Health Leadership Capacity, University of South Australia, Research Fellowship and Scholarship Deed, Heart Foundation, South Australian Department of Health Research Award and Building Indigenous Research Capacity (BIRC), James Cook University.

Thanks to Mrs. Mary Buckskin (13.4.58-5.7.2015) and Dr David Scrimgeour from the Aboriginal Health Council of South Australia for your in-kind support and advice throughout my research.

I would also like to extend my appreciation to Professor Sue Kildea, Mater Research Institute - University of Queensland for providing a supportive writing space in the last six months of my write up in Brisbane.

Quotes from Dr Arnold 'Puggy' Hunter were compiled by Dr Sophie Couzos, 7th September 2001. (*Sources*: Statements as recorded by Dr Couzos 1998-2001 from joint attendance at various national Committee meetings; Keynote Speech, 5th National Rural Health Conference, Adelaide, March 1999; Professor Richard Murray and NACCHO Secretariat staff as collated in 2001 for Tribute Edition NACCHO Newsletter; Townsville Bulletin; ATSIC News, etc.). Approval was granted by Dr Hunter's widow and children to use the quotes in this doctoral thesis.

Finally, I would like to acknowledge and thank Mr. Adrian Carson and Dr Carmel Nelson from the Institute for Urban Indigenous Health, for their personal support and their ongoing commitment to building an Aboriginal and Torres Strait Island workforce.

Acknowledgements

This PhD research journey would not have commenced without the wisdom, leadership, humour and encouragement of the late Dr Arnold ‘Puggy’ Hunter (14.8.51-3.9.2001) who dedicated most of his adult life to improving the appalling state of Aboriginal health in this country. Dr Hunters’ vision is best captured in the following:

> *‘We will continue the struggle for a better life for our people, and I know that as long as we all stand united in that struggle, we will win in the end.’*

This PhD could not have been completed without my academic supervisors Professor Robyn McDermott (Principal) and Associate Professor Christopher Zeitz (Co-Supervisor) and Professor Adrian Esterman (Associate Supervisor). This research journey was scary at times and I am grateful for my supervisors’ scholarly guidance, encouragement and most importantly, patience. My cultural mentor provided a safe sounding board for me to clarify my ideas and understand the new learning of the academy, thank you Professor Bronwyn Fredericks. Collectively, my supervisors provided me with an opportunity to acquire ‘tools’ to put into my toolbox to contribute to improving the health status of Aboriginal and Torres Strait Islander peoples.

I extend my gratitude to all the colleagues who reviewed drafts, debated ideas and re-energised me when I was making my way throughout the uncharted waters; Dr Sandra Campbell, Dr Odette Best, Dr Jenny Judd, Dr Deborah van Gaans and Ms. Sophie Hickey. The *Deadly Nerds*; Dr Karla Fell, Mr. Sean Taylor, Ms. Yvonne Clark and Mr. James Charles who made me embrace, laugh and celebrate being a nerd. Thanks to the BIRC Scholars who provided continuous support, humour and encouragement over the years. A special thank you to Ms. Terry Jones who provided administrative and academic support, encouragement and shared ‘footy stories’ with me throughout my studies.

Finally but not least, I want to say thank you to my family. To my extended family, my siblings and Peter (Senior), who encouraged me to *hurry up and finish that book stuff.* A special mention to my sister Josie, who travelled this journey with me while undertaking her own PhD. To my beautiful children Jye and Max, thank you for being patient, understanding and reminding me what is truly important. I dedicate this work to my mother, Lorraine for her unconditional love and support.

Thesis overview – introductory contextual statement

This thesis is submitted as a Thesis Containing Published Research in accordance with University of South Australia Academic Regulations for Higher Degrees Research Clause 16.1.1.b. The contribution of each author to the publications is provided in Statement of Authorship declarations at Appendix E.

The central aim of this thesis was to ascertain if Indigenous status is a predisposing factor that impacts the cardiac care of patients who present to hospital with non-ST-elevation ACS and who are at high-risk of a secondary coronary event.

The introduction outlines the human and financial costs of ACS in Australia. A contextual description of the national guidelines for the management of ACS and its application is provided and is followed by an overview of the poor health status of Indigenous Australia.

The body of the thesis is comprised of two parts: a literature review and three studies. An analysis of the literature on ACS in terms of prevalence, incidence, treatments and case fatality, and impact on Indigenous Australians is undertaken. Gaps identified in the literature segue into three separate complementary studies that explore the influence of Indigenous status on treatment, care and clinician-patient interaction.

Studies 1 and 2 use the Australian guidelines for management of ACS to assess the probability of a patient receiving interventional and therapeutic care after presenting to hospital. The studies describe high-risk characteristics for Indigenous patients. The focus is on hospital and patient characteristics as key variables influencing access to cardiac care as recommended in the guidelines. Study 1 presents findings for a national ACS audit registry multi-centre prospective audit research and Study 2 explores findings for a retrospective cohort investigation in South Australia. Differences in cardiac care provision between Indigenous and non-Indigenous patients may, to a degree, be explained by the level of the patient’s engagement and activation in their own health care. Study 3 then explores the appropriateness of using medical records to identify indicators of clinician-patient engagement. The studies suggest possible explanations for the disparities witnessed between Indigenous and non-Indigenous Australians. Each study is independent and contributes to providing important insights for understanding the connection of guideline concordance and clinician-patient engagement.

The concluding chapter synthesises the main research findings, compares these findings to the current literature, identifies the strengths and limitations of the three investigations and recommends ways to build on the evidence presented in future research.

It is anticipated that the results of this research will assist clinicians and health service managers to develop strategies to improve the quality of diagnosis, treatment and management of ACS among Indigenous clients. It is envisaged that insights gained through this doctoral study will contribute to improvement in cardiovascular disease health care for all Australians, especially those of low socioeconomic position, those with multiple risk factors, and residents of rural and remote areas.

1. Introduction

> *'Everybody feels a bit sad and sorry for the status of Aboriginal health, and it's like a trophy that you pull down once a year and polish it up and then you put it back in a glass cabinet because you don't want to do anything with it, but you still own it.'*
>
> Dr Arnold 'Puggy' Hunter(1 p38)

Acute coronary syndrome (ACS) represents one of the most common causes of acute medical admissions to Australian hospitals.(2) The number of ACS hospitalisations for 2009 was 79,990, with the associated direct and indirect costs totalling approximately $18 billion.(3) Over the past decade there has been an increase in the rate of patient transfer associated with ACS hospitalisation and the rate of cardiac procedures, while the length of stay in hospital has decreased.(4) Australia has experienced lower case fatality rates and lengthened survival times for those with ACS, in large part attributable to the benefit of improved pharmacological and procedural interventions.(5)

The improvements in outcomes for the wider Australian population have not been shared within the Aboriginal and Torres Strait Islander (hereafter referred to as Indigenous Australians) population. Gaining a better understanding of the reasons for these differences in outcomes is the impetus for this research.

This chapter has four parts. The first explains the pathophysiology and clinical presentation of ACS, in order to inform an understanding of the development of atherosclerosis and progression to thrombosis and clinical events. In the second part, the focus is on exploring the implementation of the management guidelines for ACS in Australia, while also providing a contextual description of the health status of Indigenous Australians. The third section outlines the rationale and methodology for this research in examining the differential outcomes of ACS within the Indigenous population of Australia. Finally, I present an overview of the four chapters that comprise the thesis.

1.1 Background

1.1.1 Cardiovascular disease a precursor to ACS

Cardiovascular disease (CVD) is a generic term that refers to disease of the coronary vessels (arteries, capillaries) and infers disease in the wider vascular system.

Cardiovascular disease can result in devastating health outcomes, when blood supply to the heart or brain is compromised, causing angina, myocardial infarction or stroke.(5) As a chronic disease, CVD features complex causality, multiple factors leading to onset, and a long and possibly asymptomatic development period followed by a prolonged illness associated with other health complications and functional impairment or disability.(6) Cardiovascular disease has clear proximate causes and risks factors (obesity, sedentary behaviour, poor nutrition, tobacco smoking, high blood pressure, high cholesterol), as well as more distal causes including factors associated with chronic stress and social disadvantage.(7,8) In 2010, chronic disease contributed to over 85% of the total disease burden in Australia, with cardiovascular diseases contributing 26% of the fatal burden.(9) Despite recent interventional and pharmacological advances in the field of cardiology, CVD continues to be a leading cause of morbidity and mortality in Australia. Coronary artery disease (CAD) specifically implies that the coronary arteries are diseased. Coronary artery disease is more readily identifiable and the most common underlying pathophysiological process is coronary atherosclerotic disease.(10,11) Acute coronary syndrome may be the first presentation of CAD.(11)

1.1.2 Clinical presentation

The development of disease in the arterial system, including the coronary arteries, begins in adolescence, with the rate of progression largely determined by the extent of risk factors.(11) Clinical presentation can occur in either of two ways. Stable plaque can develop to an extent that it compromises the ability of blood flow to increase during periods of increased demand (e.g. during exercise), leading to symptoms such as angina. This situation is predictable and generally safe. Alternatively, plaque can become vulnerable or inflamed, leading to plaque rupture and stimulating thrombus formation within the artery.(11,12) Mature plaque associated with atherosclerotic disease is characterised by a lipid rich core and a fibrous cap.(10-12) The combination of plaque rupture and thrombus can either occlude the vessel (myocardial infarction), or compromise blood flow without being occlusive (unstable angina).(10) The underlying pathophysiology is the same and collectively the clinical presentations are referred to as ACS. Non-ST-elevation acute coronary syndrome (NSTEACS) is a subset of ACS, characterised by the absence of ST-elevation on an electrocardiogram and no biochemical evidence of myonecrosis, but with evidence of ischaemia.(10, 13) Figure 1.1 represents the progression from asymptomatic atherosclerosis, to a high-risk/vulnerable plaque, and then to thrombosis and clinical events.(10, 11, 14)

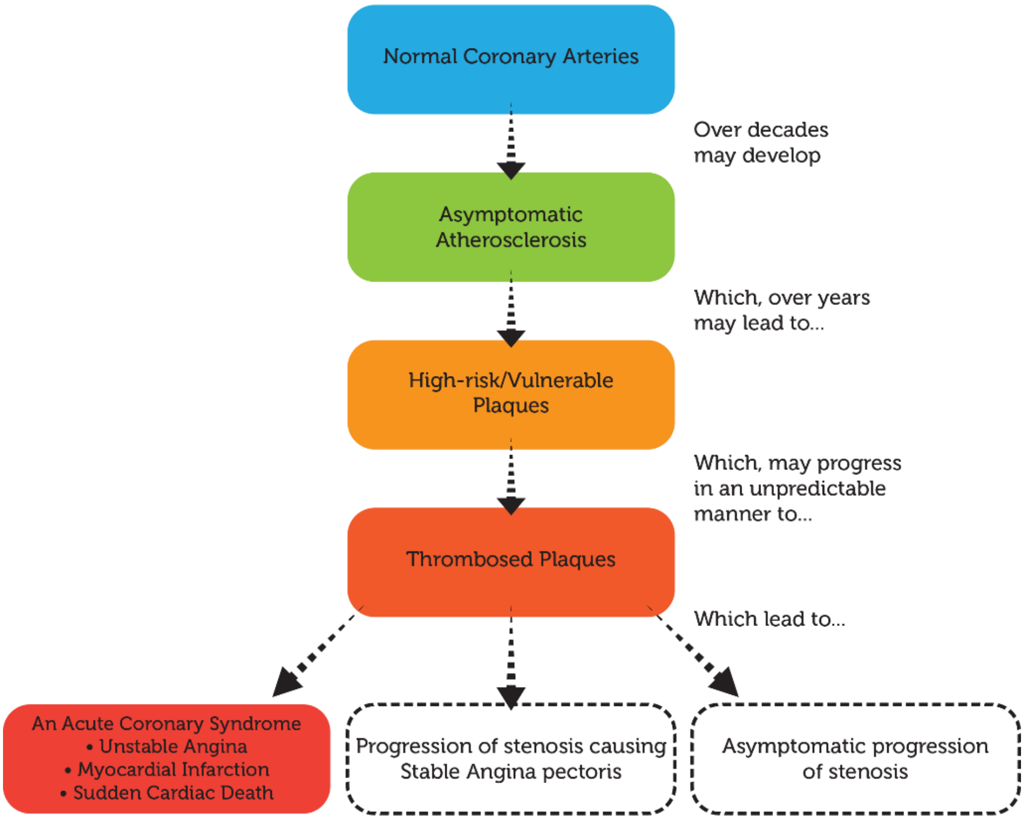

Figure 1.1 Development of atherosclerosis and progression to thrombosis and clinical events

This doctoral study adopts the definition stated in the Guidelines for the Management of Acute Coronary Syndromes 2006:

> Acute coronary syndromes represent a broad spectrum of clinical presentations, spanning ST elevation myocardial infarction through to an accelerated angina without evidence of myonecrosis. ….this diverse clinical syndrome is bound by a common pathophysiology: coronary inflammation; epicardial plaque rupture or erosion; and coronary thrombosis and distal embolisation leading to myocardial ischaemia and/or infarction.(15 pS9)

Patients with ACS have varying medical histories, diverse clinical presentations and are likely to experience a second serious cardiac event.(11, 16) Patients with ACS require acute in-hospital clinical care and have high mortality.(2) Management of ACS includes the need for revascularisation as appropriate, but more importantly requires the avoidance of other plaques becoming inflamed or vulnerable. The quality of care received in the primary health care setting and the management of ACS is important to survival and in preventing recurrences and complications.(17-20)

Cardiovascular disease is a chronic condition that predisposes the patient to events such as ACS; that is, its chronicity is interspersed with occasional crises. The quality and effectiveness of chronic disease management is a key determinant of the frequency and extent of these crises. The stress and anxiety associated with the acute event provides additional opportunities to re-focus the patient's approach to managing their chronic disease more diligently. However, it also provides an opportunity to ensure that adequate preventative pharmacotherapy is being prescribed. While health systems tend to focus on the quality outcomes of the individual crisis interactions, it is the extent to which these interactions succeed in modifying chronic risk that is the key to managing this chronic disease.

1.2 Australian context

1.2.1 Guidelines for the management of ACS

In 2006, the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand published the Guidelines For The Management Of Acute Coronary Syndromes 2006.(15) These guidelines have since undergone two revisions, in 2007 and 2011.(21, 22) The Guidelines aim to improve the process of care by defining ACS, describing diagnostic implications and making recommendations for acute management of chest pain, and management after the cardiac event.(15) The Guidelines continue to support individualised treatments according to the patients' co-morbidities, drug tolerance, lifestyle, living circumstances and preferences.(21) While they detail the recommended suite of evidence-based treatments, it is unclear how well these have been implemented and/or have led to improved efficiency and effectiveness. Yet, considerable investment has been made to assist in the translation from research to clinical practice, which can be measured by guideline-concordant care; that is provision of care in accordance with the treatment guidelines for that particular clinical presentation.(23)

Studies conducted prior to the release of the 2006 national guidelines and addendums, provided a baseline point of reference for the evaluation of the application of evidence-based interventions in the diagnosis and management of patients presenting with chest pain.(23-27) Prior to the release of the national guidelines, three key influences were apparent: an evidence practice-gap; capacity of the treating hospital; and the continuity of care - that is, transition of patients from acute care to long term care and secondary prevention. Studies that evaluated guideline-concordant care for ACS were descriptive, and while some demographic data was described, Indigenous status was not reported.

1.2.2 Evidence practice-gap

In a large Queensland study, Scott and colleagues (2002) found that in a cohort of 24,546 patients, only 68% received concordant care.(23) This finding was supported by Joynt and colleagues (2009) who conducted a multi-centre descriptive analysis study to identify variations in the use of key evidence-based therapies and in clinical outcomes among patients hospitalised with ACS.(26) Walters and colleagues (2008) also concluded that patients admitted for chest pain were likely to experience significant delays in key interventions such as angiography, revascularisation and administering thrombolysis.(27)

Both Scott and colleagues (2002) and Joynt et al. (2009) reported that factors influencing discordant care included age >65 years, ‘silent’ infarction, anterior infarction, history of heart failure and presence of a chronic condition.(23, 26) The study cohort that did not receive guideline concordant care had higher rates of re-infarction and mortality.(24, 27) These authors are inconclusive about the reasons for the lack of evidence-based treatments suggesting that suboptimal care may be influenced by a number variables not accounted for or captured in their analysis.

1.2.3 Capacity of the treating hospital

The capacity of the treating hospital was a factor in guideline-concordance and timing of care. There were significant delays to key interventions, that were often due to hospitals being non-interventional - that is, hospitals did not have onsite cardiac surgical services, and there was a delay in transferring high risk patients to interventional centres.(27) Patients receiving care at an intervention centre are more likely to receive the suite of evidence-based treatments and recommended medications compared to a non-interventional centre.(27) Joynt et al. (2009) also reported that where patients were admitted to non-tertiary hospitals they were less likely to receive coronary angiography.(26)

1.2.4 Continuity of care

Acute coronary syndrome is an acute cardiac event and the continuity of care in CAD management is critical. The limited up-take of secondary-prevention interventions has been observed as a barrier to delivering continuity of care. Secondary-prevention involves early disease detection, which increases opportunities for interventions to prevent the progression of the disease and the emergence of more serious symptoms. This is also important for rehabilitating patients who have had a cardiac event.(28) There was evidence of a high drop-off rate after discharge for recommended medications,(27) suggesting that secondary-prevention strategies were ineffectual. The up-take of secondary-prevention interventions were suboptimal with only 11% of patients reported as being referred to phase II cardiac rehabilitation at discharge.(27) Clinical complexities influenced the acute and secondary care patients received, with patients who were ≥ 65 years, and/or who were diabetic or had renal failure being less likely to receive a pharmaceutical therapy or cardiac intervention.(26) In addition, patients admitted to non-tertiary hospitals were less likely to be referred to cardiac rehabilitation.(29)

1.2.5 Acute Coronary Syndromes Prospective Audit

In 2007, the Acute Coronary Syndromes Prospective Audit (ACACIA) provided a national snap-shot of the management of ACS through enrolling a cohort of 3,042 patients across 39 hospitals. To date, six studies have been published from the national audit reporting on current management of ACS,(24, 25) outcomes for women,(30) treatment disparities and effect on late mortality(31) and the influence of age.(32, 33) Indigenous status was not reported in any of the studies, suggesting that little is known from a national perspective about the outcomes for Indigenous patients.

Effective management of ACS requires a systematic approach to ensure that patients have access to the services they need in a timeframe commensurate with their clinical condition and one that reaps the greatest benefit of treatments.(15, 34) However, evidence from the ACACIA Audit suggests that the provision of care lacks continuity and is suboptimal, despite the availability of clear guidance that underpins what needs to be done to reduce mortality and morbidity.(24, 25)

1.3 Indigenous Australians

1.3.1 The context of Indigenous health

The health status of our approximately 700,000 First Australians can only be described as shameful. In 2006, life expectancy for Indigenous males was 67.2 years, which was 11.5 years lower than for non-Indigenous males, and 72.9 years for Indigenous females, which was 9.7 years lower than for non-Indigenous females.(35) The age-standardised death rate for Indigenous people was 1.9 times the rate for non-Indigenous people, with the excessive death rates witnessed in the 25–64 age group.(36) The leading causes of death among Indigenous people were cardiovascular disease, neoplasms (almost entirely cancers) and injury, and the main reason for hospitalisation was for care involving dialysis.(36)

The current state of Indigenous health must be seen within a historical context. Kunitz (1994) rightly argues that, ‘diseases rarely act as independent forces but instead are shaped by the different contexts in which they occur.’(37 p. 5) Over the course of 230 years of colonisation, Indigenous Australians have had strong reasons not to trust in institutions for health care. History tells the story of Indigenous people not having access to health services because of government exclusion policy, institutional racism and poor quality of care.(38-41) Indigenous health has been shaped by political and social forces that have failed to make a genuine effort to respond to the overwhelming disadvantage experienced by Indigenous people across all social and economic indicators.(20, 37, 42, 43) The social gradient of housing, education, employment, access to justice and empowerment is directly linked to disastrous health outcomes for Indigenous people.(44)

1.3.2 Cardiovascular disease a leading cause of death of Indigenous Australians

The health improvements evident in the wider Australian population have not been experienced by all, with CVD being a major contributor to the relatively high rates of morbidity and mortality experienced by Indigenous Australians. In 2006, the non-Indigenous Australian population gained an estimated one million person-years due to the decline in CVD mortality.(35) Compared to other Australians, Indigenous Australians are three times more likely to have a coronary event.(45) This is problematic and CVD, followed by diabetes, collectively account for one-fifth of the health ‘gap’ in shortened life expectancy experienced by Indigenous Australians.(36, 46) Indigenous Australians aged 35-44 years are 9-12 times more likely to die from CVD than non-Indigenous Australians.(35, 47)

1.4 Research rationale

Three systemic factors appear to be key reasons for the less than optimal health outcomes for Indigenous patients. In the previous section I have argued that there is an evidence practice-gap: limited capacity of the treating hospital to adequately care for Indigenous patients experiencing ACS; and lack of continuity of care.(24) While there are other influences outside the health system contributing to poorer health outcomes, guideline concordant-care primarily focuses attention on the institutionalisation of health care that also includes effectiveness, efficiency and outputs. However, what is often not made explicit is the importance of the relationship between the health care provider and the recipient of this care. This research seeks to reveal potential factors that may influence the type of cardiac care accessed by Indigenous Australians.

1.4.1 Research aim

The aim of this research program is to ascertain if Indigenous status is a predisposing factor that impacts the cardiac care of patients who present to hospital with non-ST-elevation ACS and who are at high-risk of a secondary coronary event.

1.4.2 Approach and methodology

> *‘You can’t judge a book by its cover, you have to open it up and see what’s inside. In the same way you can’t judge Aboriginal people by their appearance today, you have to open your mind to their experience.’*
>
> John Watson (Tatika (bush name) and Jakamarra (skin name))(48 p. xi)

As an Aboriginal woman my motivation for this study is to understand why improvements evident in the wider Australian population have not been experienced by all Australians. As CVD is a major contributor to the morbidity and mortality experienced by Indigenous Australians, I am keen to understand the disparities to generate evidence that can be used for change.

There have been numerous campaigns by Indigenous communities, government and non-government agencies, over many decades, to improve the health and wellbeing of Aboriginal and Torres Strait Islander peoples. The most recent campaign and policy approaches have been the National Indigenous Reform Agreement (Close the Gap)(49) and the National Strategic Framework for Aboriginal and Torres Strait Islander Health 2003-2013: Australian Government Implementation Plan 2007-2013.(50) As a result, the past decade has seen an increased research focus into the disparity of care and health outcomes experienced by Indigenous Australians.

Studies that simply describe the disparities between Indigenous Australians and their non-Indigenous counterparts have dominated the literature.(51) However, there have been few studies that have sought to understand the experience of the patient journey from an Indigenous perspective. Moreover, there has been no comprehensive study examining if and how Indigenous status may influence the probability of receiving the type and level of care outlined in the national guidelines. Neither has there been any examination of the extent of patient-clinician engagement as a potential driver to increasing this disparity.

The urgency to close the gap in life expectancy is passionately captured by Dr Arnold Hunter:

> *'We're talking about human rights, we're not talking about extras, we're not talking about I want more than those white people, I want to get better this. The point that we're trying to make is we want to live just as long as you fellas. Twenty years is a long time in your life when you have to actually leave your family, your kids and all that sort of stuff and all the work that you actually achieved in your short time, it's not a good feeling, I can tell you.'*(52)

It is anticipated that the findings of this research will assist clinicians and health service managers to develop strategies to improve the quality of diagnosis, treatment and management of ACS among Indigenous clients. It is envisaged that insights gained through this study will contribute to improvement in cardiovascular disease health care for all Australians, especially those of low socioeconomic position, those with multiple risk factors, and residents of rural and remote areas.

This research is conducted through an Indigenous lens. How I approached the research is framed by who I am. I am informed by my history, my heritage and my life experiences. My bloodline is Nyikina Yawuru from the West Kimberley. I am a descendant of salt-water and fresh-water people.

In traditional epidemiological research, the background and motivation of the researcher is not made explicit. The invisibility of the researcher is said to be associated with objectivity and independence. Is making my standpoint explicit problematic? I propose that stating my standpoint is not only ethical but also enables me to remain loyal to the methods and norms of scholarly research traditions. Making my standpoint explicit does not distort the research findings any more than do any biases that may lurk hidden within supposedly value-neutral research. My standpoint incorporates a critical lens that identifies the limitation of Western paradigms to adequately portray Indigenous realities, knowledge, intellects, histories and experiences. Indigenous knowledge and health status are often problematised and pathologised.(53-55) As a group Indigenous people are frequently positioned as being dysfunctional and challenging. This approach has perpetuated a body of health research within which Indigenous knowledge is disregarded.(56)

This project allows me to be the researcher, not the researched and to move from the position of being an object of research to being the study designer and the knowledge interpreter. More importantly, I am in a unique position to point to patterns of behavior that others, immersed in the dominant group culture, may not be able to recognise.(57)

1.4.3 Conceptual model

Although there is a disparity in the treatment of Indigenous Australians who are diagnosed with ACS, the reason for the differential between Indigenous and non-Indigenous Australians has not been conclusively identified. Possible explanations include inappropriate diagnostic tools, access to care, patient preferences, and institutional discrimination.(58-60) The factors contributing to the uptake of health services are not simplistic and are more than just patient-related. Engaging in health care is dependent on a range of factors not only to do with the patient’s personality and socioeconomic circumstances, but also connected with the diagnosis and management proposed, and the nature, setting and communication context of the medical encounter. This clinician-patient interaction cannot be separated from the provision of services; societal and institutional factors.(61) Figure 1.2 illustrates the overall conceptual model for the research.

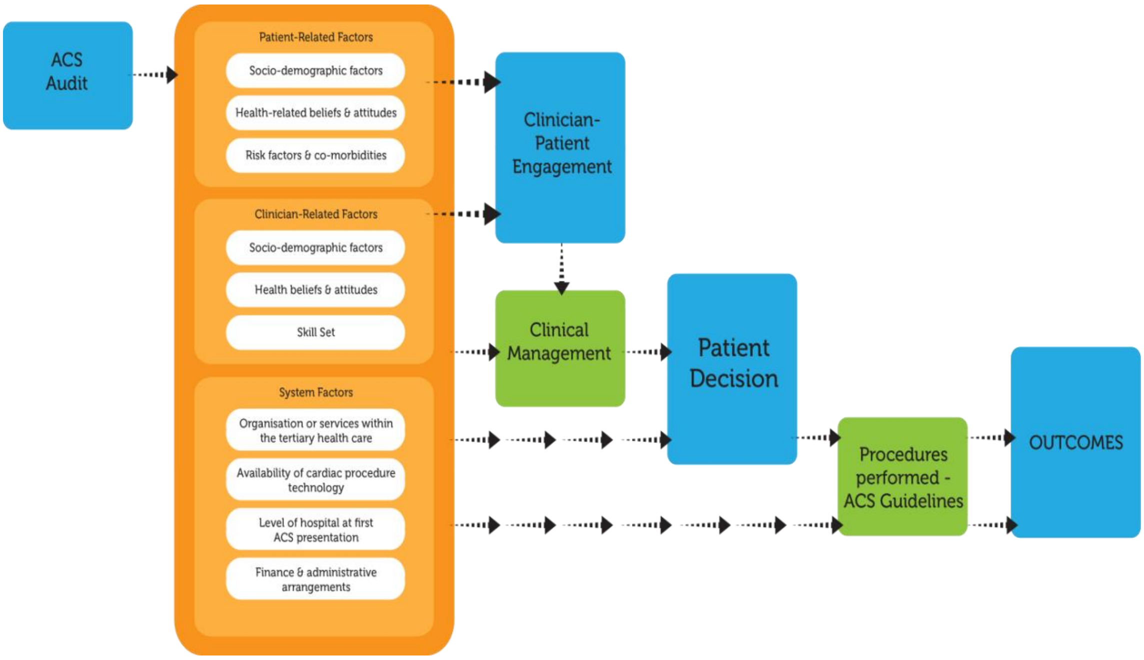

Figure 1.2 Conceptual model

Patient related factors that might influence engagement and decision making when receiving ACS care include socio-demographic variables (language, ethnicity, cultural orientation, socioeconomic position, education, age, gender, geography),(62, 63) clinical characteristics (disease burden and disease severity) and health beliefs and attitudes (community network and knowledge, previous tertiary health care experience).(20)

Engagement is multi-layered and is influenced by numerous factors. For example there are advantages to increased ACS care being provided acutely. However, with reduction in the duration of hospital care,(4) the opportunity to engage with the patient is limited by the associated reduction in the number of interactions. The engagement may also be influenced by the patient’s emotional and cognitive capacity to comprehend the potentially life-threatening situation they are in, when they are faced with acute illness. Kucia and Horowitz (2000) reported that patients had relatively poor recall while experiencing the stress (pain and anxiety) of an acute presentation, and this was more evident with women and patients with limited education.(62) Further, clinicians may have thought that they did a good job of engagement even though the patient had little recall of it.

Provider characteristics are hypothesised to influence the interface between patient and clinician. This includes CAD/ACS practice speciality (workforce skills), socio-demographic variables, health beliefs and attitudes (cultural competency, communication and approachability).

Characteristics of the tertiary care system in which treatment decisions are made include: the availability of cardiac procedure technology, organisation of services, decision-making process of the local practice teams, and access to facilities required to conduct procedures.(4) The finance and administrative issues surrounding how services are funded influence health care delivery and must also be considered.(58) There are system factors that may unintentionally result in a disparity of treatment for some groups. For example, under-servicing in remote areas disproportionately affects Indigenous people, simply because they are more likely than other Australians to live there.(61)

Patient-related factors, clinician-related factors and system factors influence the clinician-patient interaction (engagement) and in turn clinical management. The clinician-patient encounter occurs in a highly structured transactional space, in which the behaviour of both parties is determined by socialised expectations.(64) This conceptual model provides a simplified representation of temporal ordering and the hypothesised interrelationships between the different variables that may impact on guideline-concordant care and clinician-patient engagement for the management of ACS. The model does not specifically address some of the complexities and inter-relationships of the health care system between all stakeholders.

An epidemiological framework will be used to measure selected features of health care accessed, to identify co-morbidities that may impact on presentation, the care process and the outcomes in a cohort of Indigenous and non-Indigenous adults presenting to hospital with ACS. A descriptive content analysis will be used to present the findings from the patient medical records to understand clinician-patient engagement.

1.5 Thesis overview

This thesis consists of four chapters (Figure 1.3).

