The cardiovascular profile of the Aboriginal population in SA: Summary

for the
South Australian Aboriginal Heart and Stroke Plan 2017-2021

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Aboriginal people in South Australia experience significant differentials in cardiovascular disease burden and mortality compared to their non-indigenous counterparts. As such, a focused effort on reducing disparities in cardiovascular disease and care can have a significant impact on life expectancy differentials.

This profile (in summary) describes the cardiovascular health profile of Aboriginal South Australians and the service response of our health care system in South Australia to this condition for the Aboriginal population.

The profile informs a gap analysis of the health system in South Australia for Aboriginal people at risk of or with heart disease or stroke. In turn, this will drive development of a comprehensive Aboriginal heart and stroke plan for the state.

This summary cardiovascular profile is an interim snapshot for the purpose of providing context to those attending the SA Aboriginal Heart and Stroke Second Roundtable. It provides some insights into the state of Aboriginal cardiovascular health in South Australia particularly, in line with the gap analysis.

The final document will include more detail of all aspects of the profile, specifically with respect to the service availability and the flow through the system.
**Demographic profile**

**Geographic distribution:**
The SA Aboriginal population is just over 37,000 people, making up 2.3% of the total SA population.

Over 18,000 Aboriginal people (49%), live in metropolitan Adelaide distributed across the 3 metropolitan Local Health Networks. 20% of all SA Aboriginal people live in Northern Adelaide LHN.

Almost 30% of all SA Aboriginal people live in the far north or far west of the state (Country Health SA LHN sub-regions: Eyre, Flinders and Far North East and West).

<table>
<thead>
<tr>
<th>Aboriginal population distribution, by LHN</th>
<th>Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Adelaide LHN</td>
<td>8,512</td>
</tr>
<tr>
<td>Central Adelaide LHN</td>
<td>5,521</td>
</tr>
<tr>
<td>Southern Adelaide LHN</td>
<td>4,264</td>
</tr>
<tr>
<td>Country Health SA LHN</td>
<td>19,11</td>
</tr>
<tr>
<td>Barossa Hills Fleurieu</td>
<td>2,27</td>
</tr>
<tr>
<td>Eyre, Flinders and Far North East</td>
<td>4,768</td>
</tr>
<tr>
<td>Eyre, Flinders and Far North West</td>
<td>5,808</td>
</tr>
<tr>
<td>Riverland Mallee Coorong</td>
<td>2,928</td>
</tr>
<tr>
<td>South East</td>
<td>1,331</td>
</tr>
<tr>
<td>Yorke &amp; Northern</td>
<td>2,005</td>
</tr>
<tr>
<td>Total</td>
<td>37,408</td>
</tr>
</tbody>
</table>

Data Source: ABS 2015

**Age:**
The Aboriginal population has a significantly younger age profile; with half aged 22 years or under compared with 38 or under for the non-Aboriginal population. This younger age profile is mainly due to higher birth rates, and higher death rates at all ages.

**Considerations for the SA Aboriginal Heart and Stroke Plan**
The SA Aboriginal Heart and Stroke Plan must:

- provide a coordinated state-wide network of key primary care, acute care and specialist care stakeholders to provide the right care, at the right time and in the right place.
- meet the needs of all Aboriginal clients, regardless of whether they live in metropolitan, regional or remote South Australia.
- recognise that the Aboriginal population profile is significantly younger than the non-Aboriginal profile.
Socio-economic profile

Aboriginal South Australians experience significantly more disadvantage compared to non-Aboriginal people. Disparities between Aboriginal and non-Aboriginal people exist across the State.

Education:
Education is a clear indicator of socioeconomic status and an important measure for health literacy. Overall, Aboriginal persons aged 20 to 24 years of age are 50% less likely to have attained a year 12 (or equivalent) level of education when compared to non-Aboriginal persons. There were only slight differences found between males and females.

Employment & Unemployment:
Unemployment rates for Aboriginal persons in the workforce were consistently higher across all LHNs, while employment to population ratio, and labour force participation rates were consistently lower, when compared to non-Aboriginal persons. Unemployment rates for Aboriginal people are approximately double that for non-Aboriginal people.

Household crowding:
Household crowding, as well as being an indicator for socioeconomic status, is also an important indicator for rheumatic heart disease, as overcrowded housing can increase the spread of streptococcus infection, which can lead to acute rheumatic fever and subsequent rheumatic heart disease.