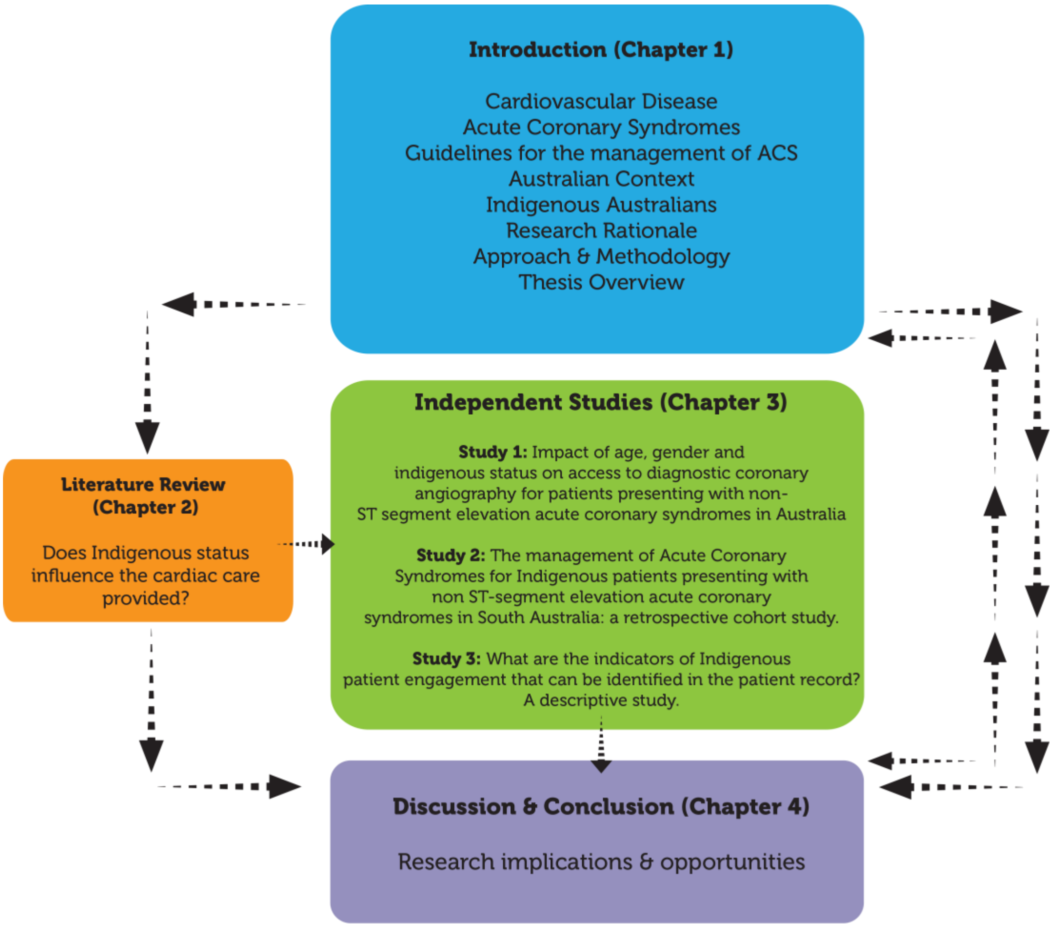

Figure 1.3 Structure of thesis

In Chapters 1 and 2, I will situate the research program through examining the related literature. Chapter 2 provides an analysis of the literature regarding ACS in terms of prevalence, incidence, treatments and case fatality and their effects on Indigenous Australians.

In Chapter 3, I present the results of three separate complementary studies that explore the influence of Indigenous status on ACS care in Australia; Study 1: National ACS Registry multi-centre prospective audit research; Study 2: Retrospective cohort study in South Australia that examines ACS guideline concordance; and Study 3 explores the appropriateness of using medical records to identify indicators of clinician-patient engagement. The studies suggest possible explanations for the disparities witnessed between Indigenous and non-Indigenous Australians. Two studies are quantitative and the other one is qualitative. The studies are presented in a scientific journal format of background, methods, results, discussion and conclusion. Each study is independent and contributes to providing important insights for understanding the connection of guideline concordance and patient-clinician engagement.

Chapter 4 contains an overall discussion of the main findings, includes reflective evaluations of the study program and describes implications from each study in terms of their relevance to policy makers, practitioners and researchers.

1.6 Summary

Australia is a rich and prosperous country that has a highly skilled health workforce with access to acute cardiac services, and has advanced health infrastructure and technology. So why do Indigenous Australians continue to experience relatively poor health compared to other Australians? Current research suggests that Indigenous patients who present to hospital with an acute cardiac event, may face barriers to care due to their Indigenous status. In this research I seek to explore whether access to cardiac care and clinician-patient engagement is influenced by Indigenous status and to identify opportunities for reducing the ‘gap’ in life expectancy between Indigenous and non-Indigenous Australians.

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2. Literature review

'I think there is a major role in research looking at better ways of actually trying to solve this problem.'

Dr Arnold 'Puggy' Hunter(1)

2.1 Introduction

The Australian health care system is funded and administered by different levels of government. Funding is reportedly directed to provide services to the population through the life course to promote, maintain and restore health and may be delivered through a variety of methods.(2) The multiplicity of services can be categorised into three care sectors: primary, secondary and tertiary. Primary care is often the first point of consultation for patients, it is where the majority of health issues are identified and addressed.(3) Secondary care is usually provided by medical specialists and other health professionals after referral by a primary care physician,(2, 3) and tertiary care is generally preserved for hospital in-patients requiring advanced medical investigations and treatments. The tertiary health care sector focuses services on people who need urgent medical or surgical care, patients returning for further acute care and those who are waiting to be admitted.(2) In 2011–12, health expenditure in Australia was estimated at $140.2 billion, or 9.5% of gross domestic product (GDP), compared with $82.9 billion in 2001–02 and $132.6 billion in 2010–11.(4)

In 2010 it was reported that almost 80% of health expenditure was allocated to hospitals (40.4%) and primary health care services (38.2%).(4) Expenditure is allocated to a multitude of health providers resulting in a plethora of services across many levels, from public health and preventive services in the community, to primary health care, emergency health services, hospital-based treatment, and rehabilitation and palliative care. Each sector makes an important contribution to illness prevention, diagnosis, treatment and management of the health and wellbeing of its consumers, but not in equal measure.(4) Australians experience one of the highest life expectancies in the world; however this is not shared by all Australians. Indeed inequalities in health continue to exist for many population groups, in particular for Indigenous Australians. In order to achieve equitable, coordinated and integrated health care services, it is essential that all three sectors of health care are efficiently linked to provide a continuum of care for patients.

This research focuses on the health care provided to Indigenous Australians who are admitted to hospital (tertiary) for acute coronary syndrome (ACS) and seeks to assess whether being an Indigenous person influences the health care accessed. The excessive burden of illness and mortality experienced across the life course by Indigenous Australians is well documented;(5-14) hence gaining insights into the accessibility and effectiveness of tertiary healthcare may improve our understanding of how to care best for this high-risk population.

The introductory chapter provided a context for understanding the history of research into cardiovascular disease, in particular, vulnerable plaque build-up in the coronary arteries and the current understanding of the application of ACS guidelines in Australia. This chapter will provide an analysis of the literature on ACS as this affects Indigenous Australians in terms of prevalence, incidence, treatments and case fatality.

The structure of this literature review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement.(15) The format includes a methods description followed by results that are summarised in graphs, tables and in text. The focus has been to undertake a critical analysis and synthesis of the literature that is, a detailed examination of methods, results and discussion. This approach identifies gaps in knowledge in current research and suggests areas for further investigation and a framework to appropriately position new research.

2.2 Research question

When Aboriginal and Torres Strait Islanders present with non-ST-elevation acute coronary syndrome (NSTEACS) at a tertiary hospital in Australia, does Aboriginal and Torres Strait Islander status influence the cardiac care provided?

2.3 Aims

This systematic review aimed to identify and synthesise relevant peer-review literature concerning Indigenous Australians and ACS. The questions for investigation were:

1. How are Indigenous Australians defined when they are diagnosed as high-risk NSTEACS?
2. What characteristics describe ACS in Indigenous Australians?
3. What are the factors that may influence whether Indigenous Australians receive ACS guideline-concordant care?

2.4 Methods

The initial literature searches for this review were conducted in October 2013. The search was periodically updated, with the final update taking place in December 2014. The systematic search was done with the guidance of an academic librarian at the University of South Australia and the eligibility for inclusion was co-assessed independently by a Postdoctoral Research Fellow.

2.4.1 Eligibility criteria

Eligible studies were limited to original research on humans and were included if they met all the criteria as follows:

1. They were published in English.
2. Aboriginal and Torres Strait Islander Australians were stated as the study population (either as the primary participants, or as a sub group or a comparative group).
3. Publication occurred between 1990- 2014.
4. Publication was in a peer-reviewed journal with one of the ACS diagnosis (myocardial infarction (heart attack, myocardial ischemia), angina (angina pectoris, angina stable), acute coronary syndromes and coronary disease (coronary artery disease and ischaemic heart disease) stated.

Studies concerning cardiac rehabilitation, chest pain, blood pressure, rheumatic heart disease and heart failure were excluded, as were abstracts, conference presentations, commentaries and narrative approaches (reviews, editorials, essays and letters). Consensus position statements, reviews (literature reviews), clinical guidelines and, study protocol were also excluded. Measurement studies that were concerned primarily with developing diagnostic measurement instruments or pharmacological treatments were excluded. Other Indigenous populations (such as Maori, Canadian Aboriginal, Native Hawaiian, Pacific Islander); multi-ethnic populations (Caucasian European, South Asian, Latinos) or if ethnicity was not defined (Southern European, Amerindian) within the study were also not included.

The remaining eligible articles were allocated to one of four geographical categories. The following categories were selected on the assumption that there may be a difference based on geography, especially between urban and rural/remote areas.

1. National Profile: defined as investigating the national health profile of Indigenous Australians with the non-Indigenous population as the comparative reference (e.g. multi-centred sites, access to national health profile data).
2. State and Territory Profiles: defined as investigating an Indigenous population from an Australian State and/or Territory (e.g. state linked database including hospital administrative data and death registry).
3. Urban: studies that describe a metropolitan population (e.g. from capital cities such as Perth, Adelaide, Darwin). The sample consists of Indigenous Australians who have been identified as living in an urban setting. The comparison group is made up of non-Indigenous metropolitan residents.
4. Rural, regional or remote: studies that target rural and/or remote populations (e.g. from towns such as Alice Springs, Katherine and Kalgoorlie). The comparison groups are either non-Indigenous patients, metropolitan populations or patients transferred to a metropolitan tertiary hospital.

2.4.2 Data sources

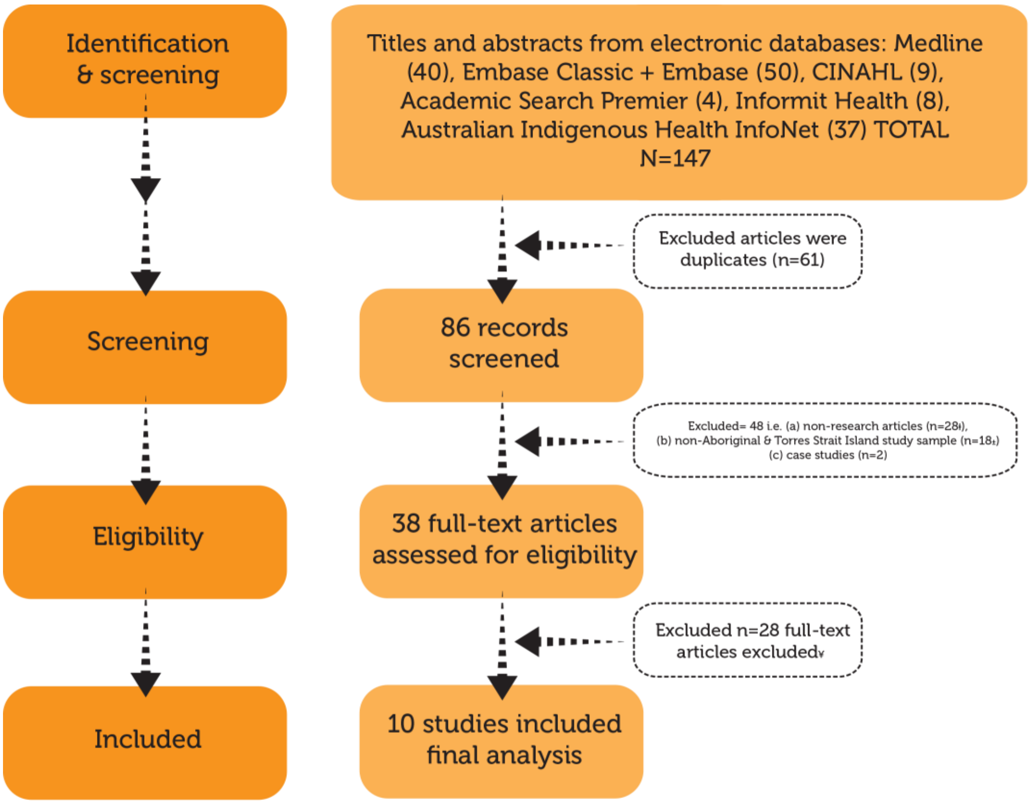
A systematic search of seven databases was conducted and included: Medline, Embase Classic + Embase, CINAHL, Academic Search Premier, Informit Health and Australian Indigenous Health *InfoNet*. Table 2.1 outlines databases searched using key terms in the publication title, abstract, subject headings and keys words. The search was augmented with a further manual title search of the references lists of the eligible articles.

Table 2.1 Databases and search terms

Database	Disease*	AND	Population*	Limits
Medline (R)	Myocardial infarction OR angina OR acute coronary syndromes OR coronary disease OR coronary artery disease OR ischaemic heart disease OR angina pectoris OR angina stable or myocardial ischemia.		Indigenous Australian OR Indigenous Australia* OR Indigenous populations OR Oceanic ancestry group Australia.	Abstracts, All Adults (19 plus years); Human; English Language; journal article.
Embase Classic + Embase	Myocardial infarction OR heart infarction OR coronary artery disease OR ischemic heart disease.		Indigenous Australian OR Indigenous Australia* OR Aborigine* OR Indigenous populations OR Oceanic ancestry group OR Australia.	Abstracts, Adults (18-64 years & 65+ years); Human; English Language; Exclude MEDLINE journal.
CINAHL	Myocardial infarction OR angina OR angina pectoris OR acute coronary syndrome.		Indigenous Australians OR Indigenous Australia* OR Aborigine*.	Abstract available, English Language, Australia and New Zealand, Peer Reviewed, All Adults, Human, academic journals.
Academic Search Premier	Myocardial infarction OR angina OR acute coronary syndrome.		Indigenous Australian OR Indigenous Australia* OR Aborigine*	English, Scholarly (Peer Reviewed) Journals, Human.
Informit Health	Myocardial infarction OR angina OR acute coronary syndrome.		Indigenous Australia* OR Aborigine*.	
Australian Indigenous Health *InfoNet*	Heart attack OR angina OR coronary heart disease OR ischaemic heart disease.			Journal

2.4.3 Study selection

Figure 2.1 is a flow chart of the literature review process. A total of 147 articles were regarded as suitable for the initial screening process, which was undertaken in two stages commencing with the removal of duplicates (n=61). The second stage resulted in the exclusion of 46 articles as they were either not peer reviewed (n=7), were not research articles (n=21) or did not include Aboriginal and Torres Strait Islander Australians in the study population or sub population (n=18). A total of 38 articles met the eligibility assessment criteria. The final stage of the review process was a detailed process that involved a systematic review and categorisation of articles.



ł A non-research article was defined as not peer reviewed, the keys words did not appear in the article title or abstract, were not a research article i.e. was an opinion piece, consensus statement, essay, conference abstract, review (literature review), clinical guidelines, editorial, letter to the editor, study protocol, book chapter.

± If the document did not include Aboriginal and Torres Strait Islander Australians in the study population or sub population they were excluded.

¥ Eligibility was co-assessed independently by a Post Doctorate Research Fellow in which there was agreement on 9/10 (90%) the articles to progress to final analysis. The reviewers teleconferenced to discuss the outcome of the two outstanding articles. After a discussion on the inclusiveness of the topic, consensus was reached to include the papers.

Figure 2.1 Flowchart of literature review process.

The abstract and/or full text of the remaining 38 articles was read to determine final eligibility for inclusion. The reference lists of articles reporting eligible studies were reviewed manually to identify any additional studies that may have been missed during the electronic search. Additionally, citations included in the reference lists of ineligible review articles were also searched manually. After reviewing the abstract and/or full text, 10 articles were excluded because they did not meet the criteria or were case reports (n=2), or reported prevalence, incidence or mortality rates of AMI or IHD with no reference to cardiac care accessed (n=14), or the study did not stratify the sample cohort by Indigenous status (n=1), or tested a measurement index (n=1)(Table 2.2).

2.4.4 Data extraction

Using a pre-determined template, data was abstracted from the full text of eligible studies. Data included information regarding year of publication, study design and year/s of data collection, sample size and study setting and population, outcome measure/s or case definitions, main study findings, reported statistics and adjustment variables (Table 2.2).

2.5 Results

2.5.1 Study characteristics

A summary of the characteristics of studies on Indigenous Australians identified with myocardial infarction, coronary artery disease, angina and or acute coronary syndrome is outlined in Table 2.2.

Table 2.2 Characteristics of studies on Aboriginal Torres Strait Islander peoples identified with myocardial infarction, coronary artery disease, angina and or acute coronary syndrome

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
National Profile					
1	Cunningham, J.(16) (2002), retrospective hospital-based analytical cohort, (July 1997-June 1998). Data source: National Hospital Morbidity Database (NHMD).	N=4,867,368.00 (Indigenous=110,992; non-Indigenous=4,756,376). Diagnosis recorded as acute in public and private hospitals Australia wide.	Recorded principal procedure for treatment of principal diagnosis. Circulatory Indigenous n=5,839.	Compared with non-Indigenous patients, the likelihood of Indigenous patients having a principal procedure[1] recorded was: *lower* if they • they had a circulatory diagnosis • attended a public hospital *similar* if they attended a private hospital	OR 0.53 (0.50-0.57)[2] 0.67 (95% CI 0.66-0.68)[2] 0.53 (95% CI 0.50-0.57)[3]
2	Ranasinghe, I., et al.,(17)(2009), retrospective multicentre hospital-based clinical audit cohort, (Jan 2003-Aug 2005). Data source: Heart Protection Partnership Study (HPPS) i.e. in-hospital clinical notes.	N=2,380 (Indigenous =199; male=133, female=66; non-Indigenous=2,174, male=1,466, female=708). Patients admitted with chest pain (cardiac in origin) at 27 interventional and non-intervention cardiac centres in five states.	Patient characteristics. Investigations, procedures and admission.	Compared with non-Indigenous patients, Indigenous patients were younger: *less* likely to: • have private health insurance • be admitted to an interventional facility • have a cardiologist as primary physician • have had a prior Percutaneous Coronary Intervention (PCI) *more* likely to:	58.7 years vs. 64.6 years; P<0.001[4] 12.4% vs. 23.7%; P<0.001[4] 26.6% vs. 47.0%; P<0.001[4] 21.4% vs. 64.5%; P<0.001[4] 1.5% vs. 5.9%; P<0.010[4]

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[1] Only separations of patients whose episode types was recorded as acute (as opposed to rehabilitative, palliative or other care) were included. Separations for dialysis visits (ICS-9-CM code V56) were excluded, as this code is based on procedure rather than diagnosis.

[2] Adjusted for gender, age, place of residence, same-day admission, patient accommodation, hospital category and area of residence. Data from the Australian Capital Territory not included.

[3] Adjusted for gender, age group, same-day admission, and place of residence.

[4] Unadjusted (crude) rates; mean age years.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				• be current smokers • have diabetes • have higher rates of ST-elevation myocardial infarction (STEMI). • have higher rates of angina • experience longer delay time to initial troponin For investigative procedures Indigenous patients were: • *more* likely to have an exercise stress test (EST) • *less* likely to have an echocardiogram. Times to presentation and administration of other tests and procedures were similar.	39.7% vs. 20.8%; P<0.001[4] 33.2% vs. 20.7%; P<0.001[4] 26.1% vs. 21.7 %; P<0.001[4] 16.5% vs. 6.2%[4] 57.09 min (95% CI 47.93-68.00) P<0.001[5] OR 2.37 (95% CI 1.49-3.78), P<0.000[6] 0.51 (0.32-0.79); P=0.003[5]
State or Territory Profiles					
3	Coory, MD. and Walsh, WF.(18) (2005), retrospective hospital-based analytical cohort, (1998-2002). Data source: Queensland (Qld) hospital administrative data.	N=14,683 (Indigenous=558; non-Indigenous =14,125). Admitted to QLD public hospitals with principal diagnosis of first-ever acute myocardial infarction (AMI).	Patient characteristics. Coronary revascularisation i.e. PCI and bypass surgery.	Compared to non-Indigenous patients, Indigenous patients were: • younger *more* likely to: • be female • live remotely • have comorbidities ○ diabetes	 54 years vs. 68 years[7] 43.4% vs. 35.7%[8] 23.8% vs. 1.6%[8] AOR 2.49 (95% CI 2.17-2.86)[9]

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[5] Mean time. Adjusted for age, gender, private insurance, transfer from outlying hospital, care by cardiologist, intervention-enabled site, region (QLD, NSW, VIC, other), cardiac risk factors (hypertension, hyperlipidaemia, family history, obesity, current smoker, ex-smoker, diabetes), prior cardiac history (prior AMI, heart failure, angina, unstable angina, arrhythmia, prior PCI and CABG) and significant co-morbidities (TIA/Stroke, PVD, AAA, COPD, renal impairment, major bleeding, major liver disease, malignancy) as well as the discharge diagnosis (STEMI, NSTEMI, UA, angina, atypical CP and other).

[6] Adjusted for aged, gender, cardiac risk factors, past cardiac history, co-morbidities, admission by transfer, intervention enable site, private under care of cardiologist, region and discharge diagnosis. In comparison with referent non-Indigenous population.

[7] Mean age.

[8] Unadjusted (crude) rates.

[9] Age-adjusted using a generalised linear model with a binomial distribution and log link. Aged standardised to the age distribution of the Indigenous cohort (mean age, 54 years).

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				○ chronic renal failure *less* likely to: • survive 12 months after hospital discharge • undergo PCI during the index admission • undergo PCI for subsequent admission • undergo all revascularisations • undergo a coronary procedure if a patient had a least one comorbidity within 12 months comorbidity. Bypass surgery rates were similar among the Indigenous and the non-Indigenous cohort.	2.52 (1.90-3.35)[9] 77.5% vs. 86.7%[10] RR 0.61 (95% CI 0.38-0.98); P=0.04[11] 0.72 (0.54-0.96); P=0.03[11] 0.78 (0.64-0.94); P=0.01[11] 0.59 (0.42-0.87)[11]
4	Lehman, S, et al.,(19)(2009), prospective hospital-based analytical study, (2000-2005). Data source: Flinders Medical Centre Cardiac Surgical Database i.e. hospital administrative data and in-hospital clinical notes.	N=2,635 (Indigenous=283; male=169, female=114; non-Indigenous=2,352; male=1,694, female =658). Patients undergoing cardiac surgery at a metropolitan specialist cardiac facility in South Australia (SA).	Patient characteristics. Operative (30-day) mortality and late mortality after coronary artery bypass grafting (CAGB) surgery.	Indigenous patients compared to non-Indigenous patients were: • younger. • younger when undergoing CABG. *more* likely to: • be female • have diabetes • have renal dysfunction • be a current smoker • previous cardiac surgery • have valvular surgery ○ single valve surgery ○ double valve surgery *less* likely to • undergo CABG	 47 years vs. 65 years[12] 52 years vs. 65 years; P<0.001[13] 40.3% vs.28.0%; P<0.001[13] 39.6% vs. 27.3%; P=0.001[13] 3.2% vs. 1.2%; P=0.009[13] 36.0% vs. 12.7%; P<0.001[13] 1.8% vs. 0.2%; P<0.001[13] 34.6% vs. 20.9%; P<0.001[13] 6.7% vs. 0.5%; P<0.001[13] 50.2% vs. 76.1%; P<0.001[13]

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[10] Age-adjusted survival by Indigenous status; estimated using proportional hazards model.

[11] Adjusted for age and gender and the following covariates: socioeconomic status, remoteness, characteristics of the hospital where the index admission occurred, and comorbid conditions.

[12] Mean age.

[13] Unadjusted (crude) rate.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				Of all patients aged less than 55 years, Indigenous patients were more likely to:	
				• have excess operative mortality	HR 6.90 (95% CI 1.42-33.50)[14]
				• experience late morality.	2.70 (1.55-4.67)[14]
5	Randall, DA., et al.,(20)(2013), retrospective analytical cohort study, (July 2000-Dec 2008). Data source: NSWAPDC	N=59,282 (Aboriginal=1,165, non-Aboriginal=58,117). Principal diagnosis of AMI or IHD.	Patient characteristics. Revascularization procedure (PCI or CABG).	Compared to non-Aboriginal patients, Aboriginal patients were:	
				• younger e.g. 25-54 years	56.3% vs. 20.1%[15]
				more likely to:	
				• be female	38.5% vs. 32.1%[15]
				• have diabetes with complications	8.4% vs. 5.5%; P<0.01[15]
				• be current smokers	51.4% vs. 26.6%; P<0.01[15]
				• have drug abuse recorded in hospital	3.6% vs. 0.6%; P<0.01[15]
				• live in socially disadvantaged areas	47.6% vs. 26.0%[16]
				• live in regional and remote areas	30.7% vs. 12.4%[17]
				• be admitted to hospital with fewer acute admissions i.e. <1,200	7.4% vs. 2.1%; P<0.01[18]
				less likely to:	
				• have private health insurance	54.6% vs. 84.3%; P<0.01[19]
				• be admitted to a major city hospital	26.1% vs. 59.0%; P<0.01[18]
				• be admitted to a hospital with on-site angiography facilities	56.4% vs. 73.5%; P<0.01[19]
				• be revasularised within 30 days	HR 0.63 (95% CI 0.57-0.70)[19]
				There was no significant disparity in revascularisation after adjusting for	

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[14] Adjusted for euroSCORE (the European System for Cardiac Operative Risk Evaluation).
[15] Unadjusted (crude) rate.
[16] Socio-Economic Indices for Areas (SEIFA) Index of Relative Socio-Economic Disadvantaged population quintiles bases on statistical local area of residence.
[17] Accessibility/Remoteness Index of Australia (ARIA+) based on statistical local area of residence or postcode or hospital.
[18] Unadjusted (crude) rates.
[19] Adjusted for age, gender, year of admission, and AMI type.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				comorbidities[20], substance use and private health insurance.	
6	Gausia, K., et al.,(21) (2014), retrospective analytical cohort study, (2000-2004).	N=1,717 (Indigenous=499; male=284, female =215; non-Indigenous=1,218; male=854, female =364).	Patient characteristics.	Compared to non-Aboriginal patients, Aboriginal patients were:	
				• younger	52 years vs. 64 years[21]
				more likely to	
	Data source: WADLS.	Principal diagnosis of ACS.	Prescription of at least three of the four evidence-based drugs at discharge. Evidence-based prescription (EBP) was defined as prescribing of aspirin, statin, and beta-blocker or angiotensin-converting enzyme inhibitor /angiotensin II antagonist (ACE Inhibitor).	• be female	40.8% vs. 26.7%; P<0.0001[22]
				• reside remotely	26.7% vs. 3.3%[22]
				• be diagnosed with MI	54.0% vs. 41.8%; P<0.0001[22]
				• be admitted to a metro teaching hospital	71.6% vs. 61.9%; P<0.0001[22]
				• be a current smoker	50.6% vs. 22.1%; P<0.0001[22]
				• have comorbidities e.g. diabetes	54.0% vs. 31.2%; P<0.0001[23]
				• have none of the EBP drugs prescribed.	10.8% vs. 7.1% ; P < 0.01[22]
				Factors that increased the likelihood of receiving EBP	
				• gender (being male)	OR 1.63 (95% CI 1.26-2.11)[24]
				• previous ACS admission	1.83 (1.39-2.42)[24]
				• comorbidity (diabetes)	1.36 (1.04-1.79)[24]
				Patients living in regional and remote areas, with a history of COPD were less likely to receive EBP.	OR 0.53 (0.40-0.72)[25]

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[20] Adjusted for comorbidities: diabetes mellitus without complications, diabetes mellitus with complications, congestive heart failure, chronic obstructive pulmonary disease, chronic renal failure, acute renal failure, cerebrovascular disease, pulmonary oedema, depression, cancer, peripheral vascular disease, dementia, cardiac dysrhythmias, and shock.

[21] Mean age.

[22] Unadjusted (crude) rate.

[23] There was a significant difference with a number of comorbidities, including hypertension (p<0.003), chronic kidney disease (p<0.0001), OCPD and/or asthma (p<0.0001).

[24] Adjusted for socio demographic variables (age, gender, rurality of residence, Aboriginal status, health insurance status), type of hospital (metro teaching, metro non-teaching, rural regional hospital, rural district/small hospital and private hospital) from which the patient was discharged, and a history of particular co-morbid conditions (history of HF, CKD, COPD and/or asthma, GI bleeding and diabetes) and Charlson comorbidity index (calculated excluding ACS, HF, COPD including asthma, CKD and Diabetes.

[25] Adjusted for socio demographic factors, hospital type and clinical comorbidities.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				There was no significant difference between Aboriginal and non-Aboriginal patients receiving EBP.	
Urban					
7	Bradshaw, PJ., et al.,(22)(2010), retrospective analytical cohort, (1980- Dec 2006). Datasource: Perth Aboriginal Atherosclerosis Risk Study (PAARS) Cohort from 1998-1999 adults living in Perth, WA was electronically linked to WA hospital mortality data. External comparisons of non-Aboriginal people were drawn from the Electoral Roll or the Perth Electoral District.	N=4,678 Probabilistic matching[26] reduced the study cohort n=311 (Aboriginal=182; non-Aboriginal=129) Admission for IHD including AMI and angina pectoris.	Patient characteristics. Coronary revascularisation.	Compared to non-Aboriginal patients, Aboriginal patients were: - younger overall - younger when undergoing first PCI *more* likely to: - have diabetes - if female be younger at first IHD admission - if female undergo revascularisation - receive a CABG than a PCI as the first procedure *less* likely to - receive PCI - receive PCI with IHD admission. Aboriginal and non-Aboriginal patients admitted for ACS had similar rates of PCI as first procedure.	49.3 years vs. 52.3 years[27] 46.4 years vs. 52.8 years; P<0.001[27] 67% vs. 26%; P≤0.001[28] 51.2 years vs. 55.2 years; P<0.046[28] 43% vs. 18.5%[28] 40.5% vs. 23%; P=0.02[28] RR 0.76 (95 % CI 0.60-0.97)[28] 0.76 (0.61-0.95)[28]
Rural and Remote					
8	Ong and Weeramanthri.(23)(2000), retrospective analytical cohort (linked data), (Jan- Dec 1996).	N=122 (Indigenous=41, male=26, female=15; non-Indigenous=81; male=62, female=19).	Patient characteristics.	Compared to non-Aboriginal patients, Aboriginal patients were: - younger *more* likely to	45.6 years vs. 58.9 years; P<0.01[29]

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[26] Probabilistic matching of records was based on name, date of birth, gender and last known residential address.
[27] Mean age.
[28] Unadjusted (crude) rates.
[29] Mean age.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
	Data source: NT hospital separations database of admissions to a Top End Hospital; and a paper-based register of the Royal Darwin Hospital (RDH) Coronary Care/ Intensive Care Unit, a clinical audit of medical records and NT Death Register. Hospitals include RDH, Katherine Hospital, Gove District Hospital.	Admitted to hospital with AMI.	Thrombolytic therapy; time to treatment (median time), and prescribed medication.	• be female	37% vs. 23%[30]
				• have onset of AMI in a rural location	59% vs. 14%; P<0.01[30]
				• be evacuated to hospital by air	61% vs. 6%; P<0.01[30]
				• experience delay from onset of AMI to:	
				○ Emergency department.	10.00 hours vs. 3.26 hours; P<0.01[31]
				○ diagnostic electrocardiogram (ECG).	8.10 hours vs. 3.50 hours; P<0.01[31]
				○ diagnostic ECG in an urban area	17.44 hours vs. 3.19 hours; P<0.01[31]
				• be administered ACE inhibitors during admission	60% vs. 40%; P=0.03[30]
				less likely to:	
				• have symptoms typical of AMI	54% vs. 72%; P<0.05[30]
				• have a previous diagnosis of AMI	10% vs. 25%; P<0.05[30]
				• receive thrombolytic therapy prior to reaching hospital	3% vs. 67%; P<0.01[30]
				• receive thrombolytic therapy because presentation delay >12hrs.	48% vs. 19%; P<0.01[30]
				After adjusting for age, there was no significant difference between Indigenous and non-Indigenous for 28-day fatality.	
9	Brown, A.(24) (2010), retrospective analytical cohort study (multi method), (Jan 2001-Dec 2002).	N=492 (Indigenous=214, male=122, female=92; non-Indigenous=278, male=194, female=84).	Patient characteristics. (1) all-cause mortality; (2) coronary intervention, (3) cardiac rehabilitation (CR), and (4) delivery of evidence-based care (EBC) across the continuum.	Compared to non-Aboriginal patients, Aboriginal patients were:	
				• younger	50.1 years vs.59.3 years; P<0.001[32]
				more likely to:	
				• be female	43% vs. 30.2%[33]
				• have existing CVD risk factors e.g. hypertension	62.1% vs. 45.0%; P<0.001[33]
				• have comorbid chronic disease e.g. diabetes	55.6% vs. 30.2%; P<0.001[33]

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[30] Unadjusted (crude) rates.
[31] Median time and unadjusted (crude) rates.
[32] Mean age.
[33] Unadjusted (crude) rate.

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
	Data source: The Central Australian Secondary Prevention of Acute Coronary Syndromes Study (CASPA) NT hospital patient information, clinical databases and primary care information systems were interrogated for evidence of outcomes of interest; and linked to national mortality data linkage systems (NDI).	Patient with ACS or complication post MI.		• be NSTEACS high-risk	65.9% vs. 49.3%; P<0.001[33]
				• experience ACS onset in a rural location	47.7% vs. 8.0%; P<0.001[33]
				• present for treatment greater than 12 hours	28.5% vs. 17.1%; P<0.002[33]
				• seek immediate care at a rural or urban a primary health care centre	43.9% vs. 9.0%; P<0.001[33] 43.9% vs. 9%; P<0.001[33]
				• die within two years of: ○ any cause ○ cardiovascular event	 30% vs. 17.8%; P<0.002[33] 17% vs. 9.9%; P<0.026[33]
				• be prescribed ACE inhibitor or angiotensin-receptor blocking agent (ARB) on discharge	65.7% vs. 55.8%; P=0.033[33]
				less likely to:	
				• present at directly to ○ general practice ○ emergency department	 0% vs. 7.2%; P<0.001[33] 29% vs. 57.9%; P<0.001[33]
				• undergo angiography	36.2% vs. 47.6%; P=0.012[33]
				• receive in-patient cardiac rehabilitation	8.9% vs.15.8%; P< 0.03[33]
				• be discharged on lipid lowering therapy	44.8% vs. 57.8%; P=0.006[33]
				• achieve clinical targets for HDL (1.0mmol/L) at 6-mths	37.9% vs. 68.4%, P=0.039[33]
				• achieve clinical targets for HDL (1.0mmol/L) at 12-mths.	23.7% vs. 79.3%; P<0.001[33]
				There was no difference between Indigenous and non-Indigenous patients receiving PCI or CABG. 62.7% of Indigenous attended their nominated primary health care provider more than once in two years after discharge Thematic analysis of the interviews identified significant barriers to care across the continuum e.g. deprivation, poor communication, perceived racism, invisibility etc.	
10	Hurune, PN., et al.,(25) (2013), retrospective analytical audit study, (June 2009-May 2010).	N=268 (Aboriginal=108; male=44, female=64; non-Aboriginal=150; male=98, female=52).	Patient characteristics. Diagnosis of CAD in the 24 months after EET.	Compared to non-Indigenous patients, Indigenous patients were:	

#	Author, Year, and Study Design and Study Year and Data Source	Sample Size, and Setting	Outcome measure/s or case definition	Main study findings	Reported Statistics
				• younger	45.7 years vs. 51.0 years; P=0.004[34]
				more likely to:	
	Data source: Alice Springs Hospital administrative data and in-hospital clinical notes.	Patients with suspected coronary artery disease CAD who underwent Exercise Electrocardiography Testing (EET).	Diagnosis based on coronary angiography and/ or admission for ACS.	• be female	59.3% vs. 34.7%; P<0.001[35]
				• have one or more chronic diseases	OR 2.0 (95% CI 1.1-3.7)[35]
				○ diabetes mellitus	5.9 (3.3-10.7)[35]
				○ chronic kidney disease	12.2 (4.1-36.1)[35]
				• have inconclusive EET results	52.8% (42.9%-62.5%); P<0.001[35]
				• have negative EET results.	41.7%, (32.3%-51.5%); P<0.001[35]
				Factors associated with an inconclusive test result were:	
				• One or more chronic disease	OR 6.0 (95% CI 2.5-14.1)[35]
				• Indigenous status.	3.7 (2.1-6.6)[36]
				A patient with a positive EET result was more likely to:	
				• proceed to coronary angiography	21/34; P<0.001[35]
				• present to hospital with chest pain within two years.	11/28; P=0.001[35]
				The effects of EET results moving from negative to inconclusive to positive for patients and were more likely to present with:	
				• an ACS within 24 months	OR 4.4 (95% CI 1.4-14.0)[35]
				• chest pain within 12 months; and	2.0 (1.3-3.1)[35]
				• represent with chest pain within 24 months.	2.0 (1.3-2.9)[35]
				Indigenous patients were less likely to proceed to angiography and more likely to present with ACS in the following two years however neither difference was statistically significant.	

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[34] Median age.

[35] Unadjusted (crude) rate.

2.5.2 Initial observations

Over the past decade the number of studies into pathophysiology, diagnosis, treatment and management of ACS in Australia has increased.(9, 10, 14, 26-42) Since the introduction of the Australian Guidelines for the Management of ACS in 2006, and its amendments in 2007 and 2011,(43, 44) there has been an increase in the number of research publications, looking at this issue, which include Aboriginal and Torres Strait Islander people.

2.5.3 Indigenous status

The inclusion criteria and search terms specified that Aboriginal and Torres Strait Islander Australians were the study population (either as the primary participants, a sub group, or a comparative group). The studies that categorised the study population as Indigenous did not specify whether they were Aboriginal or Torres Strait Islander. This research adopted the definition applied by the Australian Institute for Health and Welfare (AIHW) of 'Indigenous Australians as referring to Aboriginal people, Torres Strait Islanders and persons of both Aboriginal and Torres Strait Islander decent.'(45)

In 2011-2012 approximately 88% of Indigenous patients admitted to public hospitals were correctly identified as Indigenous, with the term being used to refer to Australian Aboriginal and Torres Strait Islander people,(46) suggesting that under-identification may be problematic. The reason for the under-identification of Indigenous patients in health data lie outside the scope of this thesis. Undercounting can be problematic in regard to data extraction from administrative health databased that is, national, state-linked or hospital sources. There may be a degree of variability between the studies on the reliability of Indigenous status being accurately recorded, although there were several studies that suggested confidence in the level of accurate recording of Indigenous status. For example, the study from the Western Australian state-linked database took into account the estimated 5-20% under-identification of Aboriginality.(47) In addition, there were two databases that was specifically designed for an identified 'Indigenous' specific research project, that is, the Perth Aboriginal Atherosclerosis Risk Study (PAARS)(22) and the Central Australian Secondary Prevention of Acute Coronary Syndromes (CASPA).(24)

2.5.4 Publication year and frequency

From 2000-2014 there were 10 publications specific to Indigenous Australians that met the inclusion criteria for this review. In 2000, Ong and Weeramanthri published the first study that described the differences in presentation and management of Indigenous and non-Indigenous patients hospitalised with acute myocardial infarction (AMI).(23) In 2002 and 2005 two articles were published that reported on the in-hospital interventional procedures provided to Indigenous Australians, specifically percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG) and valve procedures.(16, 18) Both articles described the associated lifestyle risk-factors, such as smoking, as well as comorbid conditions such as diabetes. During 2009-2014 there was a substantial 70% increase in publications, with seven additional articles comparing Indigenous and non-Indigenous Australians in this context.

2.5.5 Data sites

Of the 10 publications that met the inclusion criteria half (50%) of the studies were from Western Australia (n=2) and Northern Territory (n=3). There were no reported studies from Victoria, Tasmania and Australian Capital Territory (Figure 2.3).

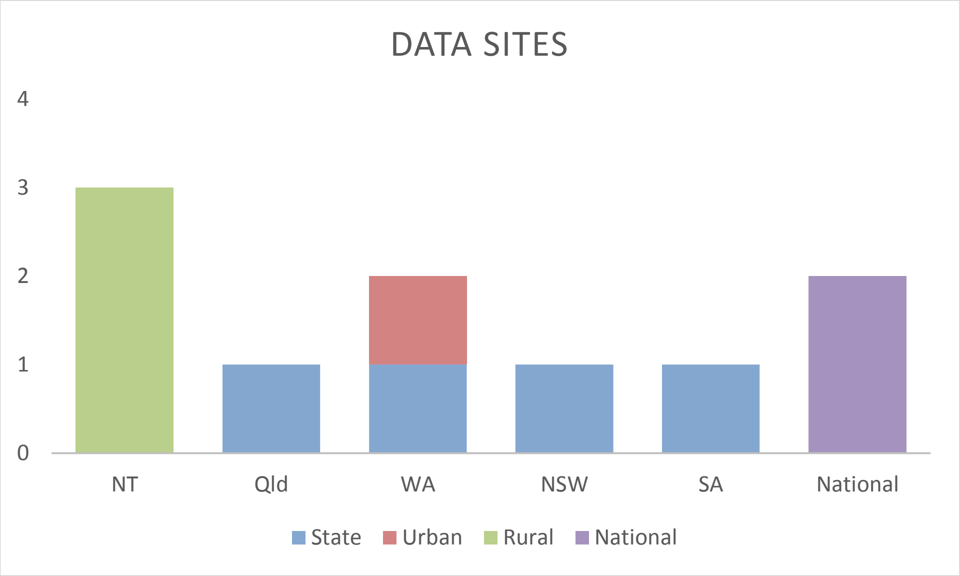

Figure 2.2 Data sites for the Indigenous studies

2.5.6 Data source

One study used nationally collected data from the National Hospital Morbidity Database, which included data from all States and the Northern Territory. Half (50%) of the publications reported on data extracted from either a state or territory linked dataset[36] or hospital administrative data that was linked to state mortality data, while the remainder were from unlinked hospital administrative data and in-hospital clinical records[37]

All studies were descriptive. There was one prospective study and nine articles were based on retrospective studies. The descriptive studies described patterns of disease occurrence with variables such as person, place and time from correlation studies, case reports, and cross-sectional surveys of individuals.

2.6 Analysis of literature

The literature was reviewed as categorised into independent variables (exposure) and also in relation to the influence of these exposures on guideline concordant care (the outcome of interest), as illustrated in Figure 2.4.

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[36] Western Australian Data Linkage System (WADLS): Hospital Morbidity Data Collection (HMDC) and mortality dataset and the NSW Admitted Patients Data Collection (APDC) and the NSW Register of Births, Deaths and Marriages (RBDM).

[37] Data was extracted from Hospital Administration datasets, separation data and/or purposefully extracted by employed researchers.

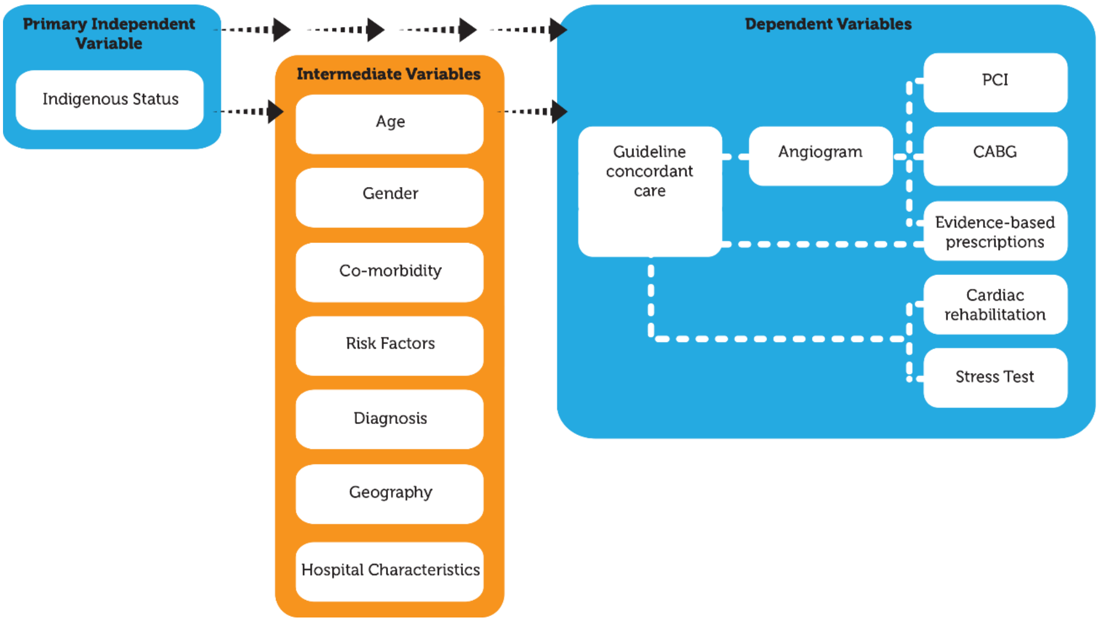

Figure 2.3 Systematic review of independent variables and their association with receiving guideline-concordant care

2.7 Indigenous status

2.7.1 Sample size and study design

The studies reviewed described treatment provided to ACS patients when admitted for an acute and/or secondary cardiac event. In each study, Indigenous participants were the group of interest and non-Indigenous participants served as the comparison group. The ten descriptive cohort studies summarised in Table 2.3 provided a total Indigenous sample size of 114,241, and were used to investigate the association between Indigenous status and guideline concordant care. Ninety seven percent of the sample (n=110,992) was extracted from the National Hospital Mortality Database; of which 5,839 Indigenous patients had a principal diagnosis as *Circulatory*, four studies were drawn from state-linked health databases (n=2,222; including 1 from WA, 1 from Queensland and 1 from NSW) and the remaining sample was derived from population-based research projects (n=1,027). Nine studies were retrospective, including a mixed method study that provided a thematic analysis on the barriers to care across the continuum, and there was one prospective cohort study.

The studies were categorised into one of three research themes and then reviewed as a cluster. A schematic representation of the critical review process is illustrated in Figure 2.5.

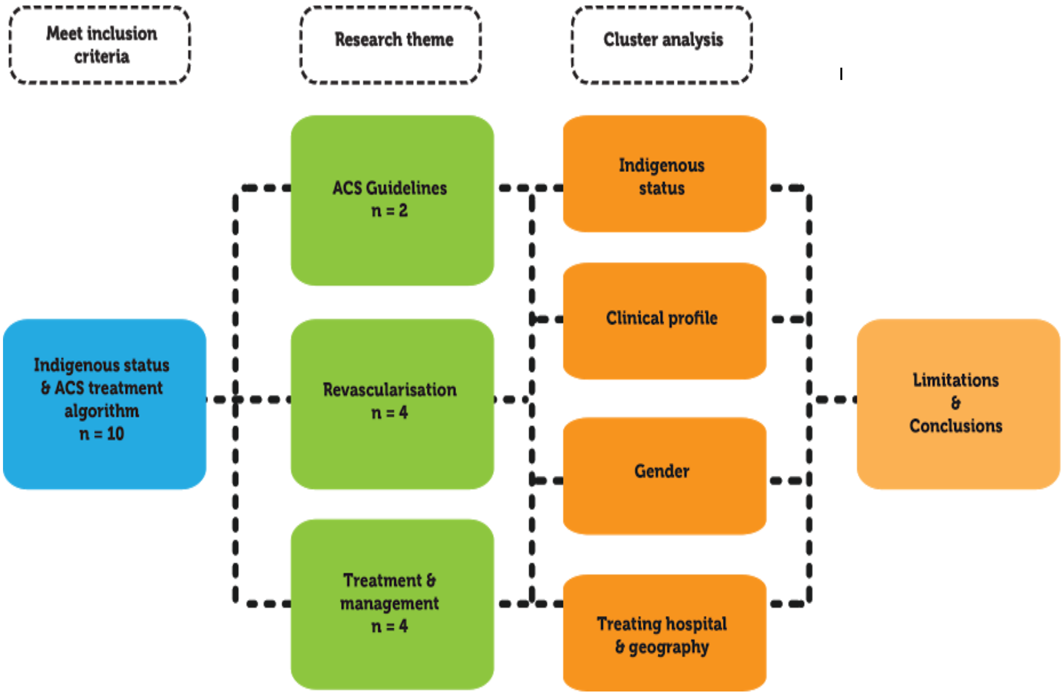

Figure 2.4 Systematic analysis of articles meeting the inclusion criteria

Of the ten studies, the primary objective of two studies was to examine the association between Indigenous status and ACS treatment and management,(21, 24) four studies focused explicitly on the disparity in relation to coronary revascularisation procedures and cardiac surgery,(18-20, 22) while the remaining four studies described treatment and management of patients when admitted to hospital for a cardiac event.(16, 17, 23, 25)

Table 2.3 A summary of the 10 reviewed articles and the ACS treatment and management strategies.

Area of research and cluster for analysis	Author(s)	Indigenous (% study sample)	Guideline Concordant Care						Case fatality
			Investigation for diagnosis	Angiogram	PCI	CABG	Stress Test[38]	EBP	
ACS treatment and management	Brown, A.(24)	214 (43.5)	↓present to ED, ↑ present > than 12 hrs, ↓cardiac rehab	↓	=	=	↓		
	Gausia, K, et al.,(21)	499 (29)						=	
Revascularisation & cardiac surgery	Coory, MD. & Walsh, WF.(18)	558 (3.8)			↓[39]	=			
	Lehman, SJ., et al.,(19)	283 (10.4)				↓			↑operative & late mortality[40]
	Randall, DA., et al.,(20)	1,165 (2)			↓[41]				
	Bradshaw, PJ., et al.,(22)	182 (59)			↓[42], =ACS	↑			
Treatment & management	Ong & Weeramanthri.(23)	41 (51)	↑delay to ED & ECG					=	=
	Cunningham(16)	110,992 (2)	↓to record procedure in public hospitals						
	Ranasinghe, I., et al.,(17)	199 (8.4)	= time to presentation				↑		
	Hurune, PN., et al.,(25)	108 (40)					↑inconclusive & ↑negative		

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[38] Including inpatient cardiac rehabilitation.
[39] ↓PCI for index and subsequent admission.
[40] <55 years.
[41] Revascularised within 30 day, revascularisation procedure not reported.
[42] ↓IHD admission.

2.7.2 Indigenous status and ACS management guidelines

Two studies describe the association of Indigenous patient outcomes with ACS guideline-concordance. The two descriptive cohort studies that examined the care provided to Indigenous patients diagnosed as high-risk NTEACS, comprised a sample of 713 (non-Indigenous n=1,496). The studies described similar patient profiles with Indigenous patients being younger (mean age 51 years and age difference of 10.5 years), more likely to be female, have high-risk NTEACS, have an existing comorbid condition (diabetes) and be a current smoker compared to non-Indigenous patients.(21, 24) Each study focused on different treatment and management strategies, outlined in the national ACS guidelines, and there was some overlap and divergence of the reported findings.

The first ever specific Indigenous ACS study was based in Central Australia. It used mixed methods to quantify clinical measures and elicited a rich narrative on the patient journey. Brown (2010) reported that Indigenous patients were more likely to be high-risk NSTEACS ($P<0.001$) and less likely to present to the emergency department ($P<0.001$); albeit when they did present there was an average delay of greater than 12 hours ($P<0.002$).(24) Brown identified that once admitted, Indigenous patients were less likely to receive the recommended guideline strategies of access to angiography ($P<0.012$), and receiving in-patient cardiac rehabilitation or a stress test ($P<0.03$), while there was no difference between Indigenous and non-Indigenous patients receiving PCI and CAGB.(24)

This study was embedded into a larger research project, called the Central Australian Secondary Prevention of Acute Coronary Syndromes (CASPA). CASPA was designed to develop a system of data collection, examine clinical outcomes, investigate the systematic provision of health care for Indigenous and all remote patients, and reduce the disparity of cardiovascular health outcomes.(24) Brown purposefully designed the study to investigate a high-risk NSTEACS cohort; however results were not reported by gender.

Brown interviewed 110 Indigenous patients (or their next-of-kin), providing a rich descriptive insight into the patient journey. It highlighted factors that may influence patient presentation, impact in-hospital care; and subsequently influence referral and uptake of secondary care. Key themes arising from the interviews were poor communication, being treated disrespectfully, feeling invisible when requiring assistance (especially in relation to pain relief), perceived racism, families being excluded from patient care, a clash of understanding, fear of pending death and the lack of a trusting relationship with the provider.(24)

These interviews embed the research within a cultural context, thereby providing an opportunity to understand the underlying and non-obvious interactions that are not captured quantitatively. The qualitative findings offer potential explanations for the disparity of treatment, unlike the quantitative results that are one dimensional in describing the statistical likelihood of a guideline concordance. The 'lived experiences' shared by interviewees provides insight into patient-clinician interaction, how people formulate meaning around an event and how that meaning is connected to the broader social dynamics occurring around them.(48) Brown reveals factors that may determine idiographic causation. He notes that mistrust and fear, competing priorities, prior experiences and deprivation could explain why patients were more likely to present for treatment greater than 12 hours after an event ($P<0.001$).(24)

Although Brown refers to the study as mixed method, there is limited evidence of synergy of the analysis of the two different forms of data. Creswell and Plano Clark (2007) suggest that the central premise of a mixed method approach is to 'use the data in combination to provide a better understanding of the research problems than either approach alone.'(49) In contrast, Brown provides an analysis of the data independently of each other, with limited evidence of any 'mixing' in the final results.

Qualitative research is constrained in terms of the ability to generalise findings and make any quantitatively based predictions. However there may be some ability to partially generalise the findings to similar Indigenous populations' in rural/remote areas with similar health infrastructure In addition, Brown does not address the issue of the objective observer or how researcher bias is managed.(48, 50)

The second published study that discussed the association of the Indigenous patients and ACS guideline, investigated the level of evidence-based prescribing (EBP) and had an Indigenous sample of 499 (non-Indigenous n=1,218). The national guidelines recommend that initiating long-term therapy with a number of medications should be considered before discharge, to significantly reduce mortality and morbidity.(42-44) Gausia et al. (2014) reported that Indigenous patients diagnosed as high-risk of a secondary cardiac event were more likely to not receive any of the four recommended medications during admission or at discharge (P<0.01, unadjusted).(21) However, after adjusting for socio demographic factors, hospital type and clinical comorbidities, there was no difference in the rate of Indigenous and non-Indigenous patients receiving EBP.(21)

Previous hospital admission, gender and comorbidity were independently associated with receiving EBP. A patient who had been previously admitted for ACS was over 80% more likely to receive EBP, compared to those not previously admitted (OR 1.83, 95% CI 1.39 - 2.42). Males were 60% more likely than women to receive EBP (OR 1.63, 95% CI 1.26-2.11), however when stratified within non-Indigenous status, non-Aboriginal males were 90% more likely to receive EBP than non-Aboriginal females. A patient with a comorbid condition such as diabetes was almost 40% more likely to receive EBP compared to those without a condition (OR 1.36, 95% CI 1.04-1.79).(21)

Brown provided insight into prescribing patterns within the Central Australian cohort, reporting that Indigenous patients were more likely, than their non-Indigenous counterparts, to be prescribed an ACE-inhibitor or angiotensin-receptor blocker (ARB). These are two recommended medications for discharge (P=0.033, unadjusted).(24)

Gausia et al. (2014) drew data from numerous sources to investigate the level of EBP. The primary data source was the Western Australian Data Linkage System (WADLS), which has six core datasets (birth records, midwives notification system, cancer registry, hospital morbidity data, mental health services records and mortality data). WADLS holds data from 1980 onwards and in addition data was extracted from in-patient notes.(21) This two-tier approach to data collection may improve the accuracy of Indigenous identification as well as being able to facilitate certain types of longitudinal studies, arising from principal diagnosis. Both Brown and Gausia et al. reported that remoteness influenced the treatment and management of patients. Compared to non-Indigenous patients, Indigenous patients were more likely to reside remotely (26.7% vs. 3.3%)(21) as well as being more likely to experience the ACS onset in a rural location (P<0.001).(24)

The recruitment of non-Indigenous participants varied for each study. Brown included non-Indigenous patients by diagnosis and time period,(24) while Gausia et al. added to the process used by Brown by randomly selecting the comparative sample from patients admitted to hospital in 2003,[43] with similar diagnosis (MI and unstable angina).(21)

While Gausia and colleagues had a relatively large sample size, their study lacks primary medical contact data.(52) By contrast clinical data is a strength in Brown's study and it is abstracted from primary health care individual medical records, in addition to in-hospital records and linked mortality data.(24)

Both studies relied on routinely collected administrative data, to some degree. For example Gausia et al. did not report variables that may impact on the clinical decision making processes. These include clinical impression variables, for example, patient fragility, clinical experience, patient literacy, clinician-patient communication, cognitive ability or patient choice. Brown provides depth to the data presented, by providing insight into the nuanced interactions between the clinician and patient that may provide some explanation for the disparity of care provided to each cohort.

In conclusion, the two studies by Brown and by Gausia et al. collectively had a relatively small sample size (n=713) and were not able to provide a description of the suite of recommended strategies identified in the ACS treatment algorithm.

These two studies investigated the treatment and management strategies for high-risk NSTEACS Indigenous patients in two jurisdictions. A further eight studies examine specific treatment and management strategies comparing Indigenous and non-Indigenous patients with ACS in Australian settings.

2.7.3 Indigenous status and revascularisation and cardiac surgery

The ACS management guidelines recommend that, except for patients with severe comorbidities, high-risk patients receive aggressive medical management which may support early angiography (within 48 hours) and revascularisation.(42) The ACS treatment algorithm includes revascularisation as a recommended procedure and, although it may not

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[43] Indigenous patients were admitted to WA hospitals in 2002-2004.

be recorded, it is assumed that an angiogram has occurred prior to the intervention proceeding.

The four cohort studies that focused explicitly on the disparity of cardiac procedures, that is, coronary revascularisation and surgery, comprised a sample of 1,023 Indigenous patients (non-Indigenous n=74,723) with 72% (740) having been diagnosed with their first-ever acute myocardial infarction (AMI), ischaemic heart disease or angina.(18-20, 22) The studies were from four different states (WA, SA, Qld and NSW), including one urban specific site. The studies described similar patient profiles in that compared to non-Indigenous patients, Indigenous patients were younger, more likely to be female, have an existing comorbid condition (diabetes), be a current smoker and live remotely[44].(18-20, 22)

Coorey and Walsh (2005) were the first to report revascularisation rates for Indigenous patients at a Queensland-wide level; the two post-AMI interventions were PCI and CABG. A study sample of 558 Indigenous patients (non-Indigenous n=14,125) was extracted from the Queensland public hospital administrative health data. The risk-profile for Indigenous patients was noticeably different from that for non-Indigenous patients. Indigenous patients presented with twice the rate of comorbid chronic conditions. For example, after adjusting for age, Indigenous patients were almost two and half times more likely to have diabetes (RR 2.49, 95% CI 2.17-2.86).(18) After adjusting for baseline characteristics age, gender, socioeconomic status, remote residence, hospital characteristics, and comorbidities), the authors reported that index admission PCI for Indigenous patients, compared to non-Indigenous patients, was 28% lower (OR 0.72, 95% CI 0.54-0.94) and this was reduced to 22% on subsequent admissions (OR 0.78, 95% CI 0.64-0.94).(18) Comorbidities were inversely related to the intervention provided that is, if a patient had one comorbidity their probability of receiving a coronary procedure was reduced by 40% (OR 0.59, 95% CI 0.42-0.87), however, there was no difference between Indigenous and non-Indigenous patients in the likelihood of accessing CABG.(18)

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[44] With the exception of the urban site.