The proportion of Aboriginal households meeting the criteria, and thus being classified as overcrowded, increases exponentially from 14% in Adelaide and inner regional SA to 51% in very remote SA (compared to under 5% across the state for non-Aboriginal households).

Considerations for the SA Aboriginal Heart and Stroke Plan

Government and non-government organisations need to develop, support and sustain state-wide initiatives that address improving Year 12 completion, improving employment status and increasing access to housing. These must be prioritised.
The heart and stroke risk for Aboriginal South Australians

The current cardiovascular risk profile for Aboriginal SA is important in understanding the future burden of disease, and the impact this will have on the health system.

Cardiovascular risk should be considered within Aboriginal concepts of health and wellbeing which include the physical, psychological and community wellbeing, and within the context burden of co-morbidities such as diabetes, kidney disease and cancer.

Aboriginal people are significantly more likely to be experiencing higher rates for a number of cardiovascular risks factors, when compared to non-Aboriginal people. Aboriginal people carry a profile of significant cardiovascular risk burden from young ages.

General health:
This assessment of general health considers how people rate their health. Aboriginal people are less likely to report their health as excellent or very good, and more likely to report health as fair or poor. Over 30% SA Aboriginal respondents aged 45 years and over reported having fair or poor overall health (ABS, 2015).

Smoking:
Smoking prevalence is more than double in the Aboriginal population (42.1%) compared to the non-Aboriginal population (17.5%) (ABS, 2015). The smoking rate stays high for the Aboriginal population (ABS, 2015). The majority of non-Aboriginal SA reported having never smoked (51.3%) while those reporting having never smoked ranged from 36.4% to 46.3% for the Aboriginal population (ABS, 2015). There are more current smokers among Aboriginal males than females (ABS, 2015).

Smoking during pregnancy: The current smoker rate for Aboriginal women at first antenatal visit is 51%. Rates of current smoking are more than 2 and a half times higher for Aboriginal women when compared to non-Aboriginal women. The percent of women who quit before first visit are the same for Aboriginal and non-Aboriginal women (5.4%) (Perinatal Statistics Collection, 2015).

Nutrition:
10% of Aboriginal people meet recommended fruit and vegetable nutritional guidelines, compared to 8% of non-Aboriginal people (ABS, 2015).

Physical activity:
Aboriginal people are more likely to be doing the recommended levels of physical activity compared to non-Aboriginal people (Aboriginal: 52% vs non-Aboriginal: 39%) (ABS, 2015). However, there is significant variation by sex. Aboriginal females are more likely to be meeting these
recommendations than non-Aboriginal females. Aboriginal males are more than 30% less likely to be achieving sufficient physical activity compared to non-Aboriginal males (ABS, 2015).

**Obesity:**
Body mass index (BMI): is the most common measure of overweight and obesity. The national survey undertaken in 2011-13, states that 56% of Aboriginal people are overweight or obese, compared to 58% of non-Aboriginal people. However, the 2012 SA Aboriginal health survey found that almost 80 percent of Aboriginal people are overweight or obese, with over 50 percent alone obese (ABS, 2015).

**Waist circumference:** reflects mainly subcutaneous abdominal fat storage and has been shown to positively correlate to disease risk. Aboriginal females are more likely to be at a substantially increased risk (Aboriginal females: 70%, non-Aboriginal females: 51%). There is little difference between Aboriginal and non-Aboriginal males (42.5 percent versus 40.5 percent) (ABS, 2015).

**Stress and worry (psychological distress):**
Estimating the burden of mental ill-health in the Aboriginal population is very important.

For both male and female, Aboriginal persons report significantly higher levels of psychological distress than non-Aboriginal persons (ABS, 2015).

Aboriginal people are significantly more likely to have experienced a family stressor in the past 12 months when compared to non-Aboriginal people (ABS, 2015).

**Comorbidities:**
The majority of Aboriginal South Australians reported having three or more long term health conditions (35.7%; n=12,700) (ABS, 2015).

Aboriginal people are significantly more likely to have been diagnosed with diabetes (sometimes reported at high sugar) (17.4%) and/or chronic kidney disease (21.6%) than non-Aboriginal people (6.8% and 10.7% respectively) (ABS, 2015). Rates of diabetes are 40% in some remote SA communities (SAAHS, 2015).