Indigenous status was not independently associated with accessing a coronary intervention although Indigenous patients in this study were significantly less likely to receive a PCI or revascularisation. There were three key observations worth noting. Firstly, there was an inverse relationship between age and the probability of receiving any coronary procedure, for example patients who were aged 60-69 years were 50% less likely than other patients to access the procedure (OR 0.43, 95% CI 0.38-0.48).(18) Secondly gender had an important influence, in that non-Indigenous women were half as likely as non-Indigenous men to receive any coronary procedure (RR 0.47, 95% CI 0.43-0.52) and finally the lower the socio-economic status of the patient the less likely they were to receive the procedure (OR 0.84, 95% CI 0.76-0.94).(18)

Two studies discussed the influence of geography on the probability of accessing coronary surgical procedures; one was based in a metropolitan city and the second was a New South Wales state-wide analysis. Bradshaw et al. (2010) reported on the findings for 182 Indigenous patients (non-Indigenous n=129), diagnosed with IHD and residing in Perth, Western Australia. The Indigenous sample was extracted from the Perth Aboriginal Atherosclerosis Risk (PAARS) cohort and age- and sex- matched with non-Indigenous patients from the State hospital morbidity data.(22) Indigenous patients diagnosed with IHD were 24% less likely to undergo PCI (RR 0.76, 95% CI 0.60-0.97), however, if diagnosed with an ACS this figure moved toward parity, with no difference in the likelihood of receiving the procedure.(22) Furthermore, Indigenous women were younger at their first IHD admission (P<0.046) and more likely to undergo revascularisation, with CABG being the first procedure (P=0.02).(22)

There are similar findings about the probabilty of accessing PCI if diagnosed with ACS, although in very diverse geographical settings, that is, metropolitian compared to remote and regional Central Australia. Bradshaw and Brown reported that there was no difference between Indigenous and non-Indigenous patients in the likelihood of undergoing PCI if diagnosed with ACS (not adjusted).(22, 24)

The second study that reported the influence of geography on the treatment and management of Indigenous patients was based in New South Wales. Randall’s (2013) study sample was drawn from a state-linked dataset (hospital admission and mortality data). This study describes the Indigenous sample in greater detail. It found that, compared to non-Indigenous patients, Indigenous patients were more likely to have a drug abuse record ($P<0.01$) and live in socially disadvantaged areas (47.6% vs. 26%), and were less likely to have private health insurance ($P<0.01$).(20) As Indigenous patients were more likely to live regionally and remotely, they had a higher probability of being admitted to a hospital that did not have on-site angiography ($P<0.01$) and that had a lower rate of acute admissions[45] ($P<0.01$).(20) Also, Indigenous patients were less likely to be admitted to a major city hospital ($P<0.01$).(20)

This study also reported the likelihood of revascularisation and the factors that may influence access to the procedure. After adjusting for age, gender, year of admission, index presentation and diagnosis, Randall found that Indigenous patients were almost 40% less likely to undergo revascularisation within 30 days (HR 0.63, 95% CI 0.57-0.70). However, when also adjusting for a comorbid condition, substance misuse, and private health insurance, the ratio moved closer to parity and no longer retained significance.(20) When a cluster analysis was made of Indigenous and non-Indigenous patients admitted to the same hospital, Indigenous patients were 18% less likely to be revascularised (AHR 0.82, 95% CI 0.74-0.91).(20)

The final report included here was a prospective study that investigated coronary and surgical procedures, based in a metropolitian teritary hospital in South Australia. This hospital is a tertiary referal centre that offers a full service of cardiac surgery, cardiac intervention, cardiac medicine and cardiac rehabilitation and recieves regional and interstate patient transfers.(19) Lehman and colleagues (2009) reported on the probability and outcomes of cardiac surgery after being admitted for an acute cardiac event to a tertiary referral centre. Data comprising a sample of 283 (non-Indigenous n=2,352) from 2000-2005 was extracted from an in-hospital cardiac surgical database. This study adjusted for the “EuroScore” which is a probability calculation to assess cardiac operative risk and includes factors associated with surgical outcomes such as age, gender, cardiac history, unstable angina, serum creatinine >200 µmol/l, emergency operation etc.(52) Compared to

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[45] <1,200 per year

non-Indigenous patients, Indigenous patients were less likely to undergo CABG (50.2% vs. 76.1%, P<0.01) and if they did undergo CABG they were more likely to be younger (52 years vs. 65 years; P<0.001).(19) After adjusting for potential factors associated with surgical outcomes post cardiac surgery, the outcomes for Indigenous patients under 55 years of age were an almost seven-times increase in operative mortality (HR 6.9, 95% CI 1.42-33.50) and an almost three-fold increase in late mortality (HR 2.70, 95% CI 1.55-3.67) compared to non-Indigenous patients in the same age category.(19)

The Lehman study uses a purposefully developed database that has the ability to track patients longitudually. A study that assessed the performance of the EuroSCORE model in an Australian adult cardiac surgical population, reported that it did not accurately predict outcomes for patients undergoing cardiac surgery in Australia.(53) The study did not stratify the cohort by Indigenous status.

These four studies provide some insight into access to and outcomes of revascularization and surgical procedures for Indigenous patients. The following four studies extend this review to include studies that investigate the diagnosis, treatment and management of Indigenous patients with ACS when admitted to hospital.

2.7.4 Indigenous status and treatment and management

The four cohort studies that described diagnosis, treatment and management of Indigenous patients when admitted to hospital were comprised of 111,340 Indigenous patients, with 99.7% of the sample drawn from a single study that extracted data from a national database. The articles were all retrospective studies that included the largest data source, as well as research that provided insight into the presentation times, treatment and management of Indigenous patients diagnosed with AMI.

Cunningham (2002) examined what was recorded in the National Hospital Morbidity Database (NHMD) and assess the likelihood of having the procedure recorded according to the record of Indigenous status of patients, adjusting for a number of variables.(16) Between July 1997 and June 1998, of all the Indigenous Australians admitted to hospitals, 97% were treated a public hospital. Cunningham identified systemic differences in the management of Indigenous patients compared to other Australians, with Indigenous patients having fewer diagnostic and therapeutic procedures recorded.(16) She reported that the likelihood of Indigenous patients having a principal procedure recorded in a public hospital was over 30% lower than for their non-Indigenous counterparts (OR 0.67, 95% CI 0.66-0.68), while there was no statistical difference of the recording of procedures in private hospitals.(16)

The remaining three studies used administrative health data to ascertain the management and treatment provided to Indigenous patients in diverse settings that is, regional, state-wide and nation-wide. As reported in the previous studies, Indigenous patients were younger and more likely to be female, than non-Indigenous patients.(17, 23, 25)

In 2000 Ong and Weeramanthri compared the presentation and management of Indigenous and non-Indigenous people hospitalised with AMI. The study highlighted the influence of remoteness on the delay of emergency care that is, pharmaceutical and diagnostic intervention. Indigenous patients were more likely to present with symptoms atypical of AMI, and the onset of AMI was more likely to be in a rural location, resulting in a greater probability of being evacuated to hospital by air.(23)

This study reported two significant differences in the management of patients with AMI. Firstly, less than a third of Indigenous patients received thrombolytic therapy prior to reaching hospital, compared with almost half of non-Indigenous patients ($P<0.01$); secondly there were delays in Indigenous patients presenting for diagnostic electrocardiogram, including in urban areas ($P<0.01$).(23) The authors suggested that the delay in pharmaceutical and diagnostic intervention was due to a delay in patient presentation (i.e. >12 hours, $P<0.01$, unadjusted). Delays in presentation existed for Indigenous and non-Indigenous people in the same location, though the delays were longer for Indigenous Australians living in rural and remote locations. After adjusting for age, there was no difference between Indigenous and non-Indigenous in the rate of 28-day fatality.(23)

In 2009 Ranasinghe and colleagues investigated the disparity of treatment between Indigenous and non-Indigenous patients, who presented at hospital with chest pain, in 27 hospitals in Australia. This study was embedded in the Heart Protection Partnership Study (HPPS). Using administrative health data, with a sample of 199 Indigenous patients (non-Indigenous n=274), the study investigated if there was a disparity of treatment between Indigenous and non-Indigenous patients who presented at hospital with chest pain. Ranasinghe et al. examined the utilisation of early investigations, treatments and times to intervention. The Indigenous patients were more likely to be diagnosed with STEMI and angina, and less likely to be admitted to a hospital with an interventional facility.(17) This is similar to the findings of Randall et al. who looked at first-ever AMI and IHD admission patterns for Indigenous patients in NSW.(20) After adjusting for numerous variables (age, gender, clinical risk profile, attending physician, on-site facilities, diagnosis etc.), Indigenous patients were found to be more likely to have an exercise stress test (OR 2.37, 95% CI 1.49-3.78) and less likely to have an echocardiogram (OR 0.51, 95% CI 0.32-0.79) compared to non-Indigenous patients.(17) Ranasinghe et al. concluded that although the Indigenous population was identified as a high-risk group there was no significant difference in their overall management.

The final study reviewed here examined the utility of exercise electrocardiography testing (EET) in evaluating suspected coronary artery disease. The study sample is drawn from hospital administrative data and in-patient clinical notes, over a 12 month period, at the regional hospital in Central Australia. There are no on-site angiography facilities at this hospital and acute cardiac and high-risk patients are transferred interstate to a tertiary referral hospital in South Australia.

Hurune and colleagues (2013) reported no difference in the rate of Indigenous and non-Indigenous patients undergoing EET, the difference was in the test results.(25) The sample included 108 Indigenous patients and 150 non-Indigenous patients with suspected coronary artery disease, who underwent EET. Compared to non-Indigenous patients, the Indigenous patients were 10 times more likely to have an ‘inconclusive’ test result ($P=0.02$) and more likely to have a negative test result ($P<0.001$, unadjusted). In a multivariate analysis, the two factors of being Indigenous (OR 3.7, 95% CI 2.1-6.6) and having a chronic disease (OR 6.0, 95% CI 2.5-14.1),(25) were independently associated with an inclusive test result. They found that Indigenous patients were less likely to undergo angiography, although this was not statistically significant.(25) The probability of a patient proceeding to angiography after a positive test result ($P<0.001$), and/or presenting to hospital within 24 months with chest pain ($P<0.001$), was not influenced by Indigenous status.(25) The variability of the test results also influenced hospital readmission, in that, a patient with a EET result, that moved from negative to positive, was associated with readmission for chest pain within 12 months.(25)

These four studies provide insight into the diagnosis, treatment and management as well as long-term health risks for Indigenous patients. However while they quantified some differences, these were not found to be all that significant in some instances.

2.8 Discussion

2.8.1 Inter-relatedness

Individually the ten reviewed studies give some insight into the treatment and management provided to Indigenous patients in various settings in Australia. When taken together, these studies suggest that a number of characteristics associated with the patient (clinical risk profile, presenting symptoms, stage at presentation, gender-specific issues), the hospital capability (service level, geography) and of other key players (e.g. clinical inertia from providers), need to be considered in more detail. Indigenous status, clinical profile, gender, capacity of treating hospital and geography will be reviewed in this thesis with regard to connectedness and their associations to the treatment and management provided to Indigenous patients.

2.8.2 Indigenous status

It would be misleading to state unequivocally that *the disparity of cardiac treatment and management of Indigenous patients is solely the result of Indigeneity*. This assumption is based on the premise that being Indigenous is the primary factor that influences guideline-concordant care. While all the reviewed studies reported a differential between Indigenous and non-Indigenous patients, an examination of the factors that could potentially explain this disparity is necessary.

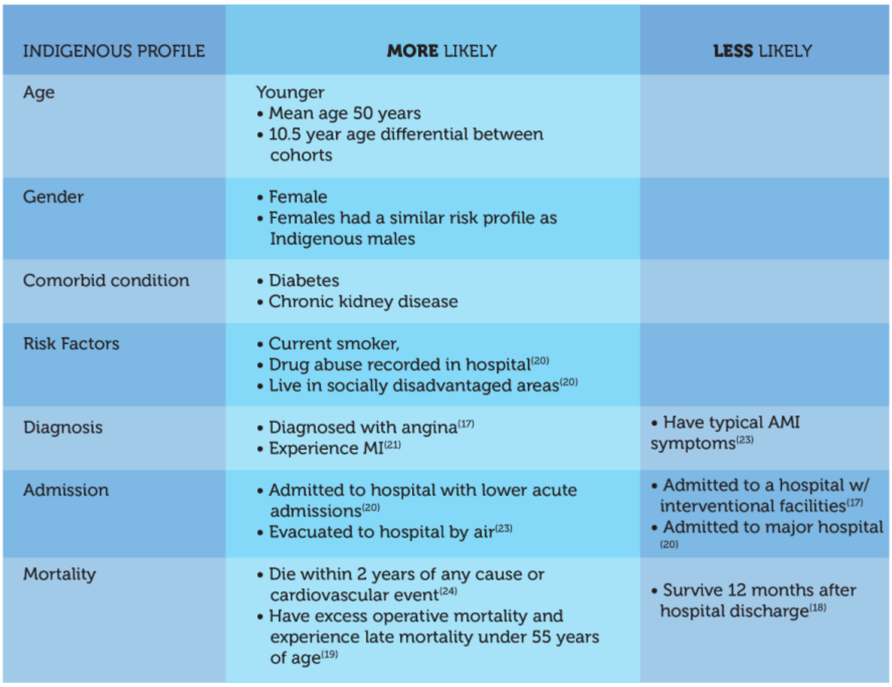
Investigative procedures such as angiography and an exercise stress test are pivotal in assessing patient risk profile, and in confirming the diagnosis and the extent of the disease process, as well as informing proceeding management. Brown (2010) found that Indigenous patients were less likely to undergo coronary angiography.(24) Ranasinghe et al. found that Indigenous patients were more likely to undergo a stress test. However, they did not report test outcomes and concluded that, although the Indigenous population was identified as a high-risk group, there were no significant differences in cardiac investigation.(17) Hurune et al. stated that Indigenous patients were more likely to have inconclusive and negative EET results and were less likely to proceed to angiography. Not undergoing the angiography was also found to be associated with an increased likelihood of hospital readmission within two years, although this was not statistically significant.(25)

There were variations in the results on the likelihood of undergoing revascularisation. Lehman et al. reported that Indigenous patients were less likely to undergo CABG,(19) although Bradshaw et al. found that Indigenous patients were more likely to receive CABG as their first revascularisation procedure.(22) Bradshaw et al. reported that Indigenous patients in an urban setting were less likely to receive CABG.(22) The four studies investigating revascularisation concluded that there was no significant disparity in revascularisation between Indigenous and non-Indigenous patients.(18, 20, 22, 24)

2.8.3 Clinical profile

All studies found a large difference in clinical profile and risk factors between Indigenous and non-Indigenous patients. Table 2.4 contains the most noticeable differences in clinical profile as cited within the ten reviewed studies, that is, age, gender, comorbid conditions, risk factors, place of admission and mortality.

Table 2.4 Summary of the Indigenous cohort profile compared to the non-Indigenous



INDIGENOUS PROFILE	**MORE** LIKELY	**LESS** LIKELY
Age	Younger • Mean age 50 years • 10.5 year age differential between cohorts	
Gender	• Female • Females had a similar risk profile as Indigenous males	
Comorbid condition	• Diabetes • Chronic kidney disease	
Risk Factors	• Current smoker, • Drug abuse recorded in hospital(20) • Live in socially disadvantaged areas(20)	
Diagnosis	• Diagnosed with angina(17) • Experience MI(21)	• Have typical AMI symptoms(23)
Admission	• Admitted to hospital with lower acute admissions(20) • Evacuated to hospital by air(23)	• Admitted to a hospital w/ interventional facilities(17) • Admitted to major hospital (20)
Mortality	• Die within 2 years of any cause or cardiovascular event(24) • Have excess operative mortality and experience late mortality under 55 years of age(19)	• Survive 12 months after hospital discharge(18)

All the studies reviewed characterised Indigenous patients as high-risk, because they had more comorbidities and hence required more comprehensive clinical management in the transition from short-term to long-term care and for the secondary-prevention of cardiovascular events. Although it has been found overall that Indigenous status is not associated with guideline concordance in treatment, there are a number of factors that may result in Indigenous patients not receiving the recommended treatment regimes, most notably through the impact of comorbid conditions (i.e. diabetes) and the capacity of the treating hospital/ geography.

All studies found that Indigenous patients were more likely to have diabetes with the prevalence within the Indigenous cohort ranging between 23-67%.(20, 22) Hurune et al. also reported that Indigenous patients were almost six times more likely to have diabetes compared to their non-Indigenous counterparts (OR 5.9, 95% CI 3.3-10.7).(25)

The Indigenous cohort had a higher prevalence of comorbid disease overall, despite a significantly younger mean age, and this may have influenced clinical care options. Four studies reported that diabetes was an independent variable associated with the probability of receiving cardiac treatment and management. Coory and Walsh reported indirect association, finding that although Indigenous status was not associated with the rate of revascularisation, if a patient had a least one comorbidity the likelihood of undergoing a coronary procedure was reduced by 40% (OR 0.59, 95% CI 0.42-0.87).(18) Randall reported that there was no significant disparity in revascularisation after adjusting for comorbidities,[46] substance use and private health insurance.(20) Inconclusive EET test results were associated with the likelihood of proceeding to angiography and Hurune et al. reported that comorbid conditions (OR 6.0, 95% CI 2.5-14.1) were independently associated with this outcome.(25) Gausia et al. reported that being male, having previous ACS admission and having diabetes, increased the likelihood of receiving EBP (OR 1.36, 95% CI 1.04-1.79).(21) On the positive side, having a comorbid condition was associated

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[46] Adjusted for comorbidities: diabetes mellitus without complications, diabetes mellitus with complications, congestive heart failure, chronic obstructive pulmonary disease, chronic renal failure, acute renal failure, cerebrovascular disease, pulmonary oedema, depression, cancer, peripheral vascular disease, dementia, cardiac dysrhythmias, and shock.

with the increased probability of a patient receiving the recommended prescriptions (OR 1.36, 95% CI 1.04-1.79).(21) The premature accrual of comorbidities in Indigenous subjects appears to strongly influence decision making about treatment regimes.

2.8.4 Gender

In all studies, Indigenous women were well represented, comprising 37-59% of the Indigenous cohort.(23, 25) Two studies report findings on gender. In an urban context, Bradshaw et al. reported that Indigenous females were younger on the first IHD admission (51 years vs. 55 years) and were more likely to undergo revascularisation (43% vs. 18.5%) compared to non-Indigenous females.(22) Gausia et al. reported that being male increased the likelihood of receiving EBP by over 80% (OR 1.83, 95% CI 1.39-0.96).(21) No firm conclusions can be drawn on whether gender, more specifically being female, has impacted on clinical decisions in providing care. An investigation into the association of gender with the treatment and management strategies should be considered.

2.8.5 Capacity of treating hospital and geography

The capacity of the treating hospital fundamentally informs the treatment regime when patients access cardiac care. Due to vast distances and sparse populations, regional and remote hospitals do not have onsite cardiac facilities. As these facilities are often located in metropolitan hospitals, the capacity for and location of treatment are intimately linked. In a national study that examined the capacity of treating hospitals, Walters et al. (2008) reported that the significant delays to key interventions were often due to hospitals not having onsite cardiac surgical services, as well as the delays experienced in transferring high-risk patients to interventional centres.(54)

Four studies described the relationship between the capacity of treating hospital and remoteness. A number of studies reported that Indigenous patients were more likely to live remotely,(18, 20) and described how remoteness was associated with the onset of the cardiac event. Brown found that Indigenous patients were more likely to experience the onset of AMI in a rural location,(24) which supports the findings that Indigenous patients were more likely to be evacuated to hospital.(23) Ranasinghe et al. and Randall et al. report that Indigenous patients were less likely to be admitted to a hospital with onsite cardiac facilities.(17) Similarly, Randall et al. found that Indigenous patients were less likely to be admitted to a major hospital and more likely to be admitted to a hospital that experienced lower acute admission (<1200 per year).(20)

In summary, the clinical profile and capacity of the treating hospital were key factors influencing the care of patients, regardless of Indigenous status. Indigenous patients are more likely to have a higher burden of disease and live in rural or remote locations when presenting for a cardiac event. This suggests that, although not directly associated, being Indigenous does influence the when and the where of the clinical management the patients can access. Indigenous status becomes a secondary predictor of access to care and disease burden, while geography becomes a primary predictor of cardiac care. The influence of gender, especially the tendency for women to have reduced access to clinical care, remains inconclusive and requires further investigation.

2.9 Limitations

The limitations of the studies are categorised into three themes; data source, study design and level of evidence.

2.9.1 Data source

Eight out of the ten studies drew data from a hospital administrative health database as the primary data source. There are numerous advantages in using state-wide administrative health data, such as being able to facilitate certain types of longitudinal studies and to examine large sample sizes at low cost. This results in a greater ability to generalise the findings, than is the case with clinic-based data. The state-wide administrative data are by definition whole of state, unless, as often happens, private facilities are excluded. If the desired data are available and recorded with acceptable accuracy, timeliness and completeness, administrative data hold considerable promise for health researchers.

The limitations of using hospital administration databases are highlighted by Cunningham, who found that the National Hospital Mortality Database was 33% less likely to have the primary procedure recorded for Indigenous patients admitted to public hospitals (OR 0.67, 95% CI 0.66-0.68).(16) Administrative data may include potential misclassification, under-reporting, and lack of socio-demographic information. Furthermore, the detailed data that may explain clinical decision making, such as severity of MI, patient preference, patient frailty and cognitive ability or pharmacological contraindication, is not contained in these datasets.

2.9.2 Levels of evidence and sample size

All ten studies were comparative observational studies that provided a descriptive account of the differences between Indigenous and non-Indigenous patients, when admitted to hospital in various settings in Australia. Comparative analytical studies can be broad ranging in their design, for example, examining hypothesised causal relationships, identifying and measuring the effects of risk factors or the health effects of a specific exposure or intervention.(55) The relatively small numbers of Indigenous people in the studies is a more important issue which becomes problematic, as it limits the interpretation of many variables which can impact on care, especially in view of the high burden of comorbidities and risk factors.

Judgement needs to be made to achieve an appropriate balance between benefits and harms, to ensure the quality of the evidence, to increase the likelihood that the evidence can be translated to specific circumstances, and to promote certainty in relation to the baseline risk.(56) Also there is an ongoing concern that the lack of interventional and longitudinal studies may give rise to the dominance of descriptive research, which may hamper the development of evidence-based protocols, practices and policies.(57) With the exception of Brown, the studies provide a one-dimensional representation of the factors that may influence the clinical care provided and fail to provide depth to the ‘back story’ that is occurring in a dynamic and complex setting. Brown’s study design is an important reminder to adopt initiative study designs that present quantitative and qualitative data to gain a more comprehensive insight into the phenomenon under investigation.

2.10 Conclusion

Indigenous status did not appear to be consistently associated with guideline concordant care in the ten studies reviewed here. The ACS treatment algorithm has numerous elements and none of the studies were able to provide a comprehensive analysis of the continuum of clinical care provided. Overall considerable gaps remain in our knowledge of whether the care provided to Indigenous patients is guideline concordant, and whether Indigenous status is an independent variable that influences the cardiac care provided.

The studies identify important factors that may influence whether Indigenous patients receive appropriate cardiac treatment and management strategies. For example, the impact of the high-risk clinical profile discriminates against Indigenous patients for certain cardiac interventions such as revascularisation, however this disparity may be addressed by prescribing appropriate pharmacological therapies. The reviewed articles identified gaps in the literature while simultaneously presenting opportunities for further investigation.

2.11 The way forward

There is a disparity in the treatment of Indigenous Australians who are diagnosed with ACS and the reasons for these differences have not been conclusively identified. Possible explanations include atypical or late presentation, geographical remoteness, reluctance to attend hospital, access to care, patient preferences, extremely adverse risk profile that limit suitability for certain invasive procedures and institutional discrimination.(5, 58, 59) The literature review has identified significant gaps in knowledge, motivating and informing further research into the treatment and management strategies provided to Indigenous patients when admitted to hospital for ACS, as the basis of this doctoral thesis.

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3. Presentation of the studies

This thesis includes one published study, as well as two unpublished empirical manuscripts that are under review at the time of submission. Three studies are presented in a scientific journal format of background, methods, results, discussion and conclusion. Each study is independent and contributes to providing important insights for understanding the connection between guideline concordance and clinician-patient engagement. The two unpublished manuscripts include abstracts.

The second published paper is an appendix embedded in the Discussion Chapter (Appendix B. Study Protocol: Establishing good relationships between patients and health care providers while providing cardiac care.). The study protocol recommends further research that could arise from this doctoral thesis.

Ethics Approvals to conduct the studies are Appendix B. Permission from the respective journals (Appendix D), the papers are reproduced as facsimiles of the original publication. Contributions of each author are provided in Statement of Authorship at Appendix D.

The study and manuscripts provide a three-tier insight into Indigenous patients presenting to hospital with ACS. The first study describes the probability of patients with high-risk clinical features without ST-segment-elevation receiving diagnostic angiography care after presenting to hospital. It uses data from a national multi-centre prospective audit after adjusting for age, gender and Indigenous status. The second study presents findings from two metropolitan tertiary hospitals based on the likelihood of patients accessing angiography and evidence-based prescriptions on discharge, after adjusting for age, gender, comorbidity and Indigenous status. The third study explores the appropriateness of using medical records to identify indicators of clinician-patient engagement. Each study is independent and contributes to providing important insights for understanding the connection of guideline concordance and clinician-patient engagement.

3.1 Study one

Impact of age, gender and indigenous status on access to diagnostic coronary angiography for patients presenting with non-ST segment elevation acute coronary syndromes in Australia.

> *‘As an Aboriginal man of my age, I’ve been saying for some time that I’m overdue for serious health problems. The sad truth is that what should be the prime of life for many of us, is often just the opposite.’*
>
> Dr Arnold ‘Puggy’ Hunter

ABSTRACT CORRECTION:

Increasing age was associated with lower rates of angiography; a high-risk patient at the age of ≥70 years was 19% less likely to receive an angiogram than one at the age of <70 years (risk ratio (RR)) = 0.81 95% Confidence Interval (CI) 0.75-0.86._

3.2 Study two

The management of Acute Coronary Syndromes for Indigenous patients presenting with non ST-segment elevation acute coronary syndromes in South Australia: a retrospective cohort study.

> *‘We all know if health care services are not delivered appropriately, our people wont use them.’*
>
> Dr Arnold ‘Puggy’ Hunter

Abstract

Aim: Using Australian guidelines for management of acute coronary syndromes, we assessed the probability of an Indigenous patient receiving appropriate interventional and therapeutic care after presenting in two metropolitan hospitals.

Methods: The study involved a retrospective case note review of patients admitted through two Adelaide public tertiary hospital emergency departments from 2008-2009. The cohort was 488 patients, with high-risk clinical features, but without ST-segment-elevation.

Results: Indigenous patients were significantly younger, presented later in the disease process and had a higher burden of cardiovascular risk factors, when compared to non-Indigenous patients. Indigenous patients were 54% more likely to receive angiography (RR 1.54; 95% CI 1.31-1.81) than non-Indigenous patients and 20 % more likely to receive the recommended medications (RR 1.19, 95% CI 1.01-1.40), however this difference disappeared after adjustment for age, gender and propensity score. Patients over 65 years of age were 53 % less likely to receive an angiogram (RR 0.47, 95% CI 0.38-0.56) and were 35 % less likely to receive the recommended medications (RR 0.65, 95% CI 0.54 - 0.78) than patients aged between 18 and 49 years. Women were almost 20 % less likely to receive an angiogram (RR 0.81, 95% CI 0.66-0.99) and 20 % less likely to receive the recommended medications (RR 0.80, 95% CI 0.71-0.91) when compared to men. The likelihood of receiving medications on discharge was significantly influenced by age, gender, Indigenous status, comorbid burden and revascularisation.

Conclusion: The younger age and significantly higher risk profile of Indigenous adults presenting to SA hospitals with ACS appears to lead to different management decisions, which may well be led by client factors. Many of these risk conditions can be better managed in the primary care setting.

Introduction

Compared to other Australians, Indigenous people are three times more likely to have a coronary event, 40% more likely to experience out-of-hospital-death from coronary heart disease and 40% less likely to be investigated by angiography.(1) This is problematic as cardiovascular disease (CVD) followed by diabetes cumulatively account for one-fifth of the health 'gap' in shortened life expectancy experienced by Indigenous Australians. Indigenous people between the ages of 35-44 years are 9-12 times more likely to die from CVD than non-Indigenous Australians.(2)

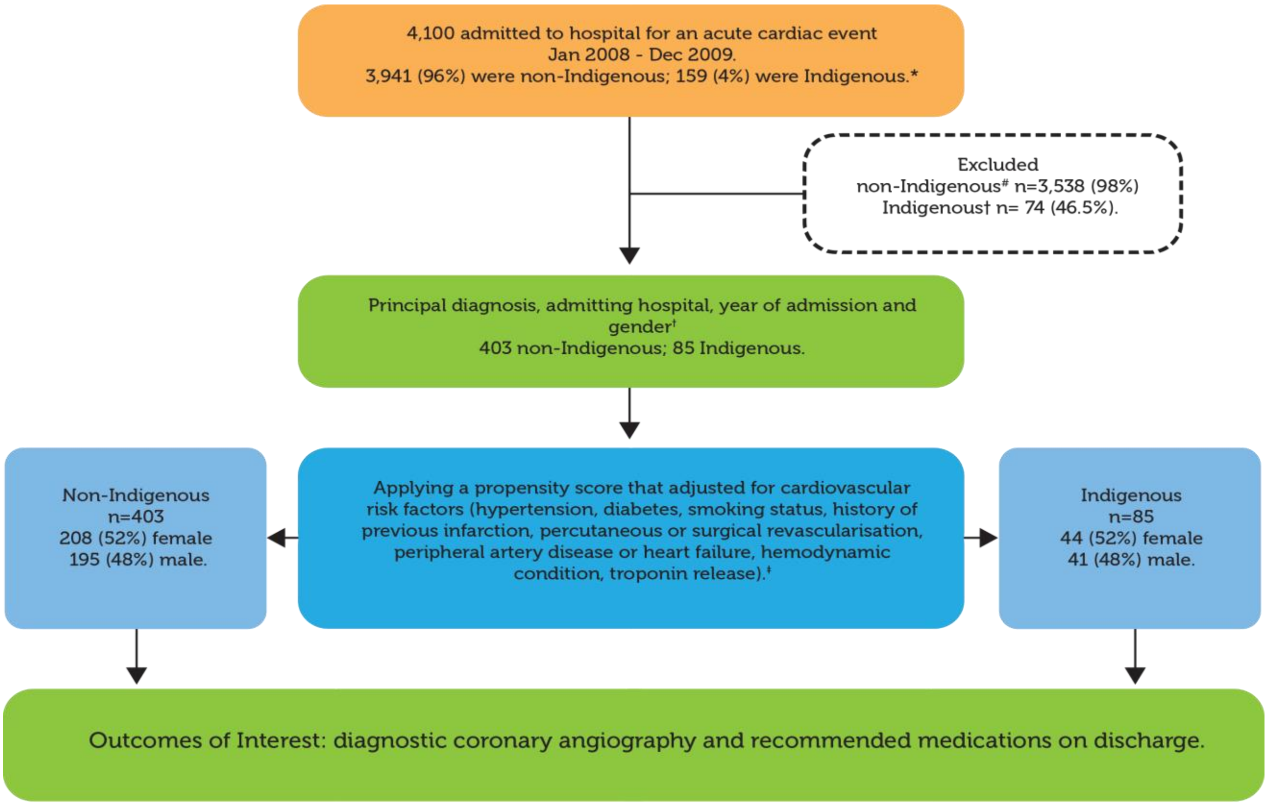
The few studies that examine revascularisation rates after an acute cardiac event for Indigenous patients compared to non-Indigenous patients report mixed results. We assessed the probability of an Indigenous patient receiving Australian guideline-concordant interventional and therapeutic care for acute coronary syndromes (ACS) after presenting at two metropolitan Australian hospitals. The outcome of interest was whether Indigenous patients diagnosed with non ST-segment elevation acute coronary syndromes (NSTEACS) received diagnostic coronary angiography and discharge medications as recommended in the Australian guidelines for the management for ACS.(3, 4)

Methods

Study cohort

We conducted a retrospective case note review of patients admitted through two Adelaide metropolitan public tertiary hospital emergency departments from January 2008 to December 2009 who were categorised as having high-risk NSTEACS. Inclusion criteria included persistent ECG changes of ST-segment depression, haemodynamic compromise, prior coronary intervention within six months, presence of known diabetes and elevated level of at least one cardiac biomarker.(3)

The variables extracted from in-hospital patient medical records included demographic data, history of CVD, clinical presentation, and in-hospital treatment. The sample cohort consisted of 3,941 non-Indigenous and 159 Indigenous patients (Figure 3.1). Sample sizes of 85 Indigenous patients and 403 non-Indigenous patients achieve 80% power to detect a rate ratio for each outcome measure of 1.2. The rate in the Indigenous group is assumed to be 0.60 under the null hypothesis and 0.72 under the alternative hypothesis. The rate in the non-Indigenous group is 0.6. The significance level of the test was targeted at 0.05.



Source: SA NSTEACS Retrospective Case Note Cohort Study

The study cohort is sourced from patients who were admitted to two public tertiary metropolitan hospitals in South Australia from Jan 2008-Dec 2009.