**Considerations for the SA Aboriginal Heart and Stroke Plan**
Community wide, culturally appropriate, cardiovascular risk factor prevention programs must be developed with community, and implemented to reach all community members.

Individual focussed Absolute Cardiovascular Risk Assessments (Heart and Stroke Checks) and management programs must be integrated into usual primary care services for all Aboriginal people older than 15 years.

Stress, worry, grief and loss must be recognised as an important risk factors that are highly prevalent in Aboriginal communities. Appropriate strategies to recognise and respond in a culturally sensitive and appropriate manner must be included in cardiovascular risk management programs and prevention programs.
Heart disease and stroke among Aboriginal South Australians

The current cardiovascular health of Aboriginal South Australians is important to understand the current burden of disease on the population, and enables some consideration of how the health system is currently responding to this burden.

Aboriginal people experience heart disease and stroke at significantly younger ages. The greatest disparities exist between the young age groups (25 to 54 years).

Prevalence of disease:

The overall prevalence of cardiovascular disease in South Australia, as reported by the AATSIHS and AHS, is lower for Aboriginal SA than non-Aboriginal (23% vs 30%). However, Aboriginal people experience onset of cardiovascular disease at young ages. Two in five Aboriginal people aged 35-44 report having a cardiovascular disease. Almost four in five people aged 55 years and over report having a cardiovascular disease (ABS, 2015).

There are significant differences between males and females, particularly at younger age groups. The protection of being female before the age of 45, typically seen in Caucasian populations, is reversed in the Aboriginal population, particularly between the ages of 15 to 34 and 45 to 54 (ABS, 2015).

Hypertension: Hypertension (high blood pressure) is an important risk factor for heart disease, stroke and other cardiovascular diseases. Hypertension is seen at earlier ages in the Aboriginal population, with one third of all 35 to 44 year old Aboriginal people having hypertension (ABS, 2015).

Acute rheumatic fever and rheumatic heart disease: The profile of acute rheumatic fever and rheumatic heart disease has changed over the last 50 years. Prior to the availability of penicillin, these conditions were common among the non-Aboriginal population, however more recently they have become a conditions disproportionately affecting disadvantaged groups, specifically Aboriginal populations in Australia.

The incidence of acute rheumatic fever in the Aboriginal population is between 2 and 4 people per 10,000, with an average of 3.3 per 10,000 between January 2013 and June 2015. Recurrences of acute rheumatic fever over the 30 month period was on average 24.2 percent of all episodes, with a reduction seen between 2013 and 2015, which is an indicator of timely diagnosis and sustained management (RHD Registry, 2016).

The prevalence of rheumatic heart disease in the Aboriginal population is between 6 and 24 people per 10,000, with an average of 15.5 per 10,000 between January 2013 and June 2015 (RHD Registry, 2016).

The majority of cases of acute rheumatic fever and rheumatic heart disease are in Country Health SA LHN, particularly in the Eyre, Flinders & Far North West sub-region. In the metropolitan Adelaide area, there were 55 cases, with the majority in Northern Adelaide LHN (RHD Registry, 2016).
Hospitalisations:
Aboriginal people account for 2.2% of all hospitalisations in SA for a principal diagnosis of cardiovascular disease, with 4,053 separations over the 5 year period from July 2010-June 2015 (ISAAC, 2015).

Females are disproportionately over-represented in the Aboriginal cohort presenting to SA hospitals, accounting for 47% of Aboriginal separations, compared to 43% in the non-Aboriginal population. Aboriginal people are hospitalised for cardiovascular at much younger ages than the non-Aboriginal population (ISAAC, 2015).

After adjusting for different age profiles, the Aboriginal hospitalisation rate was 26.0 per 1,000, compared to 16.7 per 1,000 non-Aboriginal people, meaning Aboriginal people were 60% more likely to be hospitalised for a principal diagnosis of CVD (ISAAC, 2015).
84% of separations of CVD for Aboriginal people were for cardiac conditions, compared to 75% for non-Aboriginal separations. Cerebrovascular conditions (including stroke) accounted for 7 percent of separations for Aboriginal people, which was proportionally less than for non-Aboriginal separations. Vascular disease accounted for 9% of Aboriginal separations, almost half of the 16% for non-Aboriginal separations (ISAAC, 2015).