* Indigenous status refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

From the total patient population admitted Jan 2008-Dec 2009, a sample sizes of 403 non-Indigenous patients and 85 Indigenous patients achieves 80% power to detect a rate ratio for each outcome measure of 1.2. From the total non-Indigenous sample (n=3,941) a random sample of 750 were selected, of which 403 met the inclusion criteria. Total non-Indigenous patients excluded =3,538.

† Indigenous patients was excluded because they did not meet the inclusion criteria of persistent ECG changes of ST-segment depression, haemodynamic compromise, prior coronary intervention within 6 months, presence of known diabetes and elevated level of at least one cardiac biomarker, as well as being categorised as having a catastrophic or severe consequence/outcome.

Principal diagnosis (NSTEACS), admitting hospital and gender.

Figure 3.1 Flow chart of study population, variables and outcomes of interest

Guidelines for the management of ACS

The Australian guidelines for the management of ACS recommend that patients at high-risk of a secondary cardiac event (with the exception of those with severe comorbidities) undergo angiography. The procedure examines the cause of acute ischaemia and the extent of underlying coronary artery disease (CAD), consequently influencing patient management.(4) In addition, the guidelines recommend medications that should be prescribed before discharge for high-risk patients: aspirin, clopidogrel, angiotensin-converting enzyme inhibitor or angiotensin receptor antagonist, β blocker and statin. If at least three of the five recommended medications were prescribed to the patient on discharge, the care was assessed as guideline-concordant.

Propensity Score

To account for potential confounders,(5) a propensity score was calculated based on cardiovascular risk factors (hypertension, diabetes, smoking status); history of previous infarction; percutaneous or surgical revascularisation; peripheral artery disease; and troponin release. Logistic regression, with Indigenous status as the dependent variable, was used to create the propensity score.

Adjusting for Age

The Australian Indigenous population is relatively young and characterized by higher fertility and lower life expectancy than the non-Indigenous population. Life expectancy at birth for males is 59 years and 65 years for females, with the most recent estimate of an 11 year life expectancy ‘gap’.(6) In addition, health disparities between Indigenous and non-Indigenous populations are not constant over the life course. Higher mortality rates for Indigenous people, in potentially the most productive years of their life, add to the differing population structures in the groups.(7-10) Because of this, age was used as a separate covariate rather than including it in the propensity score.

Analysis

We used risk ratios (RRs) to estimate the likelihood of having angiography and medications on discharge among Indigenous patients compared to non-Indigenous patients. We included descriptive and multivariate analyses. The descriptive analysis includes the health profile of the study populations by gender and age, as well as comorbidities and risk factors that may be associated with angiography and discharge medications. We applied a 3-step approach to develop the model-based estimate. Model 1 is an unadjusted univariate analysis with Indigenous status as the independent variable, Model 2 is Model 1 adjusted for age, and Model 3 is Model 1 adjusted for both age and propensity score. Log binomial generalized linear models were primarily used, and replaced with robust Poisson models in the case of non-convergence.

Results

Descriptive Analysis

Table 3.1 Study Population characteristics by Indigenous status

	Indigenous status			
	Non-Indigenous n=403		Indigenous* n=85	
Study Factors	Male n=195	Female n=208	Male n=41	Female n=44
Age (years) Mean (SEM)	71 (1.0)	77 (0.9)	55 (1.8)	53 (1.6)
Transfer[†]				
Metropolitan hospital	65 (33.3)	51 (24.5)	33 (80.5)	37 (84.1)
Risk stratification				
Dialysis dependent	2 (1.0)	3 (1.4)	2 (4.9)	7 (15.9)
Dyslipidaemia	18 (9.2)	11 (5.3)	4 (9.8)	6 (13.6)
Diabetes	63 (32.3)	73 (34.6)	30 (73.2)	35 (79.5)
Insulin Dependent	36 (18.5)	21 (10.1)	12 (29.3)	11 (25.0)
Hypertension	120 (61.5)	142 (68.3)	28 (68.3)	31 (70.5)
Smoker (current) [‡]	42 (21.5)	22 (10.5)	21 (51.2)	19 (43.2)
Family history of Coronary Artery Disease[§]	9 (22)	7 (16)	14 (7)	12 (6)
Known Coronary Artery Disease	109 (55.9)	118 (65.7)	32 (78.0)	36 (81.8)
Previous myocardial infarction	32 (16.4)	35 (16.8)	6 (14.6)	6 (13.6)
Prior Percutaneous Coronary Intervention	167 (85.6)	160 (76.9)	35 (85.4)	37 (84.1)
In-hospital procedure				
Diagnostic coronary angiography	109 (55.9)	85 (40.9)	29 (70.7)	34 (77.3)
Percutaneous Cardiac Intervention	64 (32.8)	26 (12.5)	10 (24.4)	16 (36.4)
Bare Metal Stent	25 (12.8)	7 (3.4)	6 (14.6)	5 (11.4)
Drug Eluting Stent	32 (16.4)	13 (6.25)	4 (9.8)	10 (22.7)
Coronary Artery Bypass Graft	8 (4.1)	11 (5.3)	2 (4.9)	3 (6.8)
Function Stress Testing[¶]	39 (20.0)	35 (16.8)	10 (24.4)	9 (20.5)
In-hospital outcomes				
Death	8 (4.1)	8 (2.6)	0	0
New onset of heart failure /acute pulmonary oedema	9 (4.6)	16 (7.7)	1 (2.4)	1 (2.3)
New onset of Atrial Fibrillation	22 (11.3)	38 (18.3)	4 (9.8)	3 (6.8)
Acute Renal Failure	9 (4.6)	23 (11.1)	2 (4.9)	1 (2.3)
Length of in-hospital stay (days) Median (IQR)**	4 (2;7)	4 (2.5;8)	3(2;9)	3 (2;6.5)
Outcomes at 12 months				
Rehospitalisation	90 (46.2)	104 (50.0)	14 (34.1)	18 (40.9)
Cardiac related hospitalisation	53 (27.2)	64 (30.8)	12 (29.3)	13 (29.5)
Revascularisation				
Percutaneous Coronary Intervention	11 (5.6)	7 (3.4)	0	5 (11.4)
Coronary Artery Bypass Graft	9 (4.6)	10 (4.8)	3 (7.3)	3 (6.8)
Death	2 (1.0)	6 (2.9)	1 (2.4)	3 (6.8)

Source: SA NSTEACS Retrospective Case Note Cohort Study

The study cohort is sourced from patients who were admitted to two public tertiary metropolitan hospitals in South Australia.

The results are presented as counts (%ages), except for age (years), Mean (Standard Error Mean) and length of stay**in hospital that is reported as a median (interquartile range).

*Indigenous participant refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

[†] Transferred to metropolitan hospital, refers to the patient being transferred from other sites to the study centre for a cardiac investigation and/or treatment such as diagnostic coronary angiogram or revascularisation.

** IQR refers to Interquartile Range

[‡] Current smoker is defined as any smoking within the past 12 months.

[§] Family history of coronary artery disease was reported by the patient i.e. first degree relative under the age of 60 years who has had a vascular disease/condition diagnosed.

[¶] Functional stress tests included one of the following tests: electrocardiogram, echocardiography, pharmacological, exercise or nuclear.

Description of the study population

The clinical characteristics of the 85 Indigenous subjects with high-risk NSTEACS and the 403 non-Indigenous high-risk patients are presented in Table 3.1. The Indigenous cohort was substantially younger, more likely to be diabetic, and/or known to have coronary artery disease (CAD). Current smoking rates were much higher for Indigenous patients, regardless of gender, compared to non-Indigenous patients. Notably, a higher proportion of Indigenous patients received an angiogram compared to non-Indigenous patients in the study. A larger proportion of Indigenous women received an in-hospital revascularisation procedure that is, percutaneous coronary intervention (PCI) and coronary artery bypass graft (CABG). Almost half of the non-Indigenous patients were re-hospitalised within 12 months of discharge. There were more in-hospital deaths of Indigenous patients and a larger proportion of them died within 12 months of initial hospital discharge.

Age, comorbidity and risk factor profile

Eighty two percent of Indigenous patients were under 64 years of age compared to just an over a third of non-Indigenous patients in the study. Indigenous patients accrued comorbidities earlier, notably diabetes and hypertension. Both groups had a similar proportion of high risk features that may be expected to influence the onset of a second acute cardiac event however there are noticeable differences in dialysis dependent, diabetes, current smoker and known coronary artery disease (Table 3.2).

Table 3.2 Comorbidity and risk profile of study participants by age- group and Indigenous status

	Age group and Indigenous status					
	18-49 years n=52		50-64 years n=123		65+ years n=313	
Study Factors	Non-Indigenous 21	Indigenous* 31	Non-Indigenous 81	Indigenous 42	Non-Indigenous 301	Indigenous 12
Comorbidities						
Dialysis	0	2 (6.5)	0	6 (14.3)	5 (1.7)	1 (8.3)
Dyslipidaemia	0	5 (16.1)	6 (7.4)	2 (4.8)	23 (7.6)	3 (25.0)
Diabetes	3 (14.3)	19 (61.3)	29 (35.8)	35 (83.3)	104 (34.6)	11 (91.7)
Hypertension	9 (42.9)	19 (61.3)	46 (56.8)	30 (71.4)	207 (68.8)	12 (100)
Known Coronary Artery Disease	6 (28.6)	21 (67.8)	38 (46.9)	35 (83.3)	183 (60.8)	12 (100)
Risk Factors						
Current Smoker[†]	13 (61.9)	20 (64.5)	18 (22.2)	15 (35.7)	33 (11.0)	5 (41.7)
Family history[‡]	6 (28.6)	10 (32.3)	8 (9.9)	5 (11.9)	12 (4.0)	1 (8.3)
Prior Myocardial Infarction	3 (14.3)	3 (9.7)	15 (18.5)	6 (14.3)	49 (16.3)	3 (25.0)
Prior Percutaneous Coronary Intervention	16 (76.2)	29 (93.5)	70 (86.4)	33 (78.6)	241 (80.1)	10 (83.3)
Prior Coronary Artery Bypass Graft	1 (4.8)	4 (12.9)	7 (8.6)	5 (11.9)	47 (15.6)	1 (8.3)
History of Atrial Fibrillation	1 (4.8)	1 (3.2)	16 (19.8)	1 (2.4)	17 (5.6)	2 (16.7)

SA NSTEACS Retrospective Case Note Cohort Study

The study cohort is sourced from patients who were admitted to two public tertiary metropolitan hospitals in South Australia from Jan 2008-Dec 2009.

*Indigenous participant refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

The results are presented as counts (%ages) and all %ages were rounded up to the nearest integer.

[†] Current smoker is defined as any smoking within the past 12 months.

[‡] Family history of coronary artery disease was reported by the patient i.e. first degree relative under the age of 60 years who has had a vascular disease/condition diagnosed.

Diagnostic Angiogram

Table 3.3 Study population characteristics and likelihood of receiving a diagnostic coronary angiogram

Study Factor			**Angiogram**		**Rate**	**95% CI**	**Sig.**
			N	%	Ratio	RR	
Demographics							
Age	<50		45	86.5	1.00		
	50-64		86	70.0	0.81	0.70;0.93	0.004
	65+		126	40.3	0.47	0.38;0.56	<0.001
Gender	Male		138	58.5	1.00		
	Female		119	47.2	0.81	0.66;0.99	0.035
Status	Non-Indigenous		194	48.1	1.00		
	Indigenous‡		63	74.1	1.54	1.31;1.81	<0.001
Transfer to Metropolitan Hospital		No	105	34.8	1.00		
		Yes	152	81.7	2.35	1.95;2.83	<0.001
Comorbidities							
Dialysis		No	247	52.9	1.00		
		Yes	8	57.1	1.09	0.66;1.80	0.745
Dyslipidaemia		No	231	51.5	1.00		
		Yes	26	66.7	1.30	1.04;1.16	0.020
Diabetes		No	144	50.2	1.00		
		Yes	113	56.2	1.12	0.95;1.32	0.166
Hypertension		No	87	53.1	1.00		
		Yes	169	52.6	0.99	0.83;1.18	0.933
Known Coronary Artery Disease		No	119	61.7	1.00		
		Yes	138	46.8	0.76	0.63;0.91	0.002
Risk Factors							
Current Smoker		No	182	47.4	1.00		
		Yes	75	72.1	1.52	1.29;1.79	<0.001
Prior Myocardial Infarction		No	228	55.8	1.00		
		Yes	29	36.7	0.66	0.50;0.87	0.004
Prior Percutaneous Coronary Intervention		No	23	25.8	1.00		
		Yes	234	58.6	2.27	1.59;3.24	<0.001
Prior Coronary Artery Bypass Graft		No	235	55.6	1.00		
		Yes	22	33.8	0.61	0.43;0.86	0.005
Cardiac biomarker							
Elevated Troponin >0.02ng/mL¶		No	107	50.7	1.00		
		Yes	150	54.1	1.07	0.90;1.27	0.461
Revascularisation							
Percutaneous Coronary Intervention		No	141	37.9	1.00		
		Yes	116	100.00	2.64	2.28;3.06	<0.001
Coronary Artery Bypass Graft		No	235	50.7	1.00		
		Yes	22	91.7	1.81	1.57;2.09	<0.001
In-hospital death							
Death		No	256	54.2	1.00		
		Yes	1	6.3	0.12	0.12;0.79	0.027
Outcome at 12 months							
Rehospitalisation		No	160	61.1	1.00		
		Yes	97	42.9	0.70	0.58;0.85	<0.001
Percutaneous Coronary Intervention		No	242	52.0	1.00		
		Yes	15	65.2	1.25	0.91;1.73	0.172
Coronary Artery Bypass Graft		No	239	51.6	1.00		
		Yes	18	72.0	1.39	1.07;1.82	0.015
Death		No	253	53.2	1.00		
		Yes	4	33.3	0.63	0.27;1.46	0.280

SA NSTEACS Retrospective Case Note Cohort Study *Australian Guidelines for the Management of Acute Coronary Syndromes 2006 specify the eligibility criteria for diagnostic coronary angiography.

All %age values are rounded up to nearest integer. †The results are presented as %ages (counts), except for Age (year) which is reported as mean (Standard Error of the Mean).

[‡] Indigenous participant refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

[†] Transfer to metropolitan hospital refers to the patient being transferred from other sites to the study centre for a cardiac investigation and/or treatment such as diagnostic coronary angiogram or revascularisation.

[§] Smoker is defined as any smoking within the last 12 months.

[¶] An elevated troponin was defined as a value >0.02 ng/mL per ESC. Current international criteria for the diagnosis of myocardial infarction have a strong emphasis on biomarkers, specifically troponin, given its high sensitivity, and in particular specificity for myonecrosis.

Table 3.3 shows the bivariate analysis that examined factors associated with angiogram including age, Indigenous status, transfer to metropolitan hospital, lifestyle risk factors and revascularisation. Patients age 50-64 were19% less likely than those aged under 50 years to have an angiogram (RR 0.81, 95% CI 0.70-0.93). Patients over 65 years of age were 53% less likely to receive an angiogram than those aged 18-49 years (RR 0.47, 95% CI 0.38-0.56). Women were 19% less likely than men to receive an angiogram (RR 0.81, 95% CI 0.66-0.99). Patients with known CAD were 24% less likely to receive angiography than patients without known CAD (RR 0.76, 95% CI 0.63-0.91). A current smoker was 52% more likely to undergo angiography than a non-smoker (RR 1.52, 95% CI 1.29-1.79). A patient with prior PCI was more than twice as likely to have an angiogram as a patient without prior PCI (RR 2.27, 95% CI 0.1.59-3.24). A patient in the study who received angiography was 40% less likely to die within 12 months of discharge, than one who did not receive angiography (RR 0.63, 95% CI 0.27-0.1.46).

Medication on Discharge

Table 3.4 Study population characteristics and likelihood of receiving recommended medications on discharge

Study Factor			Medication		Rate Ratio	95% CI RR	Sig.
			N	%			
Demographics							
Age	<50		42	80.8	1.00		
	50-64		94	76.4	0.95	0.81;1.10	0.478
	65+		165	52.7	0.65	0.54;0.78	<0.001
Gender	Male		162	68.6	1.00		
	Female		139	55.2	0.80	0.71;0.91	0.001
Status	Non-Indigenous		229	56.8	1.00		
	Indigenous‡		72	84.7	1.49	1.30;1.71	<0.001
Transfer to Metropolitan Hospital		No	156	51.7	1.00		
		Yes	145	78.0	1.51	1.33;1.71	<0.001
Comorbidities							
Dialysis		No	288	61.3	1.00		
		Yes	12	85.7	1.40	1.12;1.75	0.003
Dyslipidaemia		No	269	59.9	1.00		
		Yes	32	82.0	1.37	1.16;1.61	<0.001
Diabetes		No	166	57.8	1.00		
		Yes	135	67.2	1.16	1.00;1.34	0.046
Hypertension		No	98	59.8	1.00		
		Yes	203	63.2	1.06	0.93;1.21	0.407
Known Coronary Artery Disease		No	121	62.7	1.00		
		Yes	180	61.0	0.97	0.85;1.12	0.699
Risk Factors							
Current Smoker		No	220	57.3	1.00		
		Yes	81	77.9	1.36	1.18;1.56	<0.001
Prior Myocardial Infarction		No	256	62.6	1.00		
		Yes	45	57.0	0.91	0.76;1.09	0.311
Prior Percutaneous Coronary Intervention		No	40	44.9	1.00		
		Yes	261	65.4	1.46	1.17;1.81	0.001
Prior Coronary Artery Bypass Graft		No	262	61.9	1.00		
		Yes	39	60.0	1.03	0.81;1.30	0.792
Cardiac biomarker							
Elevated Troponin >0.02ng/mL¶		No	140	66.4	1.00		
		Yes	161	58.1	0.88	0.75;1.02	0.095
Revascularisation							
Percutaneous Coronary Intervention		No	200	53.7	1.00		
		Yes	101	87.0	1.62	1.45;1.81	<0.001
Coronary Artery Bypass Graft		No	282	60.8	1.00		
		Yes	19	79.2	1.30	1.05;1.61	0.015
Outcome at 12 months							
Rehospitalisation		No	166	63.4	1.00		
		Yes	135	59.7	0.94	0.83;1.07	0.366
Percutaneous Coronary Intervention		No	283	60.9	1.00		
		Yes	18	78.3	1.29	1.01;1.64	0.041
Coronary Artery Bypass Graft		No	286	61.8	1.00		
		Yes	15	60.0	0.97	0.69;1.37	0.868
Death		No	292	61.3	1.00		
		Yes	9	75.0	1.22	0.90;1.66	0.196

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*Australian guidelines for the management of acute coronary syndromes, 2006, specify the eligibility criteria for recommended medication on patient discharge.
All %age values are rounded up to nearest integer.

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‡Indigenous participant refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

[†] Transfer to metropolitan hospital refers to the patient being transferred from other sites to the study centre for a cardiac investigation and/or treatment such as diagnostic coronary angiogram or revascularisation.

[§] Smoker is defined as any smoking within the last 12 months.

[¶] An elevated troponin was defined as a value >0.02 ng/mL per ESC. Current international criteria for the diagnosis of myocardial infarction have a strong emphasis on biomarkers, specifically troponin, given its high sensitivity, and in particular specificity for myonecrosis

The likelihood of receiving medications on discharge was significantly influenced by age, gender, Indigenous status, comorbid burden and revascularisation (Table 3.4). A patient over 65 years of age was 35% less likely than a patient aged between 18-49 years to receive the recommended medications (RR 0.65, 95% CI 0.54-0.78). Women were almost 20% less likely to receive the recommended medications (RR 0.80, 95% CI 0.71-0.91), while Indigenous patients were almost 50% more likely to receive recommended medications (RR 1.49, 95% CI 1.30-1.71). Patients with diabetes were more likely to receive medications on discharge. A patient who had received percutaneous (RR 1.62, 95% CI 1.45-1.81) or surgical revascularisation (RR 1.30, 95% CI 1.05-1.61) was more likely to receive medications on discharge.

Multivariate Analysis

Table 3.5 Multivariate analysis on the likelihood of angiography and recommended medications on discharge by Indigenous status

Outcome of interest	Model-based estimate								
	Model 1*			Model 2[§]			Model 3[†]		
	RR	95% CI	Sig.	RR	95% CI	Sig.	RR	95% CI	Sig.
Angiography[¶]									
Non-Indigenous	Base Reference								
Indigenous‡	1.54	1.31;1.81	<0.001	0.91	0.76;1.09	0.305	0.92	0.75;1.13	0.449
Medications[§§]									
Non-Indigenous	Base Reference								
Indigenous	1.49	1.30;1.71	<0.001	1.22	1.06;1.42	0.006	1.19	1.01;1.40	0.035

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*Model 1 (crude) The risk ratio is derived from the matched bivariate analysis, with no adjustment for age, gender or propensity score.

[§] Model 2 (adjusted) The risk ratio is derived from a matched cluster that is adjusted for age (current practice for adjusting for age) and gender.

[†] Model 3 (adjusted) The risk ratio is derived from a matched cluster that is adjusted for age, gender and propensity score. The propensity score includes cardiovascular risk factors (hypertension, diabetes, smoking status), history of previous infarction, percutaneous or surgical revascularisation, hemodynamic condition (positive troponin release).

[¶] Australian Guidelines for the management of Acute Coronary Syndromes 2006 specify the eligibility criteria for diagnostic coronary angiography and describe the recommended medication on patient discharge.

‡ Indigenous participant refers to Aboriginal and Torres Strait Islander Australians. Indigenous status was recorded if identified by the patient on admission.

§§Australian guidelines for the management of acute coronary syndromes 2006 specify the eligibility criteria for recommended discharge medications i.e. aspirin, clopidogrel, angiotensin-converting enzyme inhibitor or angiotensin receptor antagonist, β blocker and statin. If three of the five recommended medications were prescribed on discharge, the case was assessed as being concordant to the guidelines.

The results of the generalised linear models are presented in Table 3.5. For angiography, Model 1 demonstrates that Indigenous patients are over 50% more likely than non-Indigenous patients to receive angiography. However, adjustment for age, sex and propensity score reduced this effect to non-significance (RR 0.92, 95% CI 0.75-1.13).

The relationship between Indigenous status and recommended medications illustrated more variation between the models. Model 1 demonstrates that Indigenous patients are almost 50% more likely to receive the recommended medications. Adjustment for age, sex and propensity score reduced this effect, but demonstrated that Indigenous patients were still almost 20% more likely to receive the correct medication (RR 1.19, 95% CI 1.01-1.40).

Discussion

Our study found that Indigenous subjects are significantly younger, present later in the disease process and have a higher burden of cardiovascular risk factors, when compared to non-Indigenous patients. While there was access to angiography and an appropriately higher use of guideline-based medication therapy for Indigenous patients, adjustment for their substantially younger age revealed a slightly lower likelihood of undergoing angiography.

There are two main reasons for performing coronary angiography in the setting of high risk NSTEACS. Typically it is used as a prelude to revascularisation to mitigate the risk for further events, and to a much lesser extent, it acts as a diagnostic test where there is doubt associated with underlying pathophysiology.(3) However, there are a number of factors that impact on the likelihood of angiography being performed, including accessibility to the service, clinician familiarity with existing treatment guidelines, consideration of procedural risk versus benefit, and patient preference.(3, 11) Procedural risk is determined by the extent of comorbid disease in the individual patient, while benefit is assessed according to the level of risk imposed by not intervening. In practice, clinicians tend to adopt an interventional approach when procedural risk is deemed lower, and risk considerations may carry greater weight than estimates of benefit in decision making. As risk increases, (characterised by increasing age, increasing burden of diabetes, renal disease and increasing comorbidities) the use of angiography declines and management tends towards medical therapy as an initial strategy.(3, 12-14) It is possible that, for secondary events, clinicians are more inclined to be influenced by procedural risk than by the overall risk profile of the patient. Decision making may also be influenced by the knowledge that less than half of all patients undergoing angiography actually proceed to revascularisation, with much of the risk mitigation for secondary events being driven by appropriate medical therapy.

The Indigenous cohort in this study had a higher level of comorbid disease, despite a significantly younger mean age, and this may have influenced the rate of angiography. Usually, increasing age would be expected to have an inverse relationship with angiography use, largely influenced by the increasing burden of comorbidities as people age.(5) The premature accrual of comorbidities in Indigenous patients appears to strongly and negatively influence the use of angiography, to a greater extent than the influence that age usually has on decision making about treatment regimes. There are other factors influencing the use of angiography that are not well understood, such as the observed lower rate of angiography for females with high risk ACS.(15, 16) Interestingly, Indigenous females in the current study were just as likely as Indigenous males to undergo angiography, and more likely than non-Indigenous females to undergo angiography.

In contrast to angiography, evidence-based medical therapy is widely available, generally well tolerated and utilised for patients with both low and high burdens of comorbid conditions. The use of guideline-based medical therapy is largely determined by clinician familiarity with guidelines and patient tolerance of medications.(3) Indigenous patients were more likely to receive guideline-compliant medications than non-Indigenous patients. This may be in response to the higher burden of comorbidities, prompting an increased likelihood of prescribing pharmacological therapies. Alternatively it may be an indication that clinicians have adopted a more aggressive approach to medication therapies to compensate for reduced access to angiography.(17)

This study demonstrates that Indigenous patients presenting with high risk NSTEACS have the same likelihood of access to angiography as non-Indigenous patients, with all else (except age) being roughly equal. Importantly, however, the age adjusted analysis reveals a significant discrepancy in utilisation of angiography for Indigenous patients. This observation is common across a number of studies. The results suggest the majority of differences observed between Indigenous and non-Indigenous populations, with regard to angiography use, are driven by accelerated comorbid disease burden. Importantly, adjusting for age was influential in highlighting the differences between the Indigenous and non-Indigenous study cohort. In essence, at any given age, Indigenous subjects have a greater load of both established vascular disease and comorbidities. Furthermore, clinical decision making for patients with high risk NSTEACS may be strongly influenced by these factors, rather than by age alone.

The mitigation of this disparity in risk could be approached with a two-pronged strategy. Improved compliance with guideline-based therapies, including angiography and recommended medication, is clearly important. However, a greater challenge is to ensure that Indigenous patients with CVD access the tertiary health system at a much earlier stage of the disease process than currently occurs (Figure 3.2).

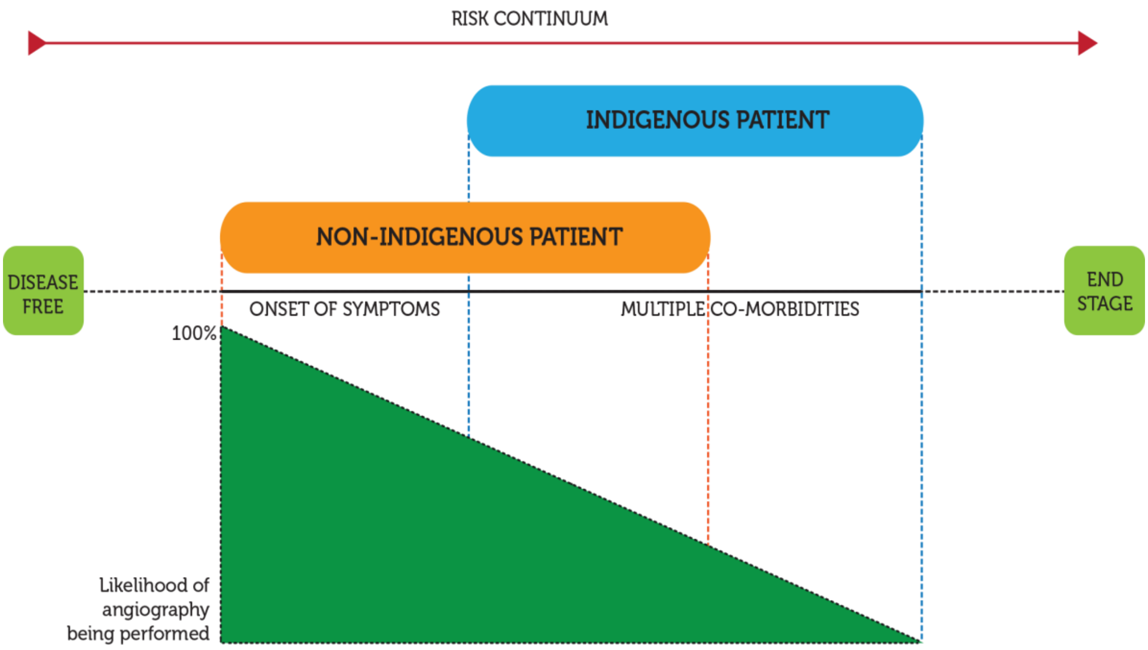

Figure 3.2 A schematic of the natural history of cardiovascular disease throughout life.

The schematic demonstrates that Indigenous patients are more likely to present at a later stage of disease than non-Indigenous subjects. The challenge is to ensure that Indigenous patients have access to tertiary care at a much earlier point in the disease process and accrue CVD risk factors at a much slower rate that reflects that of the broader population.

Limitations

There were a number of limitations to be considered in interpreting our data. As this was a retrospective review, there was data missing on some clinical indicators such as frailty and severity of CAD, patient preference and/or clinician recommendations. Both hospitals included in this study have onsite cardiac catheterisation facilities, thus increasing the likelihood of angiography. However, a significant proportion of the Indigenous cohort had been transferred into the study centres from rural locations. These factors allow for potential selection bias and the rate of intervention seen for the Indigenous cohort may be over-estimated, compared to the non-Indigenous cohort with its lower rate of transfer from referral centres.

Conclusion

The younger age and significantly higher risk profile of Indigenous adults presenting to SA hospitals with ACS appears to lead to different management decisions, which may well be driven by client factors. Many of these risk conditions can be better managed in the primary care setting.

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3.1 Study three

What indicators of Indigenous patient engagement can be identified in the patient record? A retrospective descriptive study.

> *'If you want to be involved in Aboriginal health, my best advice honestly is to involve Aboriginal people in a true partnership. And when I say true partnership, I tell people don't come to us asking what colour car we want after you bought it. Come to us when we talk about what sort of vehicle we need to actually get to where we want to go. Let's sit down and talk from there because we can work that out with you.'*
>
> Dr Arnold 'Puggy' Hunter

Abstract

Aim: To assess the usefulness of patient records to identify indicators of patient engagement for Indigenous patients admitted to hospital for acute cardiac care.

Methods: A retrospective review of 84 patient records at two metropolitan public hospitals from December 2007 to December 2009.

Results: Three overarching themes of patient engagement were identified: communication, compliance and cultural competence. All clinician-patient communication was in English, although a quarter of patients' records identified language or communication problems. The involvement of families resulted in an improved exchange of clinical information. Compliance appeared to be the responsibility of the patient. Only one measure of cultural competency was identified: the involvement of an Aboriginal Liaison Officer (ALO). Less than half (46%) of patients accessed the ALO, implying a lack of system wide protocols for utilising the ALO. In addition, it was the clinicians who determined access to the ALO.

Conclusion: This study provides an opportunity to examine how information about patient engagement can be included in the medical records to assist in the improvement of patient care for people with cardiac disease.

Implications: The study results raised the question of whether clinician-patient engagement should be defined as an indicator of quality of care and an outcome measure of in-hospital care. A potential outcome measure of clinician-patient engagement would be to quantify the level of patient understanding of their condition and treatment regime, and its long-term implications.