**Hospitalisation rate for principal diagnosis of cardiovascular condition, SA, July 2005 - June 2015, by Aboriginal status**

<table>
<thead>
<tr>
<th>Age adjusted hospitalisation rate</th>
<th>Aboriginal</th>
<th>non-Aboriginal</th>
<th>Rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary heart disease*</td>
<td>10.88</td>
<td>5.24</td>
<td>2.1</td>
</tr>
<tr>
<td>Chronic heart failure*</td>
<td>4.11</td>
<td>1.82</td>
<td>2.3</td>
</tr>
<tr>
<td>Atrial fibrillation*</td>
<td>1.9</td>
<td>2.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Hypertension*</td>
<td>0.7</td>
<td>0.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Stroke*</td>
<td>1.8</td>
<td>1.1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Calculated on cells where n<20

**Unadjusted hospitalisation rate**

| Acute rheumatic fever (per 10,000 population) | 0.09 | 0.00 | 36.6 |
| Rheumatic heart disease                  | 0.20 | 0.13 | 1.6  |

*Hospitalisation rate calculated for separations where the state/territory of residence was South Australia and where the hospitalisation occurred in South Australia

Data source: Integrated South Australian Activity Collection (ISAAC) Unit Record File provided by SA Health (unpublished) extracted for the SA State of Aboriginal Heart Health Project 22 Nov 2015.

**Death:**

Data source: Cause of Death Unit Record File for South Australia provided by the Australian Coordinating Registry (unpublished) extracted for the SA State of Aboriginal Heart Health Project 30 July 2015.
Proportion of deaths from CVD, by Aboriginal status and age, SA 2006-2012

Coronary heart disease accounted for over half of all heart and stroke hospitalisations and deaths, higher than in the non-Aboriginal population. Haemorrhagic stroke accounted for 3% of all deaths, compared to ischaemic stroke, which accounted for 1% (ACR, 2015).

Considerations for the SA Aboriginal Heart and Stroke Plan

All service providers, including those in primary care and the acute sector, must understand the burden and impact of CVD on the Aboriginal community and the potential for significant improvement in health outcomes if the evidence is translated into action.

All strategies must:
- target both men and women between the age of 25-55 years
- include families
- be culturally appropriate.

The use of peer educators with “lived experience of heart attack and stroke” and the use of narrative (story telling) should be integrated into all strategies. It is anticipated that this will help engage community members in all aspects of care.
Service availability for heart disease and stroke for Aboriginal South Australians

A detailed list of available services is contained within the full cardiovascular profile.

An overview of service availability is contained within the gap analysis.
Service activity for heart disease and stroke for Aboriginal South Australians

Health promotion and disease prevention:
The community voiced support and use of smoking cessation and healthy lifestyle campaigns which are driven by Aboriginal leadership and have strong connection to the community.

There is limited data on the service utilisation of primary health care providers, however, anecdotally, approximately half of all Aboriginal people use Aboriginal health service, and half use mainstream services. This is supported by feedback from the community.

Risk assessment and management:
There is limited data on the heart and stroke risk assessment and management activities in the primary health care sector.

Community voiced little awareness of the availability and benefits of having an absolute cardiovascular risk assessment (heart and stroke check).

Receipt of an Aboriginal and Torres Strait Islander adult health check (MBS Item 715) is used as a proxy for risk identification. The update of the adult health check is, on average, around 15 percent for South Australia, with a significant increase since 2011-2012.

At a regional level, the Country Primary Health Network has twice the rate of update of adult health checks compared to the Adelaide Primary Health Network region. Both regions have seen a double in the update in 2013-14 from 2011-12.

Secondary prophylaxis for acute rheumatic fever has increased since the introduction of the SA RHD register. In 2015, 57% of cases on the register were received 80 percent or greater adherence to benzathine penicillin G (BPG) injection.
**Investigation services:**
There is limited understanding of the scope or extent of activity to investigate CHD and CHF without access to MBS data.

ARF/RHD patients receive regular echocardiography; as at December 2015 58% of priority 1, and 71% of priority 2 cases received screening within guideline recommended timeframes. These levels increased from 2014.

**Specialist services:**
Other than MBS item data, there is little understanding of the scope or extent of activity of specialist services.

Community voiced concerns about the availability of specialists, support in accessing the service, and the lack of culturally appropriate services.

**Planned and urgent transfer and emergency retrieval services:**
There are varying levels of symptom recognition of the warning signs of heart attack and stroke in the community. Often, family play an important role in initiating care. ED data shows that 66% of all Aboriginal presentations were referrals from self or family and friends, 4% higher than non-Aboriginal presentations.