Background

Cardiovascular disease contributes to almost a quarter of the ‘gap’ in Indigenous life expectancy, resulting in Indigenous Australians being three times more likely to have a heart attack and nearly twice as likely to die from heart disease.(1, 2) Cardiovascular disease is a precursor to Acute Coronary Syndrome (ACS) and recent studies have reported disparities in the treatment received by Indigenous Australians, compared with other Australians who are diagnosed with ACS. The reasons for this treatment differential have not been conclusively identified.(3-5) However, it has been suggested that it may be, to some degree, attributable to a lack of engagement of Indigenous patients with health care services.(3, 6)

In the health care sector, the term ‘engagement’ refers to ‘a deliberate effort and commitment [by the health consumer] to working toward [the goals] with treatment providers.’(7 p.753) This definition has been further expanded to encompass a number of aspects that influence the ability of the consumer to work effectively with health providers to achieve treatment and management goals.(8) These include access to health care providers, information sharing, involvement of the patient in decision making and self-care activities, respect and support of the provider for the patient’s choices, and management of patient concerns.(7, 8)

Research on interactions and engagement between clinicians and Indigenous patients usually involves interviews, focus groups, questionnaires, hospital administrative data and observational methods.(6, 9-12) The patient medical record however, is potentially an additional and currently under-utilised data source for measuring patient engagement. A primary purpose of the medical record is to assist in the continuity of patient care by communicating clinical information and care planning among treating clinicians.(13) It is also a tool for evaluating the adequacy and appropriateness of patient care in order to assess quality and safety.(13, 14) Importantly, it is a statutory requirement of all health providers to record this information, making them the most commonly documented record of clinician patient interactions.(13, 15) However, little is known about how useful medical records may actually be in assessing or evaluating patient engagement.

Given the importance of patient engagement to achieving improved health outcomes, this study aimed to assess the usefulness of patient records as a means to identify indicators of patient engagement for Indigenous patients admitted to hospital for ACS.

The study was approved by the University of South Australia's Human Research Ethics Committee, the Queen Elizabeth Hospital Human Research Ethics Committee, the Royal Adelaide Hospital Ethics Committee and the Aboriginal Health Council of South Australia Research Ethics Committee.

Researcher standpoint

A common limitation in research undertaken by non-Indigenous researchers is a lack of adequate understanding or incorporation of Indigenous social realities, histories and experiences.(16) As an Aboriginal woman, the primary researcher and first author (YR) applied an Indigenous lens to this research. Indigenous researchers can bring Indigenous values and ways of knowing to the forefront in their research approach to strengthen analysis and contribute rigour to scientific processes. An Indigenous lens provides a counter narrative to Indigenous health research, which is often otherwise problematised and pathologised.(17, 18)

Methods

Study design and cohort selection

A retrospective medical file review of Indigenous patients who were admitted with high-risk non-ST-elevation acute ACS was undertaken from March-November 2013 at two major metropolitan hospitals in South Australia. Patients included in the review were identified from an earlier study that investigated the probability of Indigenous patients receiving recommended interventional and therapeutic care for the condition.(19)

Data source

Information extracted from the patient medical records included demographic data, patient history of cardiovascular disease, related clinical presentations, and in-hospital treatment. A 'Patient Engagement Audit Tool' (Appendix A) was developed by the first author, derived from current literature describing Indigenous patients' experiences of engagement with health care services.(6, 10, 20, 21) Proxy indicators of effective engagement were identified and the final collection template contained eight variables that included quantitative measures and open ended text boxes (Table 3.6).

Table 3.6 Patient engagement items, definition and proxy measures

Grouping	Definition	Categorisation
Patient escort	A person who accompanies the patient to the study hospital. The escort may include a spouse, sibling, adult child, family member or advocate.(10)	Communication, cultural competence
Aboriginal Liaison Officer (ALO) Contact	ALOs provide a liaison service to Indigenous patients admitted to the study hospital. This may include emotional, social and cultural support to patients and their families; advocacy and liaison on behalf of patient and families; providing information about hospital services and assisting with referrals to Indigenous and non-Indigenous organisations.(22, 23)	Communication, compliance, support, cultural competence
Multi-disciplinary health team Interaction	Clinicians from a multi-professional health team comprising of, but not limited to, a dietician, a physiotherapist, a social worker, a cardiac nurse, an occupational therapist and a pharmacist.	communication, compliance
Medication Compliance	The extent to which the patient continues the agreed-upon mode of treatment.(23)	communication, compliance
Management Action Plan	Evidence the patient had been provided with one of three care plans: Chest Pain Action Plan, Rehabilitation Plan, Angina Management/Action Plan.(24)	communication compliance
Discharge letter	A communication document used to summarise a hospital stay that is usually addressed to the patient's primary care physician.	communication, compliance
Hospital arranged post-discharge appointment	Post-discharge cardiac care appointment with a consulting cardiologist or Specialist or rehabilitation service provider.	communication
Mental Health and Social and Emotional Wellbeing issues	Refers to an assessment, presentation and/or discussion of psychological distress, impact of psychological distress, positive wellbeing, anger, life stressors, discrimination, cultural identification and removal from natural family.(25)	communication;, compliance, cultural competence

Analysis

Descriptive analysis

Baseline patient characteristics are reported using frequencies and percentages for categorical variables, and mean and standard deviations (SD) for continuous variables. Comparisons of the characteristics according to gender were made using χ^2 tests or t-test or the corresponding non-parametric tests. All analyses were performed with Stata software, version 11 (College Station, TX, USA).

Qualitative descriptive content analysis

Analysis of the qualitative data was based on descriptive content analysis and categorisation of themes into the proxy indicators building on the data collected from the Patient Engagement Audit Tool.(26) Analysis involved checking, grouping and categorising the data by two researchers, who negotiated a consensus on the final coding.

Results

Patient characteristics

There were 85 eligible participants identified from the baseline study (41 males and 44 females). While records for two female patients were not located one of the male patients was found to have duplicate records. The medical records of 84 patients admitted with non-ST elevation were included in the retrospective medical record review.

There were no statistically significant differences in risk characteristics between males and females. The patients had a median length of stay of 3-3.5 days and 21% arrived at the hospital with an escort. Over three-quarters (79%) of the cohort had co-morbid diabetes, 75% had hypertension and 50% self-reported current tobacco smoking on admission.

Almost half the patients (38/84) had contact with an Aboriginal Liaison Officer (ALO) during their admission. Over three-quarters (65/84) interacted with allied health team members, most commonly pharmacists, diabetic nurse educators or physiotherapists. Relatively few patients (11/84) had discharge action/management plans documented in their medical record and for those who did; the plans addressed management of ongoing chest pain or rehabilitation. The review found that over 90% (77/84) of patients had a discharge letter filed in their medical record and 64/84 of patients had a post-discharge specialist appointment scheduled. Eleven patients were advised to make their own arrangements for follow-up with their general practitioner after discharge. Just over a third of the patients (36%) had a mental health diagnosis recorded in their medical record with the most common diagnoses being anxiety and/or depression (Table 3.7).

Table 3.7. Engagement proxy measures for Indigenous patients diagnosed with non-ST-elevation acute coronary syndrome

Engagement Proxy Measures (Audit Tool)	N=84 n(%)
Aboriginal Liaison Officer contact	38 (46)
Multi-disciplinary health team Interaction	65 (78)
Medication Compliance	51 (61)
Management Action Plan	11 (14)
Discharge letter	77 (92)
Hospital arranged post-discharge appointment prior to discharge	64 (76)
Patient to arrange post-discharge appointment	11 (14)
Mental health diagnosis and/or social and emotional wellbeing issues	30 (36)

Source: SA NSTEACS Retrospective Case Note Cohort Study – Patient Engagement
The study cohort is sourced from Indigenous patients who were admitted to two public tertiary metropolitan hospitals in South Australia. Indigenous participant refers to Aboriginal. Indigenous status was recorded if identified by the patient on admission. The results are presented as counts (percentages).

Proxy Indicators

Communication

Effective cross-cultural communication skills are critical. While two-way understanding can result in agreed strategies to manage a patient's health problems, communicating cross-culturally is not straightforward and associated complexities may impact on the quality of patient engagement.(11, 27, 28) As evidenced from the medical records, all communication between the clinicians and patient in this study was in English, in spite of a number of patients coming from remote areas where English was not their first language. Other recorded barriers to communication included references to patients' hearing impairment, not being literate or numerate, limited English or having English as a second language. There was no record of an interpreter being used if the patient did not have a clear understanding of English. There was only one instance recorded where an Aboriginal Liaison Officer (ALO) was requested by nursing staff to assist in communicating with a patient. This nurse wrote that:

> *The Aboriginal Liaison Officer was requested to visit the patient when the patient refused to speak.* [The ALO explained that] *the patient* [who had chronic kidney disease] *was concerned about fasting prior to undergoing the procedure.* (N15)

Patients were frequently described as being poor historians by virtue of being unable or inconsistently able to recall clinical information, or because they were shy and not communicative. For example:

> *… unsure of patient's understanding of English - appears good but patient not verbally communicating a lot.* (N64)
>
> *... patient poor historian, very shy and difficult to gain a response from.* (N18)

Families were reported as assisting with clinician-patient communication. For example, when documenting one patient's clinical history one pharmacist wrote that:

> *The daughter provided medical history* [patient lives with daughter]. (P36)

In another example, family members were seen as an important factor in supporting complex patient decision-making and then communicating the request to the clinician. A specialist wrote that:

> [The patient] *did not want surgery until discussed with family, after discussing it with family the patient was happy to have the BKA* [below the knee amputation]. (D10)

The importance of family being present to support the patient and assist with communication is also captured in the following notations:

> *Patient seemed very confused and disoriented when waking, daughter come to stay with patient, more settled now* [lives with daughter]. *Daughter said her mother had also been confused the last couple of nights at* [the regional hospital], *daughter is supportive.* (N24)
>
> *Daughter assisted with ADL's* [Activities of Daily Living] *and checking BSL* [blood sugar level]. (N54)
>
> *Daughter in attendance most of the shift,* [the] *patient agitated, attempting to get out of bed, disorientated for time and place, daughter in residential wing stayed on the ward with patient, more settled. Daughter arranging for monitor and glasses to be sent to* [hospital]. (N6)

Compliance

The World Health Organisation defines compliance as 'the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.'(29 p3) Compliance is strongly associated with engagement as it seeks to achieve optimal health outcomes for the patient.(7) Compliance is facilitated through the nurturance of trust in the clinician-patient relationship while also providing an insight into the patient's knowledge and understanding of treatment strategies or pharmacological regimes.(30-32)

Patients diagnosed with Type 2 Diabetes appeared to be commonly described as having poor compliance in relation to their medication. The reported reasons for poor compliance included: the patient had not regularly collected medication from local pharmacy; the patient had forgot to take medication; and, the patient had a low level of understanding of medications. One pharmacist wrote that:

> *Discussed T2DM* [Type 2 Diabetes] *control, dietary and lifestyle advice,* [the patient] *said 'that he has not taken medication in two weeks and asked for different medications', contacted* [the patients local] *pharmacist* [who] *'knew the patient and advised that* [the patient] *did not pick up his medication regularly and was known as non-compliant.' I cannot be sure patient will be compliant with medication since he did not take any medication for the fortnight.* (P41)

Conversely, there were records that described 'good' compliance. These patients usually had an existing chronic illness, independently managed their medications and family members were included in the medication and treatment education. This is demonstrated in the following extract:

> *The patient* [daughter present], *was given dietary and lifestyle advice, was observed to be medication compliant and we* [nurse, patient and daughter] *discussed the changes to medication, patient showed good understanding of insulin therapy including the insulin pen, storage, dose and the needles ordered and provided to the patient.* (N7)

An example of 'poor' compliance is captured in the following notation by a nurse who described how a patient had discharged herself against medical advice and had remained engaged with her local health provider.

> [The nurse] *contacted the* [remote] *community clinic* [where the patient resided] *and* [was] *advised that* [the patient] *has contacted the clinic and has told them she will be coming by bus on Friday.* [Advised] *clinic staff to advise* [the patient] *to do her health review at* [the regional] *hospital. (N78)*

Strategies to assist compliance post-discharge were recorded in the medical records. On discharge, patients were advised that their GP would coordinate clinical services such as monitoring blood sugar level, smoking cessation advice, and referrals. Many patients did not identify a named GP as their primary provider of healthcare. Fifty percent of the patient records recorded an Aboriginal Community Controlled Health Service or a Community Health Clinic as their primary health care provider. Three patients stated that they accessed health care from a specialist health service (i.e. dialysis centre or diabetes centre) and a further three patients were incarcerated and accessed health care from the Department of Correctional Services.

Two hospital pharmacists wrote that:

> [The patient] *is non-compliant, explained all new medication, and* [the patient] *agreed that* [the hospital pharmacist] *will liaise with community pharmacy managing meds. The local pharmacy was contacted to update medication records and arranged for dispensing of medication and dose aids.* (P33)
>
> *T2DM poorly controlled, discussed with patient strategies to reduce weight, hypo* [hypoglycaemia] *management discussed with patient,* [the pharmacist] *will write discharge plan for correctional services, insulin education session.* (P26)

Cultural Competence

Cultural competence acknowledges and respects the difference between people while facilitating a process for health professional's work in a cross-cultural situation. Cultural competence has been defined as:

> A set of congruent behaviours, attitudes, and policies that come together in a system, agency, or among professionals that enable them to work effectively in cross-cultural situations. (33 p.iv)

In practice, it requires the clinician to acknowledge the cultural differences between the Indigenous patient and themselves, and the integration of attitudes, values, knowledge, understanding and skills to facilitate effective interventions with the client.(22) Health services aim to bridge this cultural divide by establishing Aboriginal Health Units that employ ALOs.(23, 34)

Almost half (46%) of the records included evidence of involvement of ALOs, who were requested to perform a variety of tasks with the health staff and for patients. Aboriginal Liaison Officers documented a broad range of activities that they undertook, for example;

> [The patient] *wanted to know what's going on, saying that 'the nurse isn't telling her',* [ALO] *explained that medical staff are waiting for test results and encouraged the patient to ask the nurse and doctor questions if she had concerns.* (A12)

> [ALO] *arranged patient accommodation at* [a local Aboriginal hostel] *and contacted community clinic regarding transport* [for the patient to return home]. (A17)

> [During an ALO support visit] *the patient asked* [the ALO] *to contact family to inform how* [the patient] *is going and have* [the family] *ring* [the patient]. [The patient] *lives with daughter, who is coming to Adelaide.* (A5)

Discussion

This descriptive study aimed to assess whether patient records were an appropriate source for identifying indicators of patient engagement for Indigenous patients with ACS. The content analysis found some evidence of patient engagement for Indigenous patients and the findings were categorised into three overarching themes: communication, compliance and cultural competency.

Communication

Cass and colleagues (2002) reported that miscommunication between the patient-clinician was pervasive yet often went unrecognised, especially with regard to diagnosis, treatment and prevention.(27) Brown (2010) and Artuso and colleagues (2013) reported similar findings, which consequently resulted in a diminished level of trust in the clinician. Patients became frustrated that they were not able to understand the information often contributing to negative experiences.(3, 6) In this study, miscommunication between patient and clinician was evident, with a quarter of patient records identifying issues around problems with communication. Although the remaining charts did not record problems, one should not assume from this that, from the patients' perspective, they did not occur. Communication problems appeared to be identified through the lens of the clinicians understanding of the exchange, rather than through a shared understanding of the clinician-patient interaction.

This study found that all clinician-patient communication was in English only, in spite of a quarter of patient records identifying language or communication problems. Health care providers are commonly acknowledged for using medical terms and jargon, and it requires a skilled communicator to effectively relay complex information about such things as diagnosis, pathology, pharmacology and invasive interventions.(6) Indigenous people throughout Australia are linguistically and culturally diverse. Patients may, for example, speak standard English, Aboriginal English, Kriol and/or their traditional languages.(35) The reliance on didactic exchange may obscure other more subtle forms of non-verbal cues, such as body language and silence.(27, 28) Our findings are consistent with Cass et al., suggesting that failing to acknowledge communication barriers contributes to an attitude of complacency. Identifying these barriers is important and proactively seeking a solution to overcome them is essential.

Brown reported that when families were excluded from decision making processes around further investigation or treatment, patients were less likely to communicate with clinicians and subsequently were more likely to become withdrawn.(9) This study found that when families were present they provided emotional support during times of distress or fear, assisted the patient with decision making for treatment and care, assisted with activities of daily living, acted as cultural brokers and assisted with clinician-patient communication. Family involvement appeared to be an important factor in facilitating two-way communication between the clinician and patient.

Compliance

Compliance is a biomedical social construct that implicitly represents how the clinician evaluates the patient's ability to adhere to prescribed health care.(32, 36) This study found that poor diabetic control was often recorded as being the result of the patient not complying with the prescribed medical therapy. Compliance appeared to be reported as the sole responsibility of the patient, inadvertently inferring that if the patient only modified their psychosocial behaviour, compliance would improve. Rather than relying solely on an institution-centric approach, compliance needs to be reconceptualised to include a therapeutic relationship that is focused on a shared understanding, problem solving and goal setting.

A therapeutic relationship between clinician and patient provides an opportunity to negotiate healthcare that is more acceptable to the patient and will therefore potentially increase the effectiveness of health service delivery and health outcomes.(31, 37) For example, in this study compliance was described only as medication and treatment adherence. However, previous research has found that poor compliance may be symptomatic of a broader social discourse rather than individualised intervention.(3, 6) The medical records contained no reference to the structural macro-social factors (political landscape and institutions) or distal social connections (neighbour and community) that have a downstream effect on proximal social connections (family and friends)(38) and may impede patient agency to adhere to care. A therapeutic relationship could be a mechanism to negotiate agreed strategies that become shared responsibilities, rather than the onus being solely on the patient. For this form of relationship to occur, clinicians need to be self-reflective and focus more broadly on the practice of health care rather than focusing solely on the patient's behaviour.(36)

Cultural competence

This study found that there was a sole measure of cultural competency recorded in the patient record: the involvement of ALO as a cultural broker. Both hospitals employed ALOs from Monday to Friday between the hours of 8 am to 4.30 pm and they undertook a multitude of tasks. However, there was little evidence that the ALO had a prominent role in the healthcare provided to Indigenous patients. Less than half (46%) of the charts indicated that Indigenous patients accessed the ALO, implying a lack of system wide protocols for utilising the ALO. The study findings imply that it was the clinicians who determined access to the ALO. This suggests that control rests with non-Indigenous clinicians, who may not value the importance of this cultural component of the health service. Further, the role of the ALO may have been underutilised. Opportunities to support and engage patients can therefore be lost and the potential value of this resource remain unrealized. Taylor and colleagues (2009) found that a dedicated Indigenous workforce reduced Indigenous patients' fears and anxiety.(6) Daws and colleagues (2014) reported that when patients had access to an ALO, they were more likely to attend rehabilitation and engage with other clinicians.(39)

Healthcare providers need to be more attentive to the unique context of Indigenous patients, especially where there is evidence of a disconnect between the clinician and patient that may hinder a therapeutic relationship. Establishing relationships should be done through system wide policy and protocols and not left to individual clinician decision making with no contribution from the patient or liaison with ALOs. The role of the ALO appears pivotal in brokering relationships with clinicians and patients and may play a major role in facilitating increased engagement. To ensure those relationships can be forged; access to an ALO should be extended beyond the office hours currently provided.

Limitations

Study limitations may be the reliability of the patient engagement audit tool. Further work is required to assess whether the tool captures all factors relevant to adequately defining 'patient engagement' in the context of Indigenous health. In addition most clinicians may not think to record aspects of engagement and therefore some level of engagement may have taken place that was not able to be captured. The relatively small sample of records came from two metropolitan hospitals that admit patients from the local jurisdiction, as well as regionally and from interstate. Therefore it cannot be assumed that these findings translate to a wider, heterogeneous Indigenous population across Australia.

Conclusion

This study investigated whether medical records were an appropriate source to identify indicators of patient engagement for Indigenous patients admitted to hospital for ACS. The research found that the records contained some evidence of communication, compliance and cultural competency that could be used to measure patient engagement. The research highlighted the need to more fully capture patient engagement data in patient notes. Importantly, healthcare providers may need to consider the opportunity of improving and recording clinician-patient engagement. This can be achieved by reconceptualising compliance, improving institutional cultural competency that fosters a therapeutic relationship and making more use of existing resources such as ALOs.

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4. Discussion

> *'It's the small things that actually make the difference lots of times and actually just being appreciated that we're all coming from the same place and we're all heading in the same direction.'*
>
> Dr Arnold 'Puggy' Hunter(1)

This research study has investigated the gap between outcomes for Indigenous versus non-Indigenous patients presenting with acute coronary syndrome (ACS). The overarching focus has been to ascertain if there is a difference in treatment patterns and outcomes between non-Indigenous and Indigenous patients in public hospitals for non-ST-elevation acute coronary syndrome (NSTEACS) in South Australia (SA). Using in-hospital data, three separate complementary studies highlighted disparities in the in-hospital treatment.

Two studies investigated the influence of Indigenous status on the provision of cardiac care for patients admitted to hospital with NSTEACS. The first study investigated the proportion of patients who received a diagnostic coronary angiogram out of the total number presenting with NSTEACS. It compared the influence of age, gender and Indigenous status (Study 1). The second study investigated the probability of an Indigenous patient receiving Australian guideline-concordant interventional and therapeutic care for ACS after presenting at two SA metropolitan hospitals. The outcome of interest was whether Indigenous patients diagnosed with NSTEACS received diagnostic coronary angiography and discharge medications as recommended in the Australian guidelines for the management for ACS (Study 2). The third study investigated the utility of medical records for identifying indicators of clinician-patient engagement as a potential factor that may influence Indigenous patients' access to cardiac care (Study 3). Together, these three studies have generated evidence that points to 'small things' (Hunter(1)) that can make a difference to better inform health service policy, practices and monitoring for Indigenous ACS patients in these settings.

This chapter synthesises the main research findings, compares these findings to the current literature, identifies the strengths and limitations of the three investigations and recommends ways to build on the evidence presented in future research.

4.1 Key findings

Findings from the three studies and their implications are summarised in Table 4.1. Findings were categorised into three outcomes of interest, Indigenous status, gender and ‘engagement’, to reflect key factors that may influence treatment trajectories. The implications of each study are classified in terms of their relevance to policy makers, practitioners and researchers. Findings and implications are discussed further below.

Table 4.1 Study findings and implications

Audience	Indigenous status	Gender	Engagement
Practitioners	1. Timeliness, quality and point of care are important for screening, diagnosis and management of vascular disease.		7. Indigenous patients should have 24 hour access to an Aboriginal Liaison Officer (ALO).
Policy makers	2. The study findings extend beyond Indigenous Australians.		8. Clinician-patient engagement should be regarded as a key performance indicator and measure of quality of care that promotes patient-centred care.
Researchers	3. Another marker besides angiography is necessary to assess adequacy of care. 4. A more meaningful measure to assess pharmacological guideline concordance on discharge is required. 5. The life course of chronic disease management needs to be considered, not just a single crisis admission.	6. A more detailed investigation into the gender difference in treatment of ACS is necessary. An Indigenous-specific study, with adequate statistical power is needed.	9. Research exploring the experiences of Indigenous people who are admitted to hospital for a cardiac event that includes asking clinicians about how they engage with Indigenous patients under their clinical care should be undertaken.

4.1.1 Indigenous status

Studies 1 and 2 provide evidence that Indigenous status itself does not appear to influence the level of access to cardiac care recommended by the Australian Guidelines for the Management of ACS. After adjusting for age, gender and comorbidities, Indigenous status was not an indicator of lower likelihood of access to investigation with angiography (RR 0.92, 95% CI 0.75-1.13) or recommended medicinal therapies (RR 1.19, 95% CI 1.01-1.40) on discharge from hospital (Study 2). However, the comorbidity burden that can exclude patients from eligibility for angiography was higher among Indigenous study participants. This excessive burden of illness is influenced by the life-time accrual of risk factors experienced by individuals. It is not Indigenous status alone that appears to be the foremost barrier to accessing specific cardiac interventions such as angiography, at the time of presentation to hospital, and to receiving evidence-based prescriptions on discharge.

Previous studies investigating cardiac care outcomes among Indigenous patients admitted to hospital have found Indigenous status not to be associated with guideline concordant treatment. There are a number of factors that may result in Indigenous patients not receiving recommended treatment strategies, mostly related to the impact of comorbid conditions (especially diabetes) and the capacity of the treating hospital/ geography.(2-5) The findings presented in studies 1 and 2 are supported by outcomes reported by Brown (2010), who found that Indigenous patients were less likely to undergo angiography, (although this result was from an analysis unadjusted for risk factors).(6) Another study investigated whether Indigenous status was a predisposing factor that influenced evidence-based prescribing EBP as recommended in the Australian ACS treatment algorithm.(7) While our study used in-hospital administrative health data, Gausia and colleagues (2014) extracted data from the Western Australian Data Linkage System over a two-year period, resulting in an Indigenous study cohort of 499. The comparison group for their study was a random sample of non-Indigenous patients with similar diagnosis.(7) The state-wide linked data contains a multitude of variables that enabled the binary logistic regression analysis to be adjusted for a greater number of variables such as hospital type and remoteness in order to best isolate the true relationship between Indigenous status and EBP. After controlling for numerous variables in the multivariate analysis, Gausia et al. reported no difference in outcomes between Indigenous and non-Indigenous patients receiving EBP (AOR, 0.94, 95% CI 0.67-1.33).(7) This result is a little different to our findings in Study 2, which demonstrated that Indigenous patients in South Australia were almost 20% more likely to receive their recommended medications (RR 1.19, 95 % CI 1.01-1.40). The differences in outcomes may be associated with the data sources used and the relative sample sizes of the studies conducted for this research, however, the studies point to an opportunity to better understand the impact of medical therapy discharge patterns in different jurisdictions.

Studies 1 and 2 are focused on guideline concordance in the tertiary health sector. Tertiary hospitals have the infrastructure to provide timely life-saving interventions and effective strategies for the long-term management of chronic disease to patients who often present with complex needs. An examination of the treatment disparity in the tertiary sector (Studies 1 and 2) subsequently highlights the need to prioritise efforts aimed at minimising early accrual of disease, by addressing life-time risk factors and increasing access to primary health care providers.

In fact I believe these findings represent a ‘good’ news story for Indigenous people. It is not Indigenous status of itself, but excessive burden of disease resulting in high rates of comorbidity, that appears to result on lower referral for angiography. This does not negate the notion that Indigenous people may be subjected to racism and discrimination during their patient journey, however, our study suggests that being Indigenous is not the headline exclusion criteria to accessing guideline recommended care.

Study 1 and 2 findings brings to the forefront the importance of acknowledging the multi-dimensional concept of Indigenous status. The fact that a disparity in treatment between Indigenous and non-Indigenous patients is explained by other factors (i.e. age, comorbidity, gender) does not mean that there is not disparity. Conversely, if a disparity is not explained by other factors, it does not necessarily mean that there is causal relationship between Indigenous status and outcome of interest. In Study 1 and 2 it may mean that there is uncontrolled confounding. In addition, Indigenous status is not something that is ‘fixed’ and the better we are at understanding what is driving the disparities (i.e. the things for which Indigenous status is a maker), the more we are able target resources to tackle the real causes of ‘inequity’. More importantly, Indigenous status remains a useful indicator to capture our attention to provoke us to reduce disparities in treatment and outcomes.

Cardiovascular disease is mostly preventable and treatable, and there is enormous potential to improve the risk profile of Indigenous people, in terms of both severity and number of coexisting risk factors. These results should galvanise health providers to focus attention on aspects of health care delivery that they can influence positively, especially in the primary care sector. This includes screening regularly and opportunistically, being pro-active in delivering preventive strategies and aggressively embedding chronic disease management strategies in clinical practice. Ideally, these approaches should have broad coverage. Based on the findings from our studies, five implications are provided in relation to practice, policy and research.

Implication 1: Timeliness, quality and point of care are important for screening diagnosis and management of vascular disease.

Acknowledging that illness, wellness, death and access to infrastructure and services that impact on health outcomes occurs within a social, historical and political context is critically important.

Barriers to comprehensive primary health care services continue to perpetuate the poor health status of Indigenous Australians, and the reliance on acute in-hospital care, as a result of failed prevention.(8) Primary health services are pivotal in providing care when it is most needed and are well positioned to aggressively apply evidence-based guidelines to assess the burden of disease, as well as delivering interventions that reduce disease accrual and providing effective treatment options.(9)

Implication 2: The study findings extend beyond Indigenous Australians.

Research has shown that there is inequity of access to ACS acute care across a diverse spectrum in Australia that includes females,(10) rural and remote residents(11, 12) and those in a lower socioeconomic category.(13) The needs of the 'invisible' population of the homeless, or people in long-term incarceration who may require early intervention to prevent an acute cardiac event, may not even be realised. An integrated approach to health service design is paramount to meeting the needs of our culturally diverse and geographically dispersed communities. It is envisaged that insights gained through this study will contribute to improvement in cardiovascular disease health care for all Australians, especially those of low socioeconomic position, those with multiple risk factors, and residents of rural and remote areas.

Implication 3: Another marker besides angiography is necessary to assess adequacy of care.

The intended purpose of the ACS treatment algorithm is to improve and standardise clinical decisions that lead to greater consistency and reduced variability of clinical judgement,(14) and diagnostic angiography is recommended as important for risk stratification.(15) However, access to angiography alone did not appear to be an appropriate indicator of assessing adequacy of chronic disease management care. Angiography is an invasive diagnostic procedure, not without risk, that provides a snap-shot view of the coronary arteries. Angiography provides a window of opportunity allowing clinicians to make assessments for further intervention or medical therapies. Concentrating only on angiography may distract us from the alternative options of non-invasive diagnostic modalities for confirming coronary artery disease (CAD), such as exercise electrocardiography testing or functional imaging. Assessing the patient journey after diagnosis may sharpen our focus on adequacy of care.

Implication 4: A more meaningful measure to assess pharmacological guideline concordance on discharge is required.

An approach to measure concordance that extends beyond prescribed medications on discharge would be to implement a measure that assesses how key stakeholders are included in the discharge planning process and follow-up. This could address for example, modality of medication education delivery, patient feedback on their understanding of medications and long-term chronic disease management implications, and finally a follow-up with a primary health provider to assess whether they have pharmacological information for patient management.

Implication 5: The life course of chronic disease management needs to be considered, not just a single crisis admission.

Chronic disease management encompasses a continuum of care from prevention through to treatment and care management for people with chronic disease.(16) An acute admission presents evidence of cumulated lifetime exposure to damaging physical and social environments. The crisis admission provides an opportunity to provide lifesaving interventions as well as introducing interventions that may modify a temporal sequence that forms a chain of risk. Medical attention is focused on treating the acute problem rather than on discharge planning and long-term care. We have observed Indigenous subjects presenting at a later stage of the chronic disease continuum, despite their younger age at presentation. This suggests a significant opportunity for positive responses within the primary care sector and improved surveillance with earlier referral to tertiary services where appropriate.

4.1.2 Gender

Studies 1 and 2 stratified the study cohort by gender and reported that gender influenced access to angiography and EBP. Study 1 found that after adjusting for age and Indigenous status, women were 13% less likely to receive an angiogram (RR 0.87, 95% CI 0.80-0.96) than men. Females were also significantly older than males, and the age difference may well have influenced medical decision making.