At community forums, there was discussion about how the cost of ambulances was a barrier to seeking care. Some community members reported prioritising the purchase of ambulance insurance, as they recognised their potential need.

Data has not been sought from the SA Ambulance Service.

Between January 2006 and December 2012, the RFDS undertook 137 primary evacuations from SA for people identified as Aboriginal. The majority were evacuated to Alice Springs (n=113). Many of the primary evacuations to Alice Springs were from APY lands communities.

There were also evacuations to South Australian centres, with Port Augusta receiving the greatest number. Many of the primary evacuations to Port Augusta were from the far west of SA.

There were 424 inter-hospital transfers from country SA. Of these 424 transfers, 287 (approximately 70%) were to Adelaide and 91 to Alice Springs.

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<table>
<thead>
<tr>
<th>Primary evacuation* from:</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>APY lands</td>
</tr>
<tr>
<td>Evacuation to:</td>
<td>NT</td>
</tr>
<tr>
<td></td>
<td>82</td>
</tr>
<tr>
<td>Adelaide</td>
<td>0</td>
</tr>
<tr>
<td>Ceduna</td>
<td>0</td>
</tr>
<tr>
<td>Port Augusta</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
</tr>
</tbody>
</table>

Primary evacuation* refers to retrieval from point with no medical facility.

Data source: RFDS Unit Record data provided by RFDS (unpublished) extracted for the SA Aboriginal Heart and Stroke Plan, 16 Sept 2015.
Of the inter hospital transfers to Adelaide, 40% (n=121) were from Port Augusta hospital. Ceduna and Coober Pedy were the other two sites with a high number of transfers to Adelaide.

There were also 471 inter-hospital transfers from the NT to Adelaide.

### RFDS inter-hospital transfers and retrievals by referring location and receiving location

<table>
<thead>
<tr>
<th>Receiving Location</th>
<th>NT</th>
<th>Adelaide</th>
<th>Ceduna</th>
<th>Coober Pedy</th>
<th>Leigh Creek</th>
<th>Maitland</th>
<th>Oodnadatta</th>
<th>Port Augusta</th>
<th>Port Lincoln</th>
<th>Port Pirie</th>
<th>Renmark</th>
<th>Whyalla</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>644</td>
<td>98</td>
<td>46</td>
<td>41</td>
<td>8</td>
<td>7</td>
<td>12</td>
<td>121</td>
<td>16</td>
<td>15</td>
<td>9</td>
<td>8</td>
<td>43</td>
</tr>
</tbody>
</table>

Inter-hospital transfers refer to inter-hospital transfers and retrievals with clinical staff external to RFDS (such as MedStar staff).

Data source: RFDS Unit Record data provided by RFDS (unpublished) extracted for the SA Aboriginal Heart and Stroke Plan, 16 Sept 2015

For the emergency presentations to ED departments, 58% of Aboriginal people arrived by ambulance (including air ambulance; helicopter; and ambulance service), similar to the non-Aboriginal population. However, variation in arrival mode is seen between hospitals.

### Acute hospital services:

**Emergency Departments:** Aboriginal people accounted for 2% of emergency presentations to ED departments in SA with a diagnosis of cardiovascular disease. Of the 1618 presentations for Aboriginal people, 98% of these are for an ‘emergency’ visit.

Central Adelaide LHN accounted for 48% of all ED presentations with a diagnosis of CVD for Aboriginal people. The RAH had the greatest number of Aboriginal presentations, followed by the...
Lyell McEwin Hospital and The Queen Elizabeth Hospital. Country Health SA LHN accounted for 13% of all ED presentations for Aboriginal people. Of the country hospitals, Port Augusta 41% of all presentations (n=83).

11% of Aboriginal presentations were from another hospital, compared to only 3% of non-Aboriginal presentations.

**Hospital admissions:** There were 4,053 hospital admissions for Aboriginal people with a principal diagnosis of cardiovascular disease for the period July 2010-June 2015. The number of separations has increased by 15% for the Aboriginal population from July 2005 - June 2010 to July 2010 - June 2015.

Of all hospital separations for Aboriginal people in SA hospitals, 69 percent are SA residents. NT residents make up 27 percent of all Aboriginal separations to SA hospitals.