Study 2 highlights that although Indigenous males and females had similar risk profiles, females were less likely to receive recommended procedures or medical therapies. Again, women were less likely to receive an angiogram (RR 0.81, 95% CI 0.66-0.99) and in addition, they were 20% less likely to receive recommended medications (RR 0.80, 95% CI 0.71-0.91) when compared to men. This gender differential has not been reported in other ACS studies with an Indigenous cohort.

Other national and international studies have also reported a ‘gender gap’ in access to cardiac care, with women less likely to receive angiography and EBP.(10, 17, 18) The evidence explaining the differential between males and females is inconclusive. Possible explanations include a hypothesis that women delay seeking medical attention for their symptoms, which subsequently delays treatment, and that women’s health focuses more on the ‘bikini’ areas (ovarian or breast cancer). Another possibly salient factor is that women are assumed to be less likely to die from cardiovascular disease.(17) One in three deaths and a quarter of premature deaths among women are caused by cardiovascular disease,(19) making lack of access to treatment and pharmacotherapies for women even more problematic.

Implication 6: A more detailed investigation into the gender difference in treatment of ACS is necessary. An Indigenous-specific study, with adequate statistical power is needed.

4.1.3 Engagement

The final study in this series (Study 3) found that the medical records reviewed contained some evidence of communication, compliance and cultural competency, yet overall, they did not prove to be an appropriate source for comprehensively assessing clinician-patient engagement.

An acute admission for cardiac care is a dynamic situation with the clinician and patient often having a different focus, yet both wanting the same outcome. The patient may be undergoing intense distress and anxiety as they comprehend the potential life-threatening situation when they are faced with acute illness.(20, 21) The patient may seek emotional support from family and reassurance from clinicians,(22) while clinicians are focused on treating the acute crisis by providing lifesaving interventions. The clinician-patient interaction is primarily based on the patient-health status engagement. While the clinician is the catalyst for the patient understanding the severity of the disease, they are also a potential advocate, recommending interventions that contribute to lifestyle modification and medical therapies that will improve rehabilitation and reduce mortality.

The medical records content analysis in this study supports the results reported by Brown, who interviewed Indigenous patients admitted to hospital with ACS, and their families.(23) Together, the studies contribute rich descriptive data of the patient journey and highlight the importance of communication and cultural competency as a building block to establishing a trusting and engaging clinician-patient relationship.

In a broader context, engagement is the synergy between clinical competence and cultural respect that can be achieved when the health care provider acknowledges and nurtures the wellbeing of the patient. This type of relationship provides an opportunity for two-way understanding of the broader social and cultural issues that impede patient wellness.(24) Failure to facilitate engagement may have adverse outcomes for patients with potentially life-threatening consequences, as well as contributing to inefficiencies in health care utilisation.(25)

Numerous studies reported on the barriers and enablers Indigenous people encountered when interacting with health providers. Studies reported that many Indigenous people, regardless of whether they lived remotely or in an urban setting, described a distressing patient journey. Financial burden, language barriers, lack of culturally appropriate resources and inadequate pre-operative preparation and post-operative follow-up were identified as factors contributing to such distress. Patients who felt unsupported often experienced a lack of cognitive control; a process whereby the individual can formulate and process events from the perspective of spiritual beliefs and self-determination. Patients described their experiences as ‘being lost spiritually’; and expressed high levels of anxiety and fear.(22) In response to racist treatment, people felt ashamed, humiliated, powerless and fearful; which in turn contributed to a lack of trust.(22, 23, 26) This suggests that clinician-patient engagement may be compromised and it may explain much late presentation.

Identifying and removing barriers that may hinder Indigenous patients seeking out health care in an immediate crisis and during long-term chronic disease management is important, especially as Indigenous patients have a greater likelihood of adverse outcomes in the years after discharge.(27)

The following three implications around clinician-patient engagement are provided in relation to practice, policy and research.

Implication 7: Indigenous patients should have 24 hour access to an Aboriginal Liaison Officer (ALO).

Research has shown that when there is a dedicated Indigenous hospital workforce to broker cultural and linguistic barriers, fear and anxiety among Indigenous patients is reduced,(22) and they are more likely to attend rehabilitation and engage with other clinicians.(28, 29) The role of the ALO in patient care should not be limited to supporting the patient and their family, and they should be regarded as a valued member of the health care team.(29)

Implication 8: Clinician-patient engagement should be regarded as a key performance indicator and measure of quality of care that promotes patient-centred care.

Study 3 found that medical records provided a one-sided interpretation of clinician-patient engagement, favouring the clinician’s worldview. Health care providers should implement a validated tool to document and routinely measure clinician-patient engagement, to ensure that both clinician and patient experience is captured. A standard measure which might capture clinician-patient engagement would be useful in further understanding some of these outcomes.

Implication 9: Research exploring the experiences of Indigenous people who are admitted to hospital for a cardiac event that includes asking clinicians about how they engage with Indigenous patients under their clinical care should be undertaken. We have described such a study in Appendix B. Study Protocol: establishing good relationships between patients and health care providers while providing cardiac care.

The data obtained from the research could assist in understanding the barriers and enablers to clinician-patient engagement within a tertiary hospital. The proposed study has the potential to provide an understanding of additional factors that may indirectly influence differences in treatment and outcomes. Further, the study could assist in reorienting research from a ‘deficit’ model of disease and death, to a strengths-based approach that focuses on relationships and health gains.

4.2 Study limitations

The interpretation of the study findings is influenced by a number of limitations relating to data availability, number of participants and follow-up studies. The types of data available for analysis were restricted due to the exclusive reliance on routinely collected administrative data. It is thought that Australian administrative hospital data under-estimates the number of Indigenous patients by approximately 5–20%.(30-32) Further, the administrative data used in the present study did not include information about social disadvantage, patient treatment preferences for revascularisation and therapies, patient cognitive ability, severity of disease or physician recommendations for care. Availability of these variables may have provided additional insights into clinician-related and patient-related factors that could potentially influence access to cardiac care. The three studies had a relatively small sample of Indigenous participants, increasing the possibility that some outcomes may not have had sufficient sample size to detect significant differences between variables. This small sample size is a problem as it can limit the ability to interpret variables that may impact on care, especially those that relate to comorbidities and other risk factors.

Limitations related to patient follow-up may have also affected our study conclusions. The South Australian ACS Cohort Study (Study 2) used administrative data from two metropolitan hospitals and only provides information about a 12-month follow-up period at the study site hospitals. If an Indigenous patient included in the study cohort was re-admitted to a hospital other than the two study hospitals, within the 12 months after discharge, this was not captured. Therefore our study may have underestimated the readmission rate.

The Patient Engagement Audit Tool used in the study on patient engagement relied on information in patient records that was collected retrospectively. It is yet to be validated as a reliable instrument, therefore, its ability to capture the phenomenon of interest is uncertain. Study 3 was dependent on the level of detail of care documented by clinicians in the medical records. The data available was not provided for the purpose of recording or describing patient engagement and may not have revealed the underlying motives or attitudes to patient care. While the medical records reviewed describe ‘what’ happened, they did not address the question of ‘why’ it happened.(33) Most of the medical records contained information on clinical observations and the treatment, medical therapies, test results and reports; however, information on clinician-patient interaction was limited. A range of important social, cultural and epidemiological factors that may contribute to clinician-patient engagement were not recorded in the medical notes.

4.3 Summary

Overall, the three studies identified a number of inter-related factors influencing decision-making processes, to proceed to angiography or to be prescribed pharmacological therapies. The variability of cardiac interventions and therapies was only partially explained by the hospital and patient factors which were measured. This research contributes to the current body of evidence about Indigenous patients admitted with ACS and increases our understanding of the gap in life expectancy attributable to ACS, as well as disparities in health care and factors that may increase morbidity and mortality. One advantage to this body of research was the research approach; the three studies used routinely collected data and the medical records contained routinely collected data. Therefore it was an inexpensive research exercise that could be replicated in the future and without being intrusive for patients.

4.4 Reflections on methodological implications of this study

This research is strengthened by applying an Indigenous ontological framework to interpret the research findings. I am a knowledge seeker and as such I know that knowledge is revealed not discovered; knowledge is socially situated and constructed. Harding reminds us that:

> *‘It is a delusion – a historically identifiable one – to think human thought could completely erase the fingertips that reveals its production process.’*(34 p.57)

I contend that my Aboriginal world view reveals and shares knowledge that value-adds to the scientific process by contributing a rich texture to understanding. These research findings reveal only one aspect of the lives of Indigenous people and communities, so it is important to remember that there is an alternative narrative. Indigenous Australian history does not commence with the first recorded contact with the first Europeans on the west coast of the Cape York Peninsula in 1606(35) or before the oldest human remains found in Australia that was dated as being between 57,000-71,000 years old.(36) It is a story of a prosperous country, where Indigenous people have survived and been resilient over 70,000 years and continue to do so in the understanding that health and wellness itself is part of our cultural heritage; we are researchers, scientists and intellectual warriors. We are more than statistics about high fertility and low birth weight babies,(27) we are more than the grief we experience because too many family members ‘pass away’ in the most productive years of their lives (35-54 years of age) from preventable chronic diseases.(37) We are not a disease that requires medical intervention and therapies. We are not the embodiment of the disease. Our lives are more than the estimated life expectancy of 67 years for men and 73 years for women.(37) If people find the statistics unacceptable, try putting yourself in our shoes - live our life. There is no way to bracket data from lived experience.

The epidemiological research on its own fails to capture the strength, innovation and endurance present in Indigenous people and communities. The Indigenous world is dynamic and harmonious; it is abstract and concrete. It is manifested in the spiritual, human, animal and plant form. Everything is relational.(38-40) We are informed by and act up our relationality. Our history is told in our ‘dreaming’ that continues to be passed down through the generations by oral traditions, ceremony, songlines, paintings, artefacts and sacred sites. These practices are still a reality in day-to-day Indigenous lives. For example when Indigenous people introduce ourselves to other Indigenous Australians the conversation is centered on social connectivity that is stating who we are (our tribe, clan, family group and traditional lands). The thread that weaves Indigenous Australians together is our shared history, marginalisation and oppression by the dominant culture; and this relatedness unites us. We face adversity daily, we have stories of achievement and success, and we are generous and inclusive. We sing, dance and speak in contemporary trends as well those handed down by our ancestors – this is despite past government policies implemented to eradicate us.(41) We are proactive in developing and delivering solutions to redress our current situation, while acknowledging the need for partnership with others. As Dr Hunter wisely observed to make a small difference, mainstream Australia needs to appreciate where we [as Indigenous people] are coming from and [that we all need to be] heading in the same direction.(1)

A core value of my Nyikina Yawuru culture is reciprocity, whereby I have a responsibility and obligation to contribute to the wellbeing of Indigenous people by positively contributing to the role as an intermediary between my people and the research world. We do not need research that makes us experts on our own people; we need to be experts and leaders in high quality research that leads to improved outcomes for our people. I am an agent of change, the personal is political; and this is the standpoint from which this research is presented.

4.5 Conclusion

This doctoral study contributes knowledge to gaining insight to the reasons for ACS treatment disparities. Whilst there are many contributing factors to less than optimal health outcomes for Indigenous patients that lie outside the health system, these studies have provided evidence that Indigenous status alone was not a significant contributor influencing access to cardiac care.

The findings presented in this thesis have implications for both Indigenous health policy and practice. The findings suggest that access across the spectrum of health services from primary, tertiary and secondary health sectors for Indigenous patients requires a detailed examination. The policy considerations that can facilitate intensive population health prevention and risk factor intervention approach needs to be consistent with the World Health Organisation (WHO) elements essential for the successful management of chronic diseases. The universal elements are a political commitment by stakeholders; integrated health care; align health policies; team care models to health care; and emphasise prevention.(42) Pivotal to the disease management process is a paradigm shift from acute episodic care to a system of care that is more suitable to the needs of those with chronic conditions. Patient-centered care (including families) and supporting patients in their communities with programs that span health organisations and the wider community is recommended.(42) Policy needs to enable a more aggressive and intensive intervention approach by primary health care providers that reduce cardiac risk and chronic disease risk factors by intensive management and control.

Often, when an Indigenous patient presents to hospital the potential interventions are limited by the complexity and chronicity of the disease hence the need to prioritised minimising the risk of early accrual of disease by increasing access to primary health care providers. Primary health care providers have a critical role in the screening, prevention and management of chronic disease especially cardiovascular disease. As a front line service provider, primary health care services are best placed to establish long-term relationships with the Indigenous people, which can be achieved with the individual or the family group. Primary health care providers have an opportunity assess the comorbidity burden, negotiate treatment both with the patient and external providers as well as assisting the patient in self-management of the chronic disease. It is only by establishing trusting and nurturing relationships that a healthcare provider can embed Indigenous peoples culture, spirituality and health literacy(43) into a comprehensive and integrated model of care. As an advocate for patients, primary health care providers can actively monitor and connect essential health services whether it be the tertiary or secondary rehabilitative sector which is critical for patient who are a high-risk for a second cardiac event.

The risk factors that may limit access to timely and effective care such as comorbid conditions, early accumulation of chronic disease and later presentation to healthcare services is overly represented in the Indigenous sample. The efficient and effective management of people presenting with chronic disease is challenging. There is no universal approach to addressing all the intricacies of reducing the gap in life expectancy, however, there needs to be a political and financial commitment by all stakeholders to work collaboratively toward this goal. Importantly, health service delivery needs to continue building the evidence and implement strategies that increase life-expectancy and focuses on wellness.

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5. Appendices

5.1 Appendix A – Patient Engagement Audit Tool

PART B

COMMENTS/DESCRIPTION OF IN-PATIENT ENGAGEMENT DURING ACS CARE PROCESS

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^{D40}Patient Escort

Patient had an escort? ☐ ^{C11}The relationship of patient to escort? ☐ ^{N1}Comments on patient escort.

....

....

^{D41}Aboriginal Hospital Liaison Worker (AHLO)

Interaction with the AHLO?☐ ^{C12}Intaction frequency?☐ ^{D42,C13}Reason(s) for interaction☐☐☐☐☐

^{N2}Comments on the interaction between the AHLO and patient?

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^{D43}Multi-disciplinary Health Team (MDHT)

Interaction with MDHT?☐ ^{C14}Interaction frequency?☐

^{C15}Composition of MDHT?☐☐☐☐☐☐☐☐☐☐ MDHT meeting?☐

$^{D44.C16}$Describe MHDT care?☐ ^{N3}Outcome of the MDHT care?

....

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^{D45}Discharge Letter (DL) and ^{D46}Discharge Against Medical Advice (DAMA)

A DL?☐ ^{D47,C17}DL provided to?☐☐☐☐☐☐ ^{N4}DL comments

....

....

Patient DAMA?☐ ^{C18}DAMA reason?☐ ^{C19}DAMA provided to? ☐☐☐☐☐☐☐

^{N5}DAMA comments

....

....

D48Chest Pain Action Plan (CPAP), D49Rehabilitation Plan (Rehab) and D50Angina Management/Action Plan (AMAP)

There is a CPAP? ☐ C20CPAP provided to? ☐☐☐☐☐☐☐☐☐

CPAP negotiated with patient? ☐ N6How was the CAPA was negotiated with patient?

....

....

There is a RP? ☐ C21RP provide to? ☐☐☐☐☐☐☐ RP negotiated with patient? ☐

N7How was the RP was negotiated with patient?

....

....

There is an AMAP? ☐ C22AMAP provided to? ☐☐☐☐☐☐ AMAP negotiated with patient? ☐

N8How the AMAP was negotiated with the patient?

....

....

D51Post Discharge Appointments

Appointment scheduled ***prior*** to patient discharge? ☐ C23Appointment(s) with? ☐☐☐☐☐☐

Patient to make appointment post-discharge ☐ C23Appointment(s) with? ☐☐☐☐☐☐

N9Attendance to post-discharge appointments?

....

....

D52,53Medication compliance

Medication compliance? ☐ C24Improve medication compliance? ☐☐☐☐☐☐☐☐

N10Patients' response to compliance?

....

....

D54Mental Health and Social and Emotional Wellbeing (SEWB)

Mental health and SEWB? ☐ C25Condition ☐ N11Patients' mental health and SEWB status.

....

....

D55,56Engagement and non-engagement

Clinician described patients' engagement? ☐ C26Engagement category? ☐☐☐☐☐☐

N12Patient engagement comment.

………

………

Clinician described patients' non-engagement ☐ C27Non-engagement category? ☐☐☐☐

N13Patient non-engagement comment.

………

………

D57Quality of Information

Understand in-patient ACS management? ☐ Understand occurred post-discharge? ☐

AHLO role clear? ☐ N14Researcher reflections on the role of the AHLO.

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………

………

………

Data Extraction Details:

Date: ……/……./2011 Time: …….: …………. Name/sign……………………………

Actions Completed

……… Y/N

……… Y/N

……… Y/N

……… Y/N

Data Input Details:

Date: ……/……./2011 Time: …….: …………. Name/sign……………………………

Actions Completed

……… Y/N

……… Y/N

5.2 Appendix B – Publication

Study Protocol: Establishing good relationships between patients and health care providers while providing cardiac care. Exploring how patient-clinician engagement contributes to health disparities between Indigenous and non-Indigenous Australians in South Australia.

Roe *et al. BMC Health Services Research* 2012, **12**:397
http://www.biomedcentral.com/1472-6963/12/397

BMC
Health Services Research

STUDY PROTOCOL **Open Access**

Study Protocol: establishing good relationships between patients and health care providers while providing cardiac care. Exploring how patient-clinician engagement contributes to health disparities between indigenous and non-indigenous Australians in South Australia

Yvette L Roe[1*], Christopher J Zeitz[2] and Bronwyn Fredericks[3]

Abstract

Background: Studies that compare Indigenous Australian and non-Indigenous patients who experience a cardiac event or chest pain are inconclusive about the reasons for the differences in-hospital and survival rates. The advances in diagnostic accuracy, medication and specialised workforce has contributed to a lower case fatality and lengthen survival rates however this is not evident in the Indigenous Australian population. A possible driver contributing to this disparity may be the impact of patient-clinician interface during key interactions during the health care process.

Methods/Design: This study will apply an Indigenous framework to describe the interaction between Indigenous patients and clinicians during the continuum of cardiac health care, i.e. from acute admission, secondary and rehabilitative care. Adopting an Indigenous framework is more aligned with Indigenous realities, knowledge, intellects, histories and experiences. A triple layered designed focus group will be employed to discuss patient-clinician engagement. Focus groups will be arranged by geographic clusters i.e. metropolitan and a regional centre. Patient informants will be identified by Indigenous status (i.e. Indigenous and non-Indigenous) and the focus groups will be convened separately. The health care provider focus groups will be convened on an organisational basis i.e. state health providers and Aboriginal Community Controlled Health Services. Yarning will be used as a research method to facilitate discussion. Yarning is in congruence with the oral traditions that are still a reality in day-to-day Indigenous lives.

Discussion: This study is nestled in a larger research program that explores the drivers to the disparity of care and health outcomes for Indigenous and non-Indigenous Australians who experience an acute cardiac admission. A focus on health status, risk factors and clinical interventions may camouflage critical issues within a patient-clinician exchange. This approach may provide a way forward to reduce the appalling health disadvantage experienced within the Indigenous Australian communities.

Keywords: Patient-clinician engagement, Qualitative, Cardiovascular disease, Focus groups, Indigenous methodology, Oceanic, Cardiac care

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Background

Acute Coronary Syndrome (ACS) represents one of the most common causes of acute medical admissions to Australian hospitals [1,2]. Patients with ACS have varying medical histories, diverse clinical presentations and are likely to experience a second serious cardiac event; they require acute in-hospital clinical care and experience high mortality rates [3]. Management of ACS is targeted towards identifying those patients at higher risk of subsequent events and reducing or avoiding such events through revascularisation of the culprit plaque, where appropriate, and medical therapy to stabilise other at risk plaques [4].

The incidence of ACS has increased and the outcomes of care for ACS have shown smaller improvement for Aboriginal and Torres Strait Islander[a] Australians compared to their non-Indigenous counterparts [5-12]. A national retrospective study on ACS management in Australia reported three striking failures and policy issues that were systemic: an evidence practice-gap; and concern about the capacity of the treating hospital and the continuity of care available [13]. Many contributing factors lead to less than optimal health outcomes for Indigenous patients; these factors often lie outside the health system itself [1,5,6,14-16]. For example, studies that compare Indigenous and non-Indigenous patients with ACS and or chest pain are inconclusive about the reasons for the differences in-hospital and survival rates. It has been argued that the difference in treatment and outcomes may be the result of more subtle systemic practices, not necessarily ill-intentioned but still discriminatory, and almost invisible within an individual patient-clinician encounter [14]. These findings highlight the importance of quantifying and qualifying patient-clinician engagement as a possible explanation for the differential between Indigenous and non-Indigenous patients admitted to hospital for an acute cardiac event. A focus on health status, risk factors and clinical interventions may camouflage critical issues within a patient-clinician exchange. Broadening our understanding of the Indigenous in-hospital disparities and mortality, to include patient-clinician engagement may provide opportunities to close the gap in health attainment.

This Study Protocol identifies the gaps in knowledge pertaining to patient-clinician engagement, states the research aims and questions, describes the types of people that may participate in the research, outlines the methodology and methods used as well as highlighting the limitations of the study. The Study Protocol also situates this study within a boarder research program that explores the potential drivers that may influence the differential in health care and health status experienced by Indigenous Australians compared to non-Indigenous Australians who experience an acute cardiac event.

Conceptual model

Patient-clinician engagement is shaped by a range of factors, not only to do with the agents' personality and socioeconomic circumstances, but also the diagnosis and proposed management, and the context of the medical encounter. Influencing factors may present as a single factor or may have aggregated and distributive attributes. Figure 1 illustrates the overall conceptual diagram for the research.

Literature

National and international studies suggest three key areas influence the patient-clinician relationship: reflective clinical practice, a shared understanding and integration of health care; and cultural safety which lays the foundation for this interface.

Cultural safety

Creating a culturally safe[b] environment involves health professionals undergoing a reflective process of understanding the self and others. For example, one's review of ontology (assumptions about the nature of reality), epistemology (the ways of knowing that reality), and axiology (the nature of values) [17-19]. When health professionals become aware of how their understanding of the 'other' influences their clinical practice, they may facilitate opportunities for patients to engage *'safely'* in the patient-clinician relationship [20].

In Australia, studies that described the interaction between Indigenous patients and clinicians illuminate many of the nuances of the patient-clinician interface. Miscommunication, feelings of disempowerment, mistrust and racism were reported barriers to patient engagement [15,20,21]. A summary of the factors highlighted in the literature that influence patient-clinician engagement and adverse consequences is outlined in Table 1. This list strongly suggests that patient-clinician engagement may be compromised in the case of Indigenous patients.

There is great scope for improvement in building a shared understanding in the patient-clinician interface. Australian studies reported a number of factors that influenced the quality of the patient-clinician relationship. The most common factor identified is miscommunication between the patient-clinician. Miscommunication often goes unrecognised, especially with regard to diagnosis, treatment and prevention [21]. Possible solutions that may assist to overcome these barriers include: increasing the Indigenous health workforce; increasing access to interpreter services; and engaging with patients throughout the patient pathway (pre-operative; post-operative; long-term and secondary prevention). These possible solutions may contribute to ensuring culturally appropriate health education and mandatory training in cultural safety [15,16,21]. The experiences described are not unique to Indigenous

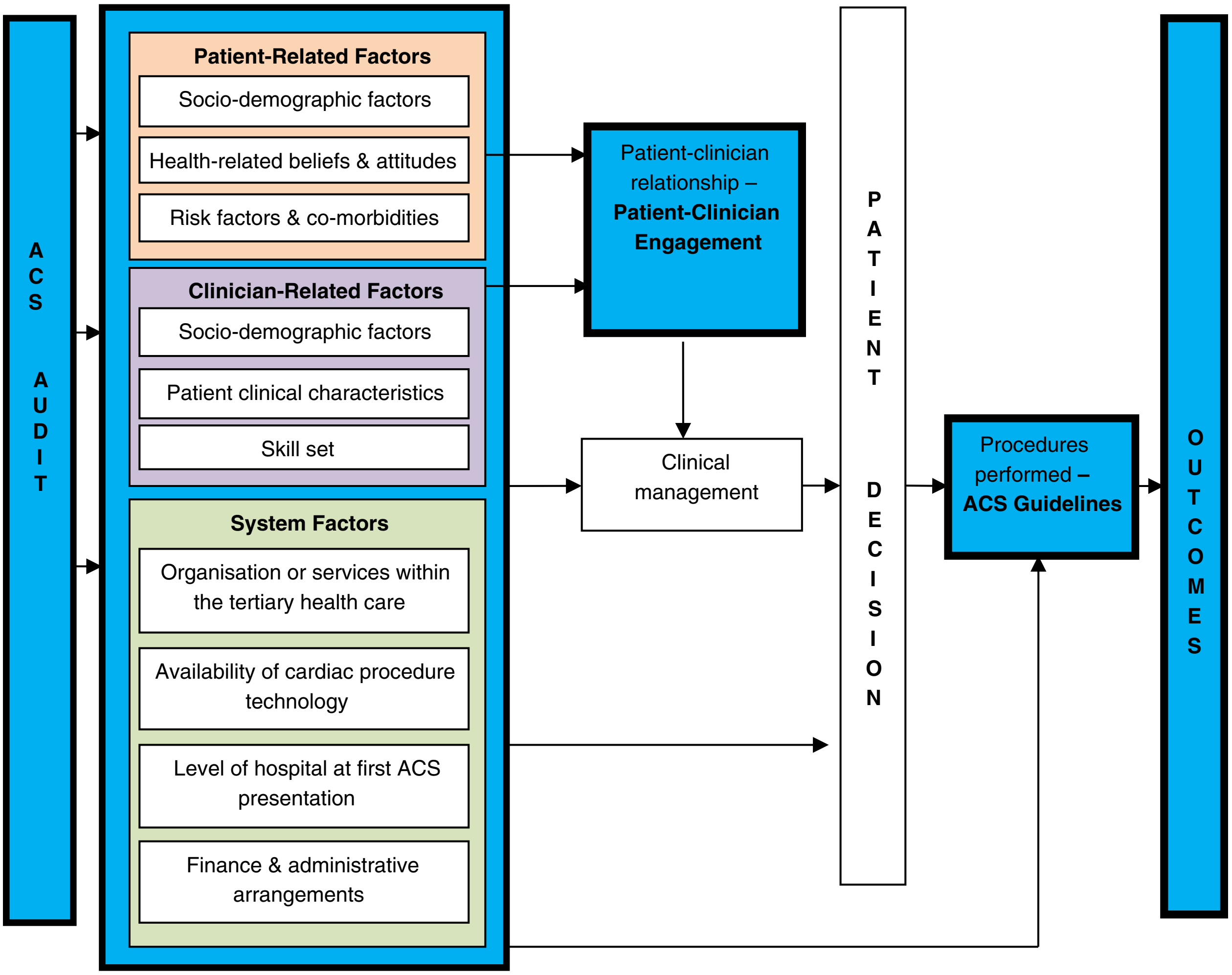

Figure 1 Conceptual diagram of the research.

people; nonetheless they provide insights into the complexities that Indigenous people have to overcome when seeking health care.

Patient-clinician engagement: synergetic partnership

It is hypothesised that patient-clinician engagement is instrumental for improving health care and results in improved health outcomes. For the purpose of this study, patient-clinician engagement is explored and defined at the micro level. Patient-clinician engagement is the two-way interface between patient and clinician (individually and systematically). Patient-clinician engagement can manifest as an outcome but fundamentally it is the process that defines the outcome.

The patient-clinician interface is framed by interrelated variables such as: gender; age; personal heterogeneities (both patient and clinician); family and professional responsibilities; cultural orientation; socioeconomic position; lived experience; and respective cultural paradigms. The interface is further contextualised by, environmental diversities, social climate and differences in relational perspectives. Engagement is not homogeneous and is neither constant nor in any sense automatic. Patient-clinician engagement is about relationships. Essentially, patient-clinician engagement is the synergy between clinical competence, cultural respect and the shared understanding that occurs when health care providers' acknowledge and nurture the wellbeing of the patient. Failure to invest in this relationship may result in adverse outcomes such as potentially life-threatening consequences for the patient and policy implications for health care providers [3,15].

Methodology

Indigenous framework Adopting an Indigenous framework identifies the limitation of Western paradigms to adequately portray Indigenous realities, knowledge, intellects, histories and experiences. This study will apply an Indigenous framework to describe the interaction

Table 1 Factors that influence patient-clinician engagement and the adverse consequences

Concept	Features	Adverse consequences
Cultural Safety	• Health professional are self-aware of their ontology, epistemology and axiology.	Actions that diminish, demean or disempower the cultural identity and well-being of an individual is unsafe clinical practice [3,4].
	• An environment that facilitates and nurtures relationships	Patients viewed the medical system as cold, indifferent and inflexible [2]
	• Health services do not comprise the patients legitimate cultural rights, views and values.” [1]	
	• High staff turnover [2]	
(Mis) Communication	• Language (verbal and non-verbal),	• May result in misdiagnosis; ineffective and inefficient clinical management; and marginalisation of the patient [6-8].
	• Rules, conventions and etiquette;	
	Communication between the community primary health care provider and the tertiary institution [5]	• An inefficient model of care i.e. ‘no shows’ in patient travel and patient has limited understanding of their clinical care [5].
(Dis) Empowerment	• A distressing patient journey [5]	• Patients feel disempowered, discriminated by their race and clinicians show a lack of empathy toward them [2,3,5].
	• Financial burden	
	• Language barriers	
	• Lack of culturally appropriate resources	
	• Inadequate pre-operative preparation and post-operative follow-up.	
	• Lack of cognitive control [2,3].	
(Mis) Trust	• Informed by a whole of life experience; which included systemic oppression and discrimination with societal institutions (particularly justice and education settings).	• In response to racist treatment people felt ashamed, humiliated, powerless and fearful; which in turn contributed to the lack of trust [3].
	• In an individual encounter.	
Biomedical Model	• The dominance of medical language used to explain clinical diagnosis, management and long-term care.	• Removes the opportunity to construct a shared understanding of health care [20].
	• Marginalisation of the patience preferred language or knowledge [2,20].	• Patients feel alienated and less likely to participate with the recommended care [16]

between Indigenous patients and clinician clinical encounters during an acute cardiac admission.

Indigenous knowledges and health status are often problematised and pathologised [18,22]. Indigenous people are frequently positioned as being dysfunctional and challenging. This perpetuates a body of health research where Indigenous knowledges are disregarded. This deficit approach obscures the survival and resistance strategies employed by Indigenous Australians for over 220 years. Indigenous methodology makes it explicit that the study will be viewed through a culturally-specific lens that privileges Indigenous realities by taking account of Indigenous epistemologies and ontologies [18].