Approximately 7 in 10 hospital admissions for Aboriginal people were emergency admissions. The Aboriginal population are 8% more likely to have an emergency admission for a hospital separation with a principal diagnosis of CVD than the non-Aboriginal population.

Central Adelaide LHN (CALHN) had the greatest number of separations for Aboriginal people between July 2010 - June 2015, with a total of 1,544 separations for a principal diagnosis of CVD. Country Health SA LHN and Southern Adelaide LHN have the next highest number of separations for CVD with 1007 and 978 separations respectively.

A majority (67%) of Aboriginal hospitalisations at the RAH were from the NT. Only 30% of Aboriginal separations at the FMC are SA residents. The RAH and the W&CH also have high proportions of Aboriginal hospitalisations from other states/territories, with only 59% of separations from SA.

**Aboriginal separations – Metropolitan Hospitals, with a principal diagnosis CVD, July 2010-June 2015, by state/territory of residence**

**Aboriginal separations – Country Hospitals, with a principal diagnosis CVD, July 2010-June 2015**
84% of separations of CVD for Aboriginal people were for cardiac conditions, compared to 75% for non-Aboriginal separations. Cerebrovascular conditions (including stroke) accounted for 7 percent of separations for Aboriginal people, which was proportionally less than for non-Aboriginal separations.

Coronary heart disease accounted for 47% of all Aboriginal separations for a principal diagnosis of CVD.

Aboriginal people were less likely to be hospitalised for ischaemic stroke compared to non-Aboriginal people, however ischaemic stroke still accounted for the majority of strokes for Aboriginal and non-Aboriginal separations (Aboriginal: 52%; non-Aboriginal: 62%).

The figure below indicates that Aboriginal people receiving angiography (between Jan 2012 and Dec 2014) were more likely to have prior acute myocardial infarction (AMI), heart failure, and stroke. However, they were less likely to have received prior percutaneous coronary intervention (PCI) and coronary artery bypass grafts (CABG). Aboriginal people were slightly more likely to have received prior valve surgery.

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Data source: CADOSA analysis provided by the CADOSA Registry, the University of Adelaide (unpublished) for the SA State of Aboriginal Heart Health Project. CADOSA was supported by a Cardiovascular Research Development Grant from the South Australian Division of the Heart Foundation of Australia and the Government of South Australia.
Aboriginal people with a principal diagnosis of cardiovascular disease were more likely to self-discharge.

After adjusting for age, the rate of self-discharge for Aboriginal adults was 36.5 per 1,000 hospitalisations, compared to 9.4 per 1,000 for non-Aboriginal hospitalisations. This is a rate ratio of 3.9.

The crude rate of self-discharge varied significantly by hospital, for both Aboriginal and non-Aboriginal hospitalisations. For all hospitals, there was a significant difference in the rate of self-discharge between Aboriginal and non-Aboriginal separations.

The high rates of self-discharge reflect in part the discomfort felt by Aboriginal people in hospital. This may be connected to the high levels of racism reported by community.

**Procedures for heart disease:** Between July 2010-June 2015, Aboriginal people had 1138 hospitalisations with a coronary angiography procedure recorded. Almost 80% of coronary angiographies were undertaken in Aboriginal people aged 35-64. 87% of coronary angiographies are done for a principal diagnosis of coronary heart disease for Aboriginal separations. Of the 1138 Aboriginal separations who received a coronary angiography, 51% were South Australian residents, an additional 43% were Northern Territory residents. Flinders Medical Centre and the Royal Adelaide Hospital undertake more angiographies for Aboriginal people from the Northern Territory than for Aboriginal South Australians.

Between July 2010-June 2015, Aboriginal people had 511 hospitalisations with a percutaneous coronary intervention (PCI) recorded. 83% of PCIs were undertaken in Aboriginal people aged 35-64. 66% of all procedures were for a principal diagnosis of acute myocardial infarction. 51% of PCIs for Aboriginal people were undertaken for Northern Territory residents. Flinders Medical Centre (45%) and the Royal Adelaide Hospital (36%) undertake the majority of angiographies for Aboriginal people. At FMC, 78% of the Aboriginal patients are NT residents. At the RAH 45% of Aboriginal patients are NT residents. This is in contrast to the LMH and TQEH.
Between July 2010-June 2015, 352 Aboriginal hospitalisations with a principal diagnosis of CVD had a coronary artery bypass graft. 86% of coronary artery bypass grafts were undertaken in Aboriginal people aged 35-64. 65% of all coronary artery bypass grafts for Aboriginal separations were undertaken at Flinders Medical Centre, 34% at RAH, and 2% in private hospitals. 28% of all coronary artery bypass grafts were undertaken for Aboriginal people from South Australia, compared to 70% for Aboriginal residents of the Northern Territory. Flinders Medical Centre undertook 81% of all procedures for Aboriginal Northern Territory separations.

Aboriginal people with a principal diagnosis of CVD had 145 separations involving mitral valve surgery, and 71 involving aortic valve surgery recorded (July 2010-June 2015). Of the Aboriginal separations, 96% of mitral valve surgery and 87% of aortic valve surgery was performed on people younger than 65. For Aboriginal separations, 79% of mitral surgery and 69% of aortic valve surgery were undertaken from the Northern Territory. 80% all mitral valve surgery, and 63% percent of all aortic valve surgery for Aboriginal separations was undertaken at Flinders Medical Centre.

Procedures for stroke: Between July 2010-June 2015, 7 Aboriginal separations with a principal diagnosis of ischaemic stroke or stroke not specified had received thrombolysis.

Receipt of evidence-based care for ACS: Using a range of national indicators, there is evidence that Aboriginal people are less likely to receive evidence-based care than non-Aboriginal counterparts. For acute ST elevation myocardial infarction (STEMI) patients, these measures include ECG within 10 minutes of first medical contact, receipt of thrombolysis within 30 minutes of arrival, and revascularisation within the index admission.
Proportion of STEMI patients who received thrombolysis or PCI, by Aboriginal status, Jan 2012- Dec 2014

Receipt of evidence-based care for stroke:
Over a 4 year period (July 2011 – June 2015), there were 60 hospitalisations for Aboriginal people with a principal diagnosis of stroke. Of the 60 Aboriginal hospitalisations, 6 (10%) received thrombolysis. This is compared to 9% of non-Aboriginal hospitalisations.

The ISAAC database does not record time of symptom onset, therefore we are unable to measure against the timeframes for care.

Hospital discharge planning and follow-up services:
There is little understanding of the scope or extent of discharge planning and follow up services. Based on anecdotal reports, discharge planning is not systematically taken or communicated to primary health care providers.

Of those individuals who received an angiography for an acute coronary syndrome, Aboriginal people were more likely to be discharged on cardiovascular medications, particularly aspirin and other anti-platelet medications, statins, ACE inhibitors, and beta blockers. The exceptions were angiotensin receptor blockers (ARBs), calcium channel blockers (CCB), and long-acting nitrates.
In the 2 year period January 2013-December 2014, 25 Aboriginal people received a referral to cardiac rehabilitation as an in-patient (28%). This compared to 34% of non-Aboriginal people. Referral to cardiac rehabilitation was higher in country hospitals (46%, n=6) compared to metropolitan hospitals (25%, n=19).

75% of Aboriginal people eligible for cardiac rehabilitation were under 65 years old, compared to 47% of non-Aboriginal people.

Rehabilitation, secondary prevention and ongoing care services:
There is little understanding of ongoing care following hospitalisation for heart disease or stroke.

In the 2 year period January 2013-December 2014, 6 Aboriginal people who were referred to cardiac rehabilitation completed (24%). This was slightly higher than the non-Aboriginal rate.

Community voiced concerns about the lack of culturally appropriate cardiac rehabilitation, and the lack of cardiac rehabilitation which was accessible and appropriate for young people following a cardiac event.
Acknowledgements:

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- SA Aboriginal Health Survey: Population Research and Outcome Studies
- ISSAC and EDDC: Finance and Corporate Services, SA Health
- CADOSA: CADOSA Registry, the University of Adelaide (CADOSA was supported by a Cardiovascular Research Development Grant from the South Australian Division of the Heart Foundation of Australia and the Government of South Australia)
- Cardiac Rehabilitation Minimum Data Set: Cardiac Rehabilitation Working Group, SA Cardiac Clinical Network, SA Health
- SA RHD Registry summary data: SA RHD Registry, SA Health
- RFDS unit record data of evacuations, retrievals and inter-hospital transfers: RFDS Central Operations
- Perinatal statistics collection: Perinatal Outcomes Unit, SA Health
- Cause of Death Unit Record File: Australian Coordinating Registry