By using an Indigenous methodology we can situate Indigenous peoples as the subjects of their experiences rather than objects of the research [23]. Indigenous Australians think and interpret the world and its realities in different ways to non-Indigenous Australians because of their experiences, histories, cultures and values, which in turn influences their patterns of morbidity, mortality and health outcomes. Indigenous ways of knowing is a continuum because context is important and this is particularly important in an area where efforts from non-Indigenous researchers towards ‘knowing’ have often been intrusive and exploitative [22,23]. Finally, cultural safety, cultural respect, cultural relevance and world view alignment is the nucleus to an Indigenous framework [24].

Research scope

Research questions

1. How do Indigenous and non-Indigenous patients who were admitted for an acute cardiac event describe patient-clinician engagement?
2. How do clinicians who provide cardiac care to patients describe Indigenous and non-Indigenous patient-clinician engagement?; and
3. How can patient-clinician engagement improve cardiac care hospital admission and transition into secondary health care?

Research aims

1. To describe patient-related factors, clinician-related factors and system factors that influence the patient-clinician engagement for Indigenous and non-Indigenous patients diagnosed and treated for an acute cardiac event in South Australia; and
2. To identify areas of potential improvement that may support patient-clinician engagement during and

after admission for an acute cardiac event i.e. into secondary and rehabilitative cardiac care.

Methods

A triple layered designed focus group will be the format to discuss patient-clinician engagement. Seeking opinions using focus groups provides an effective platform for developing a holistic and contextualised understanding of the diverse factors in a complex health setting [22,25].

Focus groups will be arranged by geographic clusters i.e. metropolitan and a regional centre. Patient informants will be identified by Indigenous status (i.e. Indigenous and non-Indigenous) and the focus groups will be convened separately. The health care provider focus groups will be convened on an organisational basis i.e. state health providers and Aboriginal Community Controlled Health Service Sector (Table 2). There will be nine focus groups comprising five to seven participants. Participants may have similar social and cultural backgrounds or have similar experiences pertaining to their cardiac diagnosis, management and clinical experience.

Data collection: yarning

Yarning will be used as a research method to facilitate discussion. Yarning as a strategy assists in decolonising, re-positioning and supporting Indigenous research methods as well as embedding itself within the Indigenous framework [18,23-25]. Yarning is in congruence with the oral traditions that are still a reality in day-to-day Indigenous lives. Yarning also acknowledges the relatedness of past and present and also the future [26].

While widely recognised in an informal social setting, Yarning in the research context is somewhat different. That is, while the technique is relaxed and interactive it is also purposeful with a defined beginning and end. Bessarab and Ng'angu suggests that yarning as a method enables the researcher and participant(s) to develop an informal relationship whereby information can be shared and exchanged between two or more people either socially or more formally [26,27].

Yarning as a method has proven effective when applied within a number of settings involving Indigenous people and within policy development [25-28]. Sharing stories using Yarning is a means of knowing and sharing knowing [28]. In its essence, yarning is a two-way process where people share knowledge. The focus group data collection method is predicated on engaging all participants in a safe, relaxed and inviting manner so they are able to share their lived experience. This will involve selecting a venue that is accessible, inviting and relaxing, ensuring that the seating arrangements encouraging open conversations, provision of food, informal introductions of participants, while also accommodating gender, age of patients and diverse cardiac workforce.

A series of questions will be asked to the group to gain a better understanding of patient-clinician engagement both from a patient and clinician perspective. A broad question will be asked of patient participants to begin the interview: *"How has having a heart problem changed your life?"* The clinician focus group will also commence with a broad question, *"How long have you worked in cardiac care?"* The moderator may pose additional questions and offer observations for comment to keep the discussion focused, or to clarify information provided by participants. The questions are open-ended and semi-structured (Table 3).

The focus groups provide the formal structure for the participant gathering. This might include venue, catering, recording of narratives, and group composition. However, the richness of the data will be drawn out by the facilitators' ability to negotiate a contextually based conversation with participants that fosters an interactive environment. The application of Yarning as a method allows the facilitator to ask purposefully targeted questions about the participants' cardiac care experience while also establishing a safe, informal and respectful relationship with these participants. The interaction between the facilitator and participants will be informed by the semi-structured questions in a conversational space where there is two-way interaction between the facilitator and participants.

There is also social protocols and conventions involved in conversing that need to be acknowledged and embraced in this dialogical process [26]. In addition, listening (not just hearing) and valuing the context the participants' experience is as equally as important as the questions posed. Finally, there is a multiplicity of factors that influence patient-clinician engagement and capturing the subtle nuances in how participants may share their lived experience is pivotal. The facilitator is consciously applying the every-day-conversational method while also seeking an insight into the patient-clinician interaction by not only stating the outcome but also illuminating the processes that define the outcomes. Other authors who have applied this method have acknowledged that participants may stray from the posed question resulting 'messy text' [26,29]. To limit the potential of this occurring the facilitator will be trained to acutely listen to the yarn, respect/embrace conversational protocols and gently refocus the discussion back to the research question. Underlying the interaction between the facilitator and participant is a specific research question that includes a dynamic process, of data collection and data analysis.

Participants

A Participant Information Sheet or a customised flip chart (to assist with literacy) in plain English will be

Table 2 Focus Group Questions

Question Type	Purpose	Example	
		Patient Informant	**Clinician Informant**
Opening	Participants get acquainted & feel comfortable	Please tell us your name and how are you feeling today?	Please tell us your name and where you work?
Introductory	Begins discussion of topic	How has having a heart problem influenced your life?	How long have you been employed in cardiac care?
Transition	Moves smoothly and seamlessly into key questions	I would like you to reflect when you became unwell because of your heart, when you were admitted to hospital and after you left hospital.	We often use the term patient journey, however there are many components to it i.e. clinical presentation, guidelines, risk factors, patient involvement etc.
		Are there any specific things about the how you got along with the health care providers or the care you received that stands out in your mind? How would you describe your relationship with the people who provided your care?	Are there any specific things about that you have done during your interaction with patient that you felt made it a good interaction that is critical to providing cardiac care? E.g. imparting facts in a way that there is a shared meaning?
Key	Obtains insight into areas of central concern in the study	Do you feel that you were able to establish trust and rapport with the people who provided your care?	When I say the term 'patient-clinician engagement' what things come to mind?
		Do you feel that you were able to talk easy to the health staff, especially if you had concerns about your heart or things that worried you?	Is it a term that you've heard of and that you are familiar with?
			Do you felt you developed trust and rapport with the patients?
		What things made you feel like you had a good relationship with the people who provided your health care?	How do you build trust, rapport and a shared understanding with patients?
		When you left hospital, how easy was it to gets health care so you could look after your heart? i.e. seeing the doctor or specialists, rehabilitation, getting medication etc.	Where do you think trust, rapport and understanding falls downs when you are caring for patients?
			Do you have a specific strategy when caring for Indigenous patients?
		What are the things that may influence or stop you looking after your heart?	Can you provide some examples of how care maybe different for Indigenous and non-Indigenous patients?
		What can health care providers do to help you look after your heart?	What can health professionals do to encourage patient-clinician engagement? Is this different for Indigenous and non-Indigenous patients?
Ending	Helps the researcher determine where to place emphasis and bring closure to the discussion.	Moderator to summarise key discussion points.	
		Is this an adequate summary of what was said here?	
		We are trying to make the patient journey better.	
		What advice would you have for us?	

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provided to potential participants. The Information Sheet outlines what is required of participants as well as any possible risks to them resulting from their participation. The Participant Consent Form will be in plain English and participants are free to withdraw at any time, without affecting their status now or in the future. Consent will be obtained from all participants.

Inclusion criteria

- Patient informants aged 18–75 years discharged from hospital between 1 January 2008 and 31 December 2011; diagnosed with an acute cardiac event and South Australian residents. Indigenous status will be determined on the basis of self-identification; and
- Clinical informants aged 18 years (and over) employed to provide cardiac care to patients within the continuum of cardiac care i.e. transition of patients from acute care to long term care and secondary prevention.

Recruitment

Purposive sampling will be used to recruit informants to the study. This approach requires the deliberate selection of specific individuals (patients and clinicians) because of the crucial information they can provide on engagement, both as a process and an outcome during an acute cardiac event [29,30]. This approach has proven to be effective with Indigenous people [26,31]. Recruited informants are thereby best placed to provide information-rich narratives into patient-clinician engagement.

Three public cardiac care health providers and two Aboriginal Community Controlled Health Services in South Australia have been approached and agreed to assist with the recruitment of Indigenous and non-Indigenous participants. Discussion with key stakeholders and displaying of information flyers will occur at each site to attract participants.

Participation in the study is recognised by compensating participants for their time, especially if they incurred financial or emotional expense to participate such as: child care; travel; and the possible apprehension of talking about their personal experiences [29]. Patient participants will be provided with a $30 gift voucher to use at a local shopping retailer on completion of the focus group.

Analysis

The study will use the group, rather than the individual group members, as the unit of analysis. Group interaction through the process of yarning will take into account and the levels of consensus generated by the different topics both between and within groups will be assessed. The analysis will systematically elicit themes in relation to the research questions.

The focus groups' transcripts are the primary source of the data analysis. The transcript will also include boarder communication traits that occur during the yarning process such as tones, silences and body language. After immersion, the data will be coded and categorised into preliminary themes (Figure 2) [32]. Emerging themes and patterns will be identified and final conclusions developed and verified by another member of the research team. The analysis will be done as a direct reflection of the conceptual model and study question.

All analyses will be facilitated by the use of QSR International NVivo software, version 9 (QSR International). NVivo will be used to manage data, manage ideas, query data, illustrate models and report from the data [33].

Validity

The study will draw on multiple sources of evidence such as the transcripts, field notes and a reflective journal. Participants will have the opportunity to view and validate the group transcript before the analysis. Participants may delete, add or modify any of their content.

An independent review of the interview transcripts will occur. The reviewer (PhD student supervisor) will be provided with a sample of interview questions and asked to code and categorise the data. There will be an assessment of the level of congruence between the researcher and independent reviewer in coding and categorising data. The higher the congruence between the researcher and reviewer the more confident one can be that internal validity is met.

Ethical considerations

Health consumer advocacy

The Participant Information sheet outlines the risks of participating in the research i.e. the process of sharing experiences has the potential to raise many emotions such as anger or grief and yet may be equally healing. If a participant becomes distressed during the discussion they are encouraged to seek advice from their doctor or local health centre. The researcher will provide information about the Hospital Consumer Adviser or Health Consumer Advocate and provide assistance with initial contact as required.

Ethics approval

The University of South Australia's Human Research Ethics Committee and the Aboriginal Health Council Research Ethics Committee approved the research. The study design incorporates the underlying principles in the NHMRC Road Map: A Strategic Framework for Improving Aboriginal and Torres Strait Islander Health. That is, the research aims to add practical value to

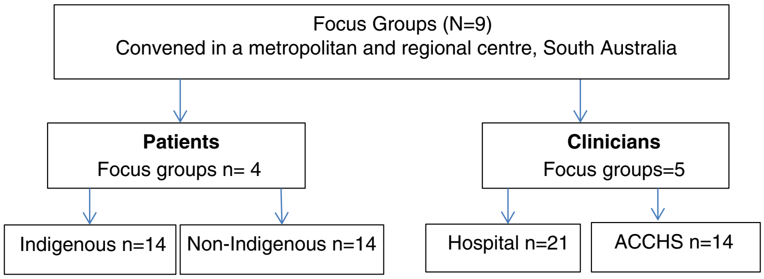

Figure 2 Triple layered designed focus groups: Locations and Composition.

Indigenous peoples and their service providers, through building Indigenous research workforce capacity while also embracing community involvement in the development, conduct and communication of research [34].

Cultural protocol for conducting research

The principal researcher is Aboriginal, a Njikena Yawuru woman from the West Kimberley, Western Australia. The role of the researcher requires her to unpack key elements of the research process. Firstly, as an 'Outsider' to the South Australian Aboriginal community this process requires certain terms of reference to work (i.e. working in someone else's Country). To adhere to Aboriginal cultural protocols and to demonstrate the respect of undertaking research on another Aboriginal nation's sovereign land, a Cultural Protocol for Research was negotiated between the principal researcher and the Aboriginal Health Council of South Australia. The Protocol outlines principles for conducting the research; cultural mentoring; and using Indigenous knowledge and researcher accountability. The Protocol is informed by Dr Karen Martins' seminal text *'Please Knock before you enter: Aboriginal regulation of outsiders and the implications for research'* [25]. The Protocol also includes the role of the Indigenous Reference Group who will assist in the development of the focus group and interpretation of the data. This will be achieved by conducting a collaborative workshop between the researcher and Reference Group as a means of ensuring adherence of cultural protocols and research validity.

Limitations

The methods applied will result in analytic generalisations. The study does not represent the views of all patients who experience an acute cardiac event or the entire cardiac health workforce. This research highlights the significance of particular contexts and settings. The design, analysis and reporting of this research intends to provide a sufficiently detailed account and analysis to enable others to determine whether there are other circumstances to which these findings may be applicable or replicate this study elsewhere [35].

The limitations are:

1. Due to the nature of group discussion, some participants may conform with the responses of other members in the group even though they might not agree [36];
2. The complexity of unpacking what is understood by the term patient-clinician engagement;
3. The double burden of engaging the 'disengaged';
4. To identify and address rival explanations for the findings;
5. To account for bias, poor recall and poor or inaccurate articulation; and
6. To explain the multi-factorial confounders along patient-clinician pathway.

Discussion

This study is nestled in a larger research program that explores the drivers to the disparity of care and health outcomes for Indigenous and non-Indigenous Australians who experience an acute cardiac admission. An examination of the level of guideline concordance may provide insight into the application of evidenced-based guidelines and the capacity of the treating hospital. To ensure a comprehensive understanding of possible drivers of the disparity between Indigenous and non-Indigenous patients, intimate knowledge about the interface between the patient and clinician is needed.

Applying an Indigenous framework, using focus groups and Yarning as a method, seeks to ensure that the research is conducted rigorously, is respectful and culturally safe for all participants. This research moves away from a deficit model that currently describes Indigenous health knowledge and reorients the discussion toward a resilience and asset model of health care. This approach may provide a way forward to reduce the appalling health disadvantage experienced within the Indigenous Australian communities.

Ethics committee approval

University of South Australia Human Research Ethic Committee.

Aboriginal Health Research Ethics Committee.

Endnotes

[a] Aboriginal and Torres Strait Islander Australians will now be referred to as Indigenous Australians.

[b] Cultural safety also includes cultural safety, cultural security and cultural respect.

Abbreviations

ACS: Acute Coronary Syndrome; NHMRC: National Health and Medical Research Council.

Competing interests

The authors declare that they have no completing interests.

Authors' contribution

YLR designed the study, negotiated support from participating health services, negotiated the Cultural Protocol for Research between herself and the Aboriginal Health Council of South Australia and drafted the manuscript. CJZ provided intellectual planning of the research, contributed to the research design and reviewed/edited the manuscript. BF participated in the designing the methodological framework of the study and thematic analysis. All authors read and approved the final manuscript.

Acknowledgements

Dr David Scrimgeour (Aboriginal Health Council of South Australia) assisting in the research design.
Proofs of funding and ethics.
No external funding was received for this study.

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Received: 26 June 2012 Accepted: 31 October 2012
Published: 14 November 2012

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doi:10.1186/1472-6963-12-397
Cite this article as: Roe *et al.*: Study Protocol: establishing good relationships between patients and health care providers while providing cardiac care. Exploring how patient-clinician engagement contributes to health disparities between indigenous and non-indigenous Australians in South Australia. *BMC Health Services Research* 2012 **12**:397.

5.3 Appendix C – Project ethics approvals

From:	no_reply@unisa.edu.au
Sent:	Tuesday, 7 December 2010 1:11 PM
To:	outlooklive-ROEYL001
Cc:	Adrian Esterman; bronwyn.fredericks@med.monash.edu.au; outlooklive-ROEYL001; Robyn McDermott; Research Compliance
Subject:	Human ethics: Application approved

Dear Applicant

Re: Ethics protocol "Exploring potential differences between Indigenous and non-Indigenous patients admitted to hospital in South Australia for Acute Coronary Syndromes (ACS) with particular emphasis on engagement in the health care process on outcome. Study 2 - Matched Retrospective Cohort in South Australia: Royal Adelaide Hospital and The Queen Elizabeth Hospital Audit"

Thank you for submitting your ethics protocol for consideration. Your protocol has been considered by the E3 Committee Review Group.

I am pleased to advise that your protocol has been granted ethics approval and meets the requirements of the National Statement on Ethical Conduct in Human Research.

Please regard this email as formal notification of approval.

Ethics approval is always made on the basis of a number of conditions detailed at http://www.unisa.edu.au/res/forms/docs/humanresearchethics_conditions.doc; it is important that you are familiar with, and abide by, these conditions. It is also essential that you conduct all research according to UniSA guidelines, which can be found at http://www.unisa.edu.au/res/ethics/default.asp

Please note, if your project is a clinical trial you are required to register it in a publicly accessible trials registry prior to enrolment of the first participant (e.g. Australian New Zealand Clinical Trials Registry http://www.anzctr.org.au/Survey/UserQuestion.aspx) as a condition of ethics approval.

Best wishes for your research.

Vicki Allen
Executive Officer
UniSA's Human Research Ethics Committee
CRICOS provider number 00121B

This is an automated email and cannot be replied to. Please direct your query to the relevant person.

AHREC
ABORIGINAL HEALTH
RESEARCH ETHICS COMMITTEE

6th September 2010

Ms Yvette Roe
PhD Candidate
Health Sciences
P5-21, City East Campus
University of South Australia
Adelaide SA
5000

Reference No: 04-10-355

Dear Yvette

Thank you for submitting your research project, *Exploring potential differences between Indigenous and non-Indigenous patients admitted to hospital in South Australia for Acute Coronary Syndromes (ACS) with particular emphasis on engagement in the health care process on outcome* for ethical consideration.

At our last meeting your application was assessed and I am pleased to inform you that this proposal has met with support and that the committee has decided that your application be recommended.

In accordance with the NH&MRC guidelines, *National Statement on Ethical Conduct in Research Involving Humans*, we require at regular periods, at least annually, reports from principle researchers.

If you require any further information please do not hesitate to contact the Executive Officer or myself.

We wish you well with the project and look forward to receiving a copy of your report.

Sincerely yours

LAEvans

MS LUCY EVANS
ACTING CHAIRPERSON
Ref: Proposal/Approval/6September2010

Aboriginal Health Council
of South Australia Inc.

AHREC is a sub-committee of AHCSA

78 Fullarton Road Norwood SA 5067 PO Box 787 Kent Town SA 5071
Tel: (08) 8132 6700 Fax: (08) 8132 6799 Email: alwin.chong@ahcsa.org.au Website: www.ahcsa.org.au

Government of South Australia
SA Health

ETHICS OF HUMAN RESEARCH COMMITTEE

The Queen Elizabeth Hospital
28 Woodville Road
WOODVILLE SOUTH SA 5011
Lyell McEwin Hospital
Haydown Road
ELIZABETH VALE SA 5112

6 December 2010

Ms Yvette Roe
Population health and Epidemiology
City East Campus
University of South Australia SA 5000

Dear Ms Roe

Application Number **2010159**

The Ethics of Human Research Committee at the last meeting considered your protocol entitled:

"Exploring potential differences between indigenous and non-indigenous patients admitted to hospital in South Australia for Acute Coronary Syndromes with particular emphasis on patient engagement in the health care process on outcome. Matched retrospective cohort in South Australia."

The following documents have been reviewed and approved:

- University of SA, Human Ethics Application, dated 04 August 2010
- Email of approval from University of SA, Human Ethics Committee, dated 01 September 2010
- Letter of approval from the Aboriginal Health Council of SA, dated 06 September 2010
- Letter of support from the Aboriginal Health Council of SA, dated 13 August 2010
- Letter of support from Dr M Worthley, dated 10 June 2010
- Letter of support from A/Prof C Zeitz, dated 17 May 2010
- "Ethics and Integrity in Research with Humans" Certificate of Attendance , dated 21–22 June 2010
- Sanofi-Aventis ACACIA Codes & Definitions Booklet, version 7, dated 08 February 2006
- Sanofi-Aventis ACACIA, dated 18 October 2005

Approval Status: **FINAL**

Period of Approval: **22 November 2010 – 22 November 2011**

***Please note the terms under which Ethical approval is granted:**

1. Researchers are required to immediately report to the Ethics of Human Research Committee anything which might warrant review of ethical approval of the protocol, including:
a) serious or unexpected adverse effects on participants;
b) proposed changes in the protocol; and
c) unforseen events that might affect continued ethical acceptability of the project
2. Protocols are approved for up to twelve months only and a report is required at the end of the study or 12 month period. Extensions will not be granted without a report to the Committee.
3. Confidentiality of the research subjects shall be maintained at all times as required by law
4. All research subjects shall be provided with a Patient Information Sheet and Consent Form, unless otherwise approved by the Committee
5. The Patient Information Sheet and Consent Form shall be printed on the relevant site letterhead stating the contact details for the researchers

6. The Patient Information Sheet must state that the Executive Officer can be contacted for information regarding conduct of the study, policies and procedures, or if the participant wishes to make a confidential complaint
7. A report and a copy of any published material should be forwarded to the Committee at the completion of the project.

Yours sincerely

A/Professor Timothy Mathew

Government of South Australia
SA Health

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Research Ethics Committee
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Tel: (08) 8222 4139
Fax: (08) 8222 3035
Email: Heather.O'Dea@health.sa.gov.au

9 November 2010

Ms Yvette Roe
Population Health and Epidemiology
Division of Health Sciences
City East Campus
UNIVERSITY OF SOUTH AUSTRALIA

Dear Ms Roe,

Re: "Exploring potential differences between Indigenous and non-Indigenous patients admitted to hospital in South Australia for Acute Coronary Syndromes with particular emphasis on patient engagement in the health care process on outcome. Study 2 – Matched Retrospective Cohort in South Australia." Statement concerning Waiver of Consent.

RAH PROTOCOL NO: 101107.

In response to the justification of waiver of consent for participants who are the subject of this retrospective cohort study, I provide the following information:

The NHMRC National Statement on Ethical Conduct in Human Research (2007) addresses the circumstance in which a participant's right to informed consent may be waived. These are in section 2.3.6 which is reproduced below.

> *"2.3.6 Before deciding to waive the requirement for consent (other than in the case of research aiming to expose illegal activity), an HREC or other review body must be satisfied that:*
> *(i) involvement in the research carries no more than low risk to participants;*
> *(ii) the benefits from the research justify any risks of harm associated with not seeking consent;*
> *(iii) it is impracticable to obtain consent (for example, due to the quantity, age or accessibility of records);*
> *(iv) there is no known or likely reason for thinking that participants would not have consented if they had been asked;*
> *(v) there is sufficient protection of their privacy;*
> *(vi) there is an adequate plan to protect the confidentiality of data;*
> *(vii) in case the results have significance for the participants' welfare there is, where practicable, a plan for making information arising from the research available to them (for example, via a disease-specific website or regional news media);*
> *(viii) the possibility of commercial exploitation of derivatives of the data or tissue will not deprive the participants of any financial benefits to which they would be entitled;*
> *(ix) the waiver is not prohibited by State, federal, or international law."*

In this instance I am of the opinion that all conditions (i) to (ix) are met and am reassured in a letter from Dr Matthew Worthley dated 10th June 2010 that he will supervise you in aspects of confidentiality and access to hospital IT systems. It was under these circumstances that the waiver of consent was approved.

Yours sincerely,

Dr A Thornton
CHAIRMAN
RESEARCH ETHICS COMMITTEE

5.4 Appendix D – Permission to reprint published paper

STATEMENT OF AUTHORSHIP FOR PUBLICATION IN APPENDIX A

STUDY PROTOCOL: ESTABLISHING GOOD RELATIONSHIPS BETWEEN PATIENTS AND HEALTH CARE PROVIDERS WHILE PROVIDING CARDIAC CARE. EXPLORING HOW PATIENT-CLINICIAN ENGAGEMENT CONTRIBUTES TO HEALTH DISPARITIES BETWEEN INDIGENOUS AND NON-INDIGENOUS AUSTRALIANS IN SOUTH AUSTRALIA

Roe Y.L., Zeitz C.J., Fredericks B.

University of South Australia
GPO Box 2471 Adelaide South Australia 5001

The University of Adelaide
North Terrace, Adelaide South Australia 5005

Central Queensland University
Bruce Highway, North Rockhampton QLD 4702

BMC Health Services Research, 2012; 12:397

STATEMENT OF AUTHORSHIP

STUDY PROTOCOL: ESTABLISHING GOOD RELATIONSHIPS BETWEEN PATIENTS AND HEALTH CARE PROVIDERS WHILE PROVIDING CARDIAC CARE. EXPLORING HOW PATIENT-CLINICIAN ENGAGEMENT CONTRIBUTES TO HEALTH DISPARITIES BETWEEN INDIGENOUS AND NON-INDIGENOUS AUSTRALIANS IN SOUTH AUSTRALIA

BMC Health Services Research, 2012; 12:397

Name of candidate: Yvette Roe

YR contributed to the concept and design, managed and analysed the data, interpreted the findings and drafted the manuscript all under the supervision of CZ and BF.

I hereby certify that this statement of contribution to the above-named paper is correct.

Signed: *Date:* 12.6.15

Author 2:

Associate Professor Christopher Zeitz

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed: *Date:* 15/6/15

Author 3:

Professor Bronwyn Fredericks

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed:

Date: 08/06/15

5.5 Appendix E – Authorship declaration forms

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Licensed Content Author	Y. L. Roe,C. J. Zeitz,M. N. Mittinty,R. A. McDermott,D. P. Chew
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Chapter 3 – Paper #1

IMPACT OF AGE, GENDER AND INDIGENOUS STATUS ON ACCESS TO DIAGNOSTIC CORONARY ANGIOGRAPHY FOR PATIENTS PRESENTING WITH NON- ST SEGMENT ELEVATION ACUTE CORONARY SYNDROMES IN AUSTRALIA

Roe Y, L., Zeitz C, J., Mittinty M, N., McDermott R, A., Chew D, P

University of South Australia
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The University of Adelaide
North Terrace, Adelaide South Australia 5005

Flinders University
GPO Box 2100, Adelaide 5001, South Australia

Internal Medicine Journal. 2013;43(3):317-22

STATEMENT OF AUTHORSHIP

Impact of age, gender and Indigenous status on access to diagnostic coronary angiography for patients presenting with non- ST segment elevation acute coronary syndromes in Australia

Internal Medicine Journal. 2013;43(3):317-22

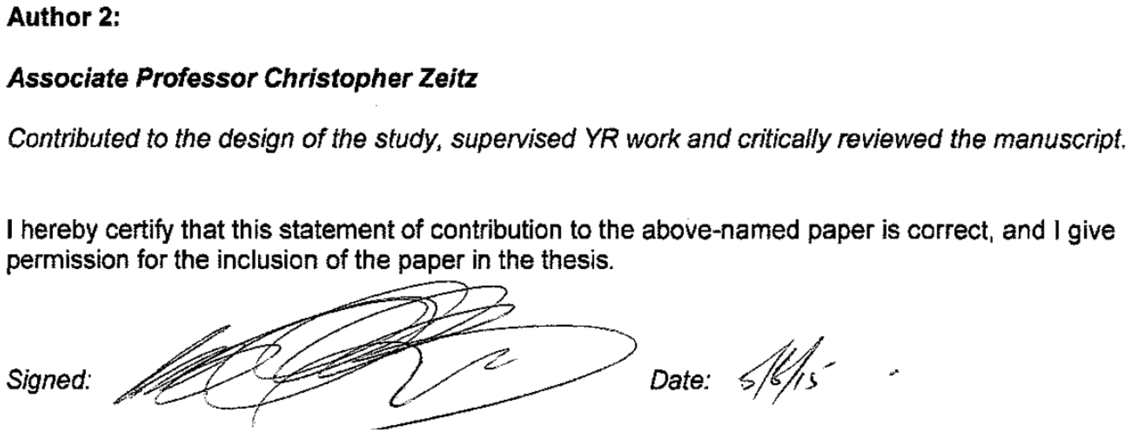
Name of candidate: Yvette Roe

YR contributed to the concept and design, managed and analysed the data, interpreted the findings and drafted the manuscript all under the supervision of MM, CZ, RM and DC

I hereby certify that this statement of contribution to the above-named paper is correct.

Signed:

Date: 03/06/2015



Author 2:

Associate Professor Christopher Zeitz

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed:

Date: 5/6/15

Author 3:

Dr Murthy Mittinty

Contributed to the design of the study, bio-statistical support, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed: M·N·

Date: 3|6|2015

Author 4:

Professor Robyn McDermott

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Date: 17/06/2015

Signed:

Author 5:

Professor Derek Chew

Contributed to the design of the study and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Date: 03/06/2015

Signed:

Chapter 3 – Paper # 2

THE MANAGEMENT OF ACUTE CORONARY SYNDROMES FOR INDIGENOUS PATIENTS PRESENTING WITH NON ST-SEGMENT ELEVATION ACUTE CORONARY SYNDROMES IN SOUTH AUSTRALIA: A RETROSPECTIVE COHORT STUDY

Roe Y, L., Esterman A, McDermott R, Zeitz C, J.,

University of South Australia
GPO Box 2471 Adelaide South Australia 5001

The University of Adelaide
North Terrace, Adelaide South Australia 5005

Internal Medicine Journal; 2015: original research – submitted and under review

STATEMENT OF AUTHORSHIP

The management of Acute Coronary Syndromes for Indigenous patients presenting with non ST-segment elevation acute coronary syndromes in South Australia: a retrospective cohort study.

Internal Medicine Journal; 2015: original research – submitted and under review

Name of candidate: Yvette Roe

YR contributed to the concept and design and drafted the manuscript all under the supervision of AE, RM and CZ.

I hereby certify that this statement of contribution to the above-named paper is correct.

Date: 03/06/2015

Signed:

Author 2:

Professor Adrian Esterman

Contributed to the design of the study, provided bio-statistical support and critically reviewed the manuscript

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Date: 4 June 2015

A. Estera.

Signed:

Author 3:

Professor Robyn McDermott

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed:

Date: 17/06/2015

Author 4:

Associate Professor Christopher Zeitz

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Signed:

Date: 5/6/15

Chapter 5 – Paper # 3

WHAT INDICATORS OF INDIGENOUS PATIENT ENGAGEMENT CAN BE IDENTIFIED IN THE PATIENT RECORD? A RETROSPECTIVE DESCRIPTIVE STUDY.

Roe Y.L. and Kruske S.

University of South Australia
GPO Box 2471 Adelaide South Australia 5001

University of Queensland
Brisbane Queensland 4072

Australian Indigenous Health Bulletin; 2015: original research - submitted and under review

STATEMENT OF AUTHORSHIP

What indicators of Indigenous patient engagement can be identified in the patient record? A retrospective descriptive study.
Australian Indigenous HealthBulletin; 2015: original research – submitted and under review

Name of candidate: Yvette Roe

YR contributed to the concept and design and drafted the manuscript all under the supervision of SK.

I hereby certify that this statement of contribution to the above-named paper is correct.

Signed:

Date: 02/06/2015

Author 2:

Professor Sue Kruske

Contributed to the design of the study, supervised YR work and critically reviewed the manuscript.

I hereby certify that this statement of contribution to the above-named paper is correct, and I give permission for the inclusion of the paper in the thesis.

Date: 02/06/2015

Signed: