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REVIEW ARTICLE

Heart Failure in Minority Populations - Impediments to Optimal Treatment in Australian Aborigines

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Abstract: Chronic heart failure (CHF) among Aboriginal/Indigenous Australians is endemic. There are also grave concerns for outcomes once acquired. This point is compounded by a lack of prospective and objective studies to plan care. To capture the essence of the presented topic it is essential to broadly understand Indigenous health. Key words such as 'worsening', 'gaps', 'need to do more', 'poorly studied', or 'future studies should inform' occur frequently in contrast to CHF research for almost all other groups. This narrative styled opinion piece attempts to discuss future directions for CHF care for Indigenous Australians. We provide a synopsis of the problem, highlight the treatment gaps, and define the impediments that present hurdles in optimising CHF care for Indigenous Australians.

Pupalan Iyngkaran

Keywords: Aboriginal Australian, Chronic Heart Failure, Cultural Health Attributions, Culture and Healthcare, Health Beliefs, Indigenous Australian.

INTRODUCTION

> *'Politics is the art of the impossible and science is the art of the possible'*
> *Unknown*

Have we made inroads in improving chronic heart failure (CHF) outcomes for Indigenous Australians? We have certainly made inroads in delivery of services and therapeutics for most urban centres. In addition, the evidence seems to indicate that trial outcomes have been reproduced for the wider Australian population and worldwide [1-3]. Without definitive prospective data, anecdotal data suggests otherwise for Indigenous patients, anywhere in Australia [4-11]. Some may even suggest that we are going backwards [12]. Some have raised the notion of '*cultural sensitivities*', the simplest way to highlight this point is to ask the question 'would it be acceptable to conduct a RCT among Indigenous Australians and apply the findings to all Australians?' Thus more attempts are needed to refocus the question on the community in front of us rather than implement solutions more relevant for others. Many still consider the medical issues of the first Australians as too hard. The politics continue to tell us to believe change is around the corner, while the science tells us we may be going backward. But the truth of the matter is that neither of these two arms meet regularly to continue the dialogue on how to improve care. It does however highlight that there are poles between scientific possibilities, political will and community sentiment on Indigenous affairs. It would be timely for all these factions to draw more on the commonalities to address the challenges.

CHF is a chronic condition without cure. The epidemiology which is well studied highlight that CHF: is a top three cause for admissions among older Australians; has a 5 year

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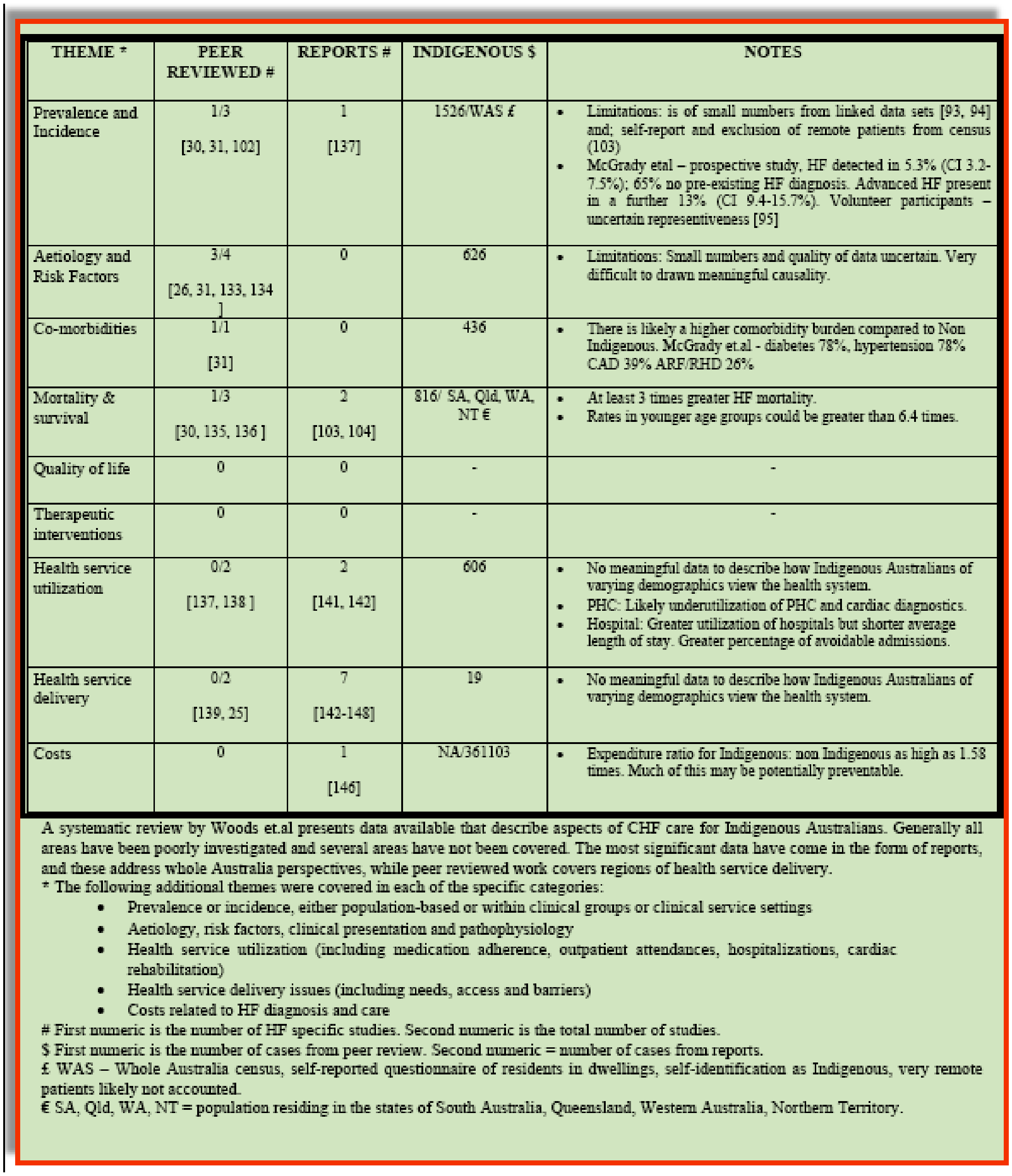
mortality approaching 50%; is associated with chronic comorbidities in the majority of cases; impacts the demand for medical and allied health care in hospital and the communities. The direct healthcare costs from these wide-ranging needs account for 2% of many developed nations' health budgets, the majority related to admissions. Thus there is a health strain even for mainstream HF care [11]. For Indigenous Australians, the difference in their socio-geo-political demographics leads to imbalance between services needs and disease epidemiology, far greater than can be planned for. In this we have to factor in cultural sensitivities, which have never been translated at a population level for Indigenous clients [13, 14].

Ensuring whether CHF guidelines are implemented broadly is an important start as demonstrated by the OPTIMIZE-HF study. It is also important we consider broader issues [10, 11]. As there are diverse treating health clusters, some consensus on the direction is required. Examples of this include broader considerations in developing and applying guideline evidence [15, 16]. Lenzen *et al*, argues that less than 10% of CHF patients are eligible for the randomised controlled trials (RCT) that inform guidelines [17]. There are issues for Indigenous patients at the very heart of the evidence tree. Thus we have to not only ask, '*why does such a devastating health care gap still exist*?' but 'does the conventional treatment strategies also contribute to the health

Box 1. Disparities of heart failure outcomes.



THEME *	PEER REVIEWED #	REPORTS #	INDIGENOUS $	NOTES
Prevalence and Incidence	1/3 [30, 31, 102]	1 [137]	1526/WAS £	• Limitations: is of small numbers from linked data sets [93, 94] and; self-report and exclusion of remote patients from census (103) • McGrady etal – prospective study, HF detected in 5.3% (CI 3.2-7.5%); 65% no pre-existing HF diagnosis. Advanced HF present in a further 13% (CI 9.4-15.7%). Volunteer participants – uncertain represeutiveness [95]
Aetiology and Risk Factors	3/4 [26, 31, 133, 134]	0	626	• Limitations: Small numbers and quality of data uncertain. Very difficult to drawn meaningful causality.
Co-morbidities	1/1 [31]	0	436	• There is likely a higher comorbidity burden compared to Non Indigenous. McGrady et.al - diabetes 78%, hypertension 78% CAD 39% ARF/RHD 26%
Mortality & survival	1/3 [30, 135, 136]	2 [103, 104]	816/ SA, Qld, WA, NT €	• At least 3 times greater HF mortality. • Rates in younger age groups could be greater than 6.4 times.
Quality of life	0	0	-	-
Therapeutic interventions	0	0	-	-
Health service utilization	0/2 [137, 138]	2 [141, 142]	606	• No meaningful data to describe how Indigenous Australians of varying demographics view the health system. • PHC: Likely underutilization of PHC and cardiac diagnostics. • Hospital: Greater utilization of hospitals but shorter average length of stay. Greater percentage of avoidable admissions.
Health service delivery	0/2 [139, 25]	7 [142-148]	19	• No meaningful data to describe how Indigenous Australians of varying demographics view the health system.
Costs	0	1 [146]	NA/361103	• Expenditure ratio for Indigenous: non Indigenous as high as 1.58 times. Much of this may be potentially preventable.

A systematic review by Woods et.al presents data available that describe aspects of CHF care for Indigenous Australians. Generally all areas have been poorly investigated and several areas have not been covered. The most significant data have come in the form of reports, and these address whole Australia perspectives, while peer reviewed work covers regions of health service delivery.

* The following additional themes were covered in each of the specific categories:

- Prevalence or incidence, either population-based or within clinical groups or clinical service settings
- Aetiology, risk factors, clinical presentation and pathophysiology
- Health service utilization (including medication adherence, outpatient attendances, hospitalizations, cardiac rehabilitation)
- Health service delivery issues (including needs, access and barriers)
- Costs related to HF diagnosis and care

\# First numeric is the number of HF specific studies. Second numeric is the total number of studies.

$ First numeric is the number of cases from peer review. Second numeric = number of cases from reports.

£ WAS – Whole Australia census, self-reported questionnaire of residents in dwellings, self-identification as Indigenous, very remote patients likely not accounted.

€ SA, Qld, WA, NT = population residing in the states of South Australia, Queensland, Western Australia, Northern Territory.

ABBREVIATIONS: ARF/RHD = acute rheumatic fever/rheumatic heart disease; CAD = coronary artery disease; CI = confidence intervals; NA = not available; PHC – primary health care. Modified from ref 4.

care gaps?' In short, are evidenced based CHF guidelines generalizable for our Indigenous clients and what really is the evidence base? In this review we aim to explore impediments and avenues to improve CHF care for Indigenous Australians.

DISPARITIES IN HEART FAILURE OUTCOMES

CHF from all perspectives is suspected to be worse among Australia's Indigenous population compared to Australians of any other ethnic background. There has never been a significant retrospective analysis or prospective study to confirm this [18]. Woods et.al reviewed this area and concluded that despite the shortfalls of available published data, Indigenous Australians have an excess burden of CHF, where undiagnosed cases may also be more common [4] (Box **1**). If we look at what has been achieved in CHF care, from a nationwide retrospective analysis, HF was coded as the underlying cause of death in 4667 and mentioned anywhere on the death certificate in 20,614 cases, in 1997; and 3661 and 18491 respectively in 2003 representing decreases of 21.6% and 10%. Age standardised mortality rates were 17.1 and 78.8 per 100,000 person-years for the lowest and highest ages, thus mortality increased sharply with age, but overall decreased in all age groups and both sexes by 38% and 39%, over the study period. Age standardized mortality was higher in men than women. This excess decreased with higher ages and was reversed in over 85 year olds. The contribution of HF to deaths attributed to ischemic heart and circulatory diseases remained stable between 1997 and 2003 ranging from 24.8/24.1% and 18.3/17.3% respectively [2]. This would support a decline of greater than 37% since 2003 and with perhaps greater gains presently, and community wide. Subsequent studies have continued to support this improving trend. Smaller regional databases also support this finding [19-25].

Specific to Indigenous Australians additional studies [6, 7, 26-28] not mentioned in the Woods paper, however suggest Indigenous patients are not doing as well (Box **2**). Retrospective linked Western Australian hospital admissions data support improving CHF outcomes generally [20, 21, 23], but data for Indigenous clients show otherwise [6, 7, 29, 30]. Among 17 379 index HF patients, Teng et.al identified 5.8% of 1013 clients as Indigenous. Incidence HF rates were 11 and 23 times higher in young males and females dropping to 2 times in the oldest group. In general, these patients tended to be younger, female and more likely to reside remotely. Ischemic and rheumatic aetiologies were more common in younger age groups. All groups had higher proportions with comorbidities including hypertension, diabetes, chronic kidney disease, chronic obstructive airways disease and a high Charlson comorbidity index, similarly noted by McGrady *et al.* 12 month mortality was 1.9 times higher in Indigenous patients below 59 years of age. Geographically, in the total cohort only 1.9% of Indigenous clients resided in a metropolitan address and 17.2% were from remote areas. The authors noted remoteness contributes to variable access to health care and is an independent predictor for poorer health outcomes [5, 6, 7, 31, 32]. Despite these significant gaps there is evidence to show that we are capable of making inroads, but this requires common sense and getting's some basics right [33]. The bigger question is whether we can sustain such efforts for long periods, given the transitional nature of scientific funding and political sentiment. Regardless, to move forward we need to explore contrasting views on health and illness and understand the willingness from all sides to find common ground.

DOES TRADITIONAL INDIGENOUS LIFE-STYLES REPRESENT AN IMPEDIMENT TO MANAGEMENT OF CHRONIC HEART FAILURE?

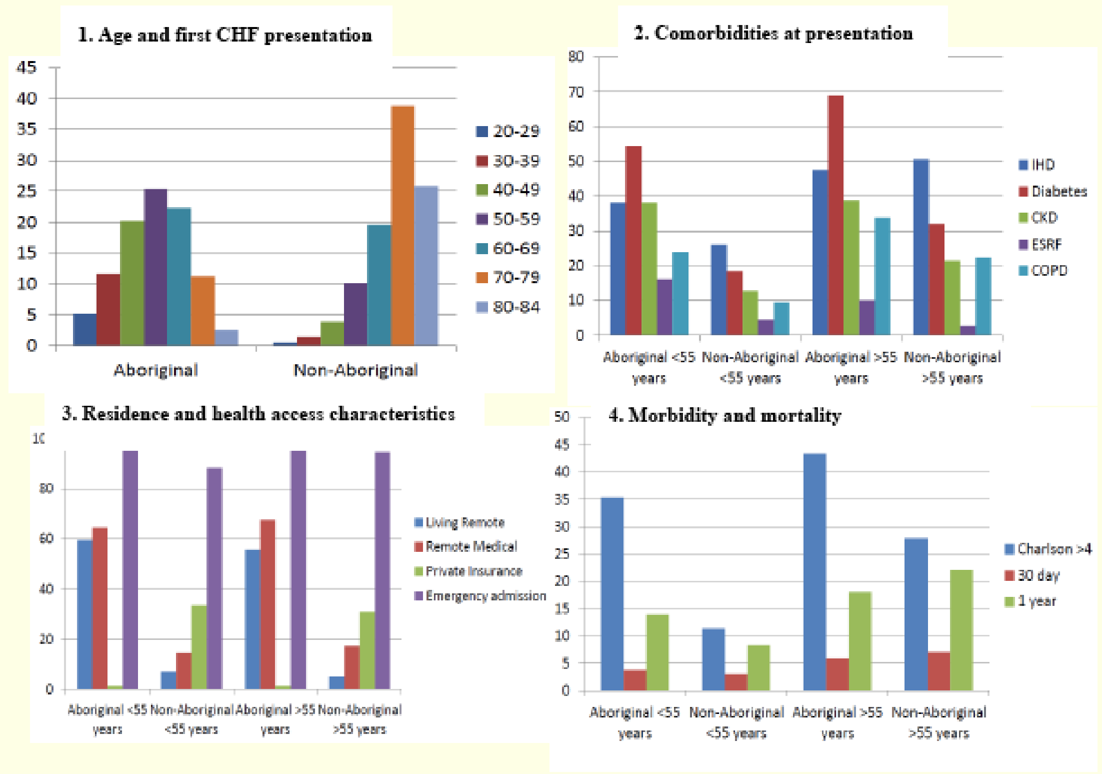
> *"Contemporary bioethics recognizes that medicine manifests social and cultural values and that the institutions of health care cannot be structurally disengaged from the sociopolitical processes that create such values."*
>
> *Jean-Francis Leotard 1988* [10]

Is there a disconnect between the Western treatment paradigm for chronic ambulatory health care diseases such as CHF and the Indigenous way of life? We have deliberately labeled this section using the phrase 'Way of Life', as the 40,000-year-old Indigenous culture was the likely common starting place for our shared humanity. Paradigms evolved from here. Not enough is spoken of, to ensure we understand and cherish the richness of this nomadic society and the successes they have had, living in such a harsh environment in the driest continent on earth. Box **3** explores a small but important part of this, by looking purely at Aboriginal and Torres Strait Islander Languages (ATSI) [34]. There is undoubtedly a clash of cultures within and external. We could explore this from 3 points:

- Cultural Values and Health:
    - Is the traditional Indigenous view of health and life-style an impediment to management of CHF?
    - Is the Western view of health and life-style impeding optimal CHF management for Indigenous Australians?
- Common Ground between Cultures:
    - Is the traditional Indigenous life-style adaptable/compatible with current models, or are new approaches needed?
    - Is the Western view of ambulatory health care adaptable/compatible with delivering optimal CHF care for Indigenous clients?
    - Are there areas of overlap?
- Unanticipated Cultural Changes:
    - Is the current delivery of the Western paradigm of Ambulatory Health Care changing the Traditional Indigenous way of life?

A decisive debate between stakeholders who deliver and receive healthcare in Indigenous Health is required to develop an agreed framework from both parties, which we can successfully implement. However, we do not feel this is

Box 2. Demography for first heart failure admission in Western Australia.



Box 2 highlights patient characteristics for first CHF presentation in Western Australia between 2000 and 2009. The study captured 1013 Aboriginal (mean age 54 ± 14 years) and 16,366 non-aboriginal patients (mean age 71±11 years). Aboriginal patients comprised 24% of all index HF patients aged less than 55 years, but only 3% of patients aged 55 years and older. The data are presented in four groups as percentages of patients for a particular group. 1 – incidence of HF hospitalisation by age in years; 2 – comorbidities; 3 - location of presentation, speciality services, and medical insurance; 4 - mortality. Length of stay was 4.5 ± 4.9, 5.6 ± 7.6, 5.5 ± 6.2 7.2 ± 11 between the four groups. Aboriginal patients tended to be younger, live and access remote medical services, stay in hospital for shorter periods and suffer greater morbidity and mortality. Abbreviations: DM – diabetes mellitus; CKD – chronic kidney disease; ESRF – end stage renal failure; IHD – ischemic heart disease; (Compiled from ref 7)

achievable in the current climate, at least outside a research domain. A defining summary on traditional Indigenous views on health has been provided by Maher and is sufficiently authoritative to ensure it is essential reading for any medical context [35]. Similarly health system perspectives on Indigenous health have been summarised [14, 33-49]. What is lacking is direct information from the Indigenous clients themselves. The published work is diverse, but does not appear coherent [49]. There is a lack of sustained lock-step measures addressing one issue from multiple angles (Box **4**). Exceptions include work from Brown *et al*, which provide strong foundations, with elements that are implementable [47], to continue a program of work [50-54].

Thus to answer the above question, can we deliver best practice using the Indigenous model, the Western model or a new model, is not possible. From the Western perspective, we know it is difficult to consider broader treatments to cater for the high burden of CHF with comorbidities, or similarly look to implement therapies that factor in reducing pill burden, pill size, agents with potential extra class effects and agents with potential for fewer side effects or adverse drug interactions [15, 16]. In essence the guidelines have not factored in this scenario. Furthermore if we are to acknowledge aspects of traditional medicines, enhancing extended family networks in care, understanding the nomadic and behavioural elements such as diet and even sleep wake cycles, we continue to show greater gaps, again raising questions of '*culturally sensitivy*'. From the Indigenous perspective we fail the most by not understanding chronological and hierarchical priorities in health care which affect uptake of chronic condition care. Collectively, principles that guide drug compliance could be universal highlighting the importance of simplified treatment regimes.

Box 3. Languages of Aboriginal Australia.

ATSI LANGUAGES:

- 250/600 ATSI languages/dialects spoken before 1788.
- 145 ATSI languages spoken today

ATSI LANGUAGE USAGE:

- 11% mainly speak an Aboriginal language at home in 2008. 75% can also speak English.
- 50% in some remote areas speak an ATSI language at home.
- 62% ATSI adults who identified with a clan, language or tribal group in 2008.
- 50,000 whose mother tongue is an ATSI language.
- People who speak Yolngu: 6,000, Arrernte: 3,000, Warlpiri: 3,000.

NSW STATE FIGURE:

- 70/20 languages and dialects before 1788 and in 2006.
- 804 adults identified as speaking an ATSI language

THE PROBLEM:

- 110 ATSI "critically endangered
- 60 considered 'alive' and in use as a first tongue today
- 250/40000 Noongar people who speak Noongar.
- 10 Number of Aboriginal languages in NSW considered healthy enough to be included in school curriculums.
- *No Aboriginal Language in Curriculum today.*

The figures highlight the diversity of languages in Australia and its evolution since the first European settlements. As a source of identity many would argue this is a crucial element in a person's holistic wellbeing. At the same time there will be dissenting voices that argue for realism and sustainability in today's world. While we accept aspects of this point, we believe that in complicated anthropological and sociological evolution disenfranchisement has been the cause of many a problem in the battles between equity in developed nations such as Australia and its Indigenous communities. Culturally sensitive medical practices, many of which are guidelines based, should be sensitive to this and not be a contributor to any form of Indigenous cultural decline. Figures based on 2002, 2006 & 2008 Census. Aboriginal Australia language map compiled by AITSIS [34].

Thus we have a very complex situation, with potential for stalemate all round. Western and liberal values that shape the fabric of Australian societies on health and wellness, social communication, interpersonal relationships spill over into the healthcare system. Medical systems that share these values can negatively impact on those who are 'foreign' to such principles. Moving forward a new approach with bidirectional transfer of information with respect and understanding could be considered. We feel, at this point no one person or group is certain what this new paradigm could or should look like. We also feel that because of the close relationship between culture, socioeconomics and health and the potential for intergenerational impacts of chronic conditions management, a dedicated team with control over the process should pursue a quasi-experimental path for a sustained period. Success should not be the benchmark, but obtaining findings with a high sensitivity, specificity and validity should be the premise. Let us explore such viewpoints in more detail.

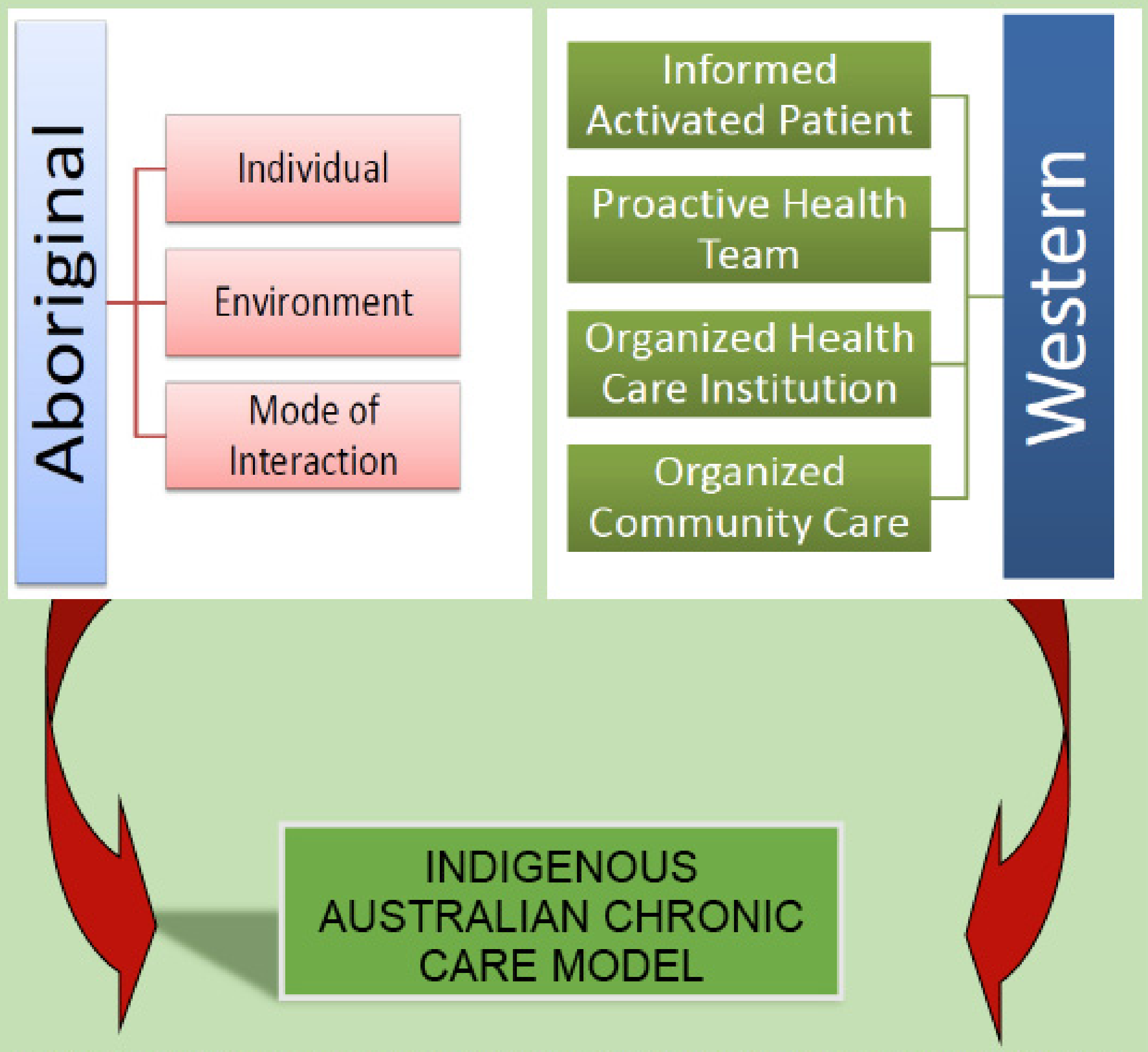
"The world is immediate, not external, and we are all its custodians, as well as its observers. A culture which holds the immediate world at bay by objectifying it as the Observed System, thereby leaving it to the blinkered forces of the market place, will also be blind to the effects of doing so until those effects become quantifiable as, for example, acid rain, holes in the ozone layer and global economic recession. All the social forces which have led to this planetary crisis could have been anticipated in principle, but this would have required a richer metaphysics. Aboriginal people are not against money, economics or private ownership, but they ask that there be recognition that ownership is a social act and therefore a spiritual act. As such, it produces effects in the immediate world which show up sooner or later in the 'external' world. What will eventually emerge in a natural, habituated way is the embryonic form of an intact, collective spiritual identity for all Australians, which will inform and support our daily lives, our aspirations and our creative genius".

Mary Graham 1999 [43]

BEHAVIOURAL BASES FOR POOR INDIGENOUS OUTCOMES

As, Maher has detailed [35], the heterogeneity and generational transfer through spoken means, implies that the traditional Indigenous culture is more complex than what is documented. In addition, while personal experience is plenti-

Box 4. GULFS APART – Two models of disease within the new and old cultures of Australia.



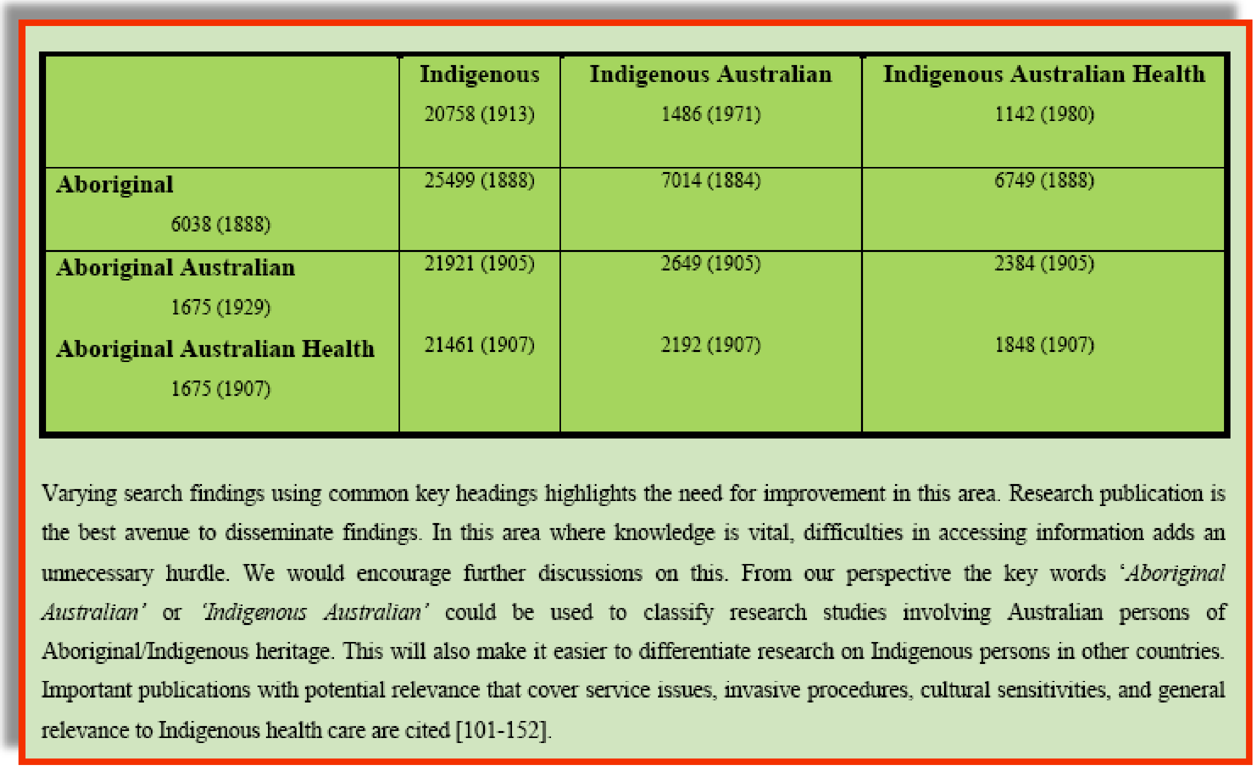
A vast ocean of medical understanding separates the dominant, new and old cultures of Australia. Bidirectional sharing of information between these models are heavily in favour of the western chronic care model. Minimal Aboriginal Australian views and practises on health are studied or allowed to be practised at all Australian, especially tertiary, health care centres. Shared goals include measures to improve outcomes and reduce reliance on *'outside'* assistance for health and wellbeing. Use of ambulatory subspecialists in either model should be encouraged in any new models. In this sense an *'INDIGENOUS AUSTRALIAN CHRONIC CARE MODEL'* would be of benefit. At this stage we are unclear what such a model could look like. However, with the right partnerships understanding the clinical and basic sciences for such a model is more likely to succeed [11, 127].

ful, actual publications are few. As such we will explore 5 areas in this section through a combination of a consensus of personal experiences and published evidence.

Compliance and Attitudes to Taking Pills

It is a difficult proposition for any client to consider a lifetime of medications. This proposition becomes more difficult when there are multiple agents, multiple dosing intervals, larger pill sizes, potential side effects, comorbid conditions, language barrier to communicate this, long intervals between specialist consultations and large distances to travel. Most of us who provide care to Indigenous clients will agree that there are few issues in the acute setting, perhaps consistent with similarities in both health paradigms. There remain concerns about longer-term compliance. We continue to feel that this area is under-resourced for Indigenous CHF care. In regards to chronic health care, additional confounders such as the supernatural and the environment could shape thinking and thus belief in the value of medications and henceforth

Box 5. Search differentials using common keywords.



	Indigenous 20758 (1913)	**Indigenous Australian** 1486 (1971)	**Indigenous Australian Health** 1142 (1980)
Aboriginal 6038 (1888)	25499 (1888)	7014 (1884)	6749 (1888)
Aboriginal Australian 1675 (1929)	21921 (1905)	2649 (1905)	2384 (1905)
Aboriginal Australian Health 1675 (1907)	21461 (1907)	2192 (1907)	1848 (1907)

Varying search findings using common key headings highlights the need for improvement in this area. Research publication is the best avenue to disseminate findings. In this area where knowledge is vital, difficulties in accessing information adds an unnecessary hurdle. We would encourage further discussions on this. From our perspective the key words *'Aboriginal Australian'* or *'Indigenous Australian'* could be used to classify research studies involving Australian persons of Aboriginal/Indigenous heritage. This will also make it easier to differentiate research on Indigenous persons in other countries. Important publications with potential relevance that cover service issues, invasive procedures, cultural sensitivities, and general relevance to Indigenous health care are cited [101-152].

compliance. However some of these illness categories have only developed in the last century; as such it is unclear if communities solely use older systems to explain this. Again most of us feel that the majority of indigenous patients do initially attempt to comply, but remain unclear how they may respond should therapies become more complicated, cause side-effects or are seen to be ineffective. Evidence from interventions in the Western paradigm proposes that this is a universal phenomenon, and remains a difficult issue to address [55], even for non-pharmaceutical treatments [56, 57].

Adverse Drug Reactions

There are no data on side-effect rates for Indigenous clients and it will remain difficult to obtain. Publications involving elderly clients, who are more likely to have associated comorbidities and polypharmacy, report that the risk of adverse reactions increases from 13% for two drugs to 82% when taking more than seven drugs to 100% when using more than 10 drugs [58]. Specifically, for beta-blockers, the COPERNICUS study with carvedilol reported drug-related adverse events in 3-5% (mainly bradycardia, hypotension and syncope) with similar findings from the SENIORS study in older CHF clients, with reported rates of 4-17% for these symptoms. Tolerability over the trial periods averaged 65-70%. With spironolactone, RALES reported severe hyperkalaemia in only 2%. In older cohorts, other authors reported severe hyperkalaemia in 11%, acute kidney injury in excess of 37% and discontinuation rates of 34% [59, 60]. Adverse reactions are likely high, under-reported, a cause for submaximal dosing and lower compliance among Aboriginal patients.

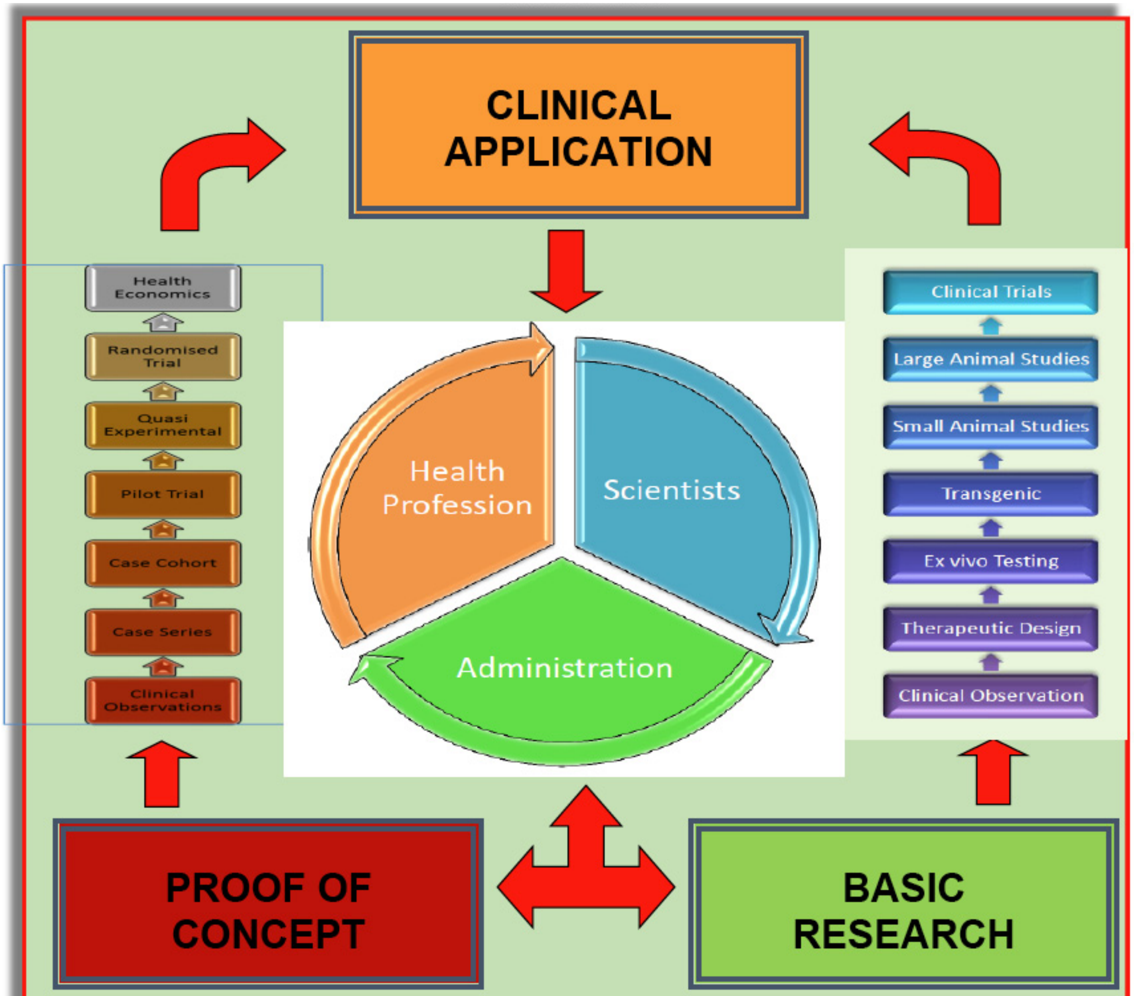
Consequences of Isolation

Isolation in the Indigenous context, predominately geographical and socio-cultural, poses problems with drug monitoring. The most important of these may simply be the inability to communicate a common side effect such as dizziness after ACE-I initiation or not being able to regulate fluid intake when the weather changes. Large distances and service gaps could thus lead to under prescription of therapy [16, 61, 62] and the inability to communicate due to language and understanding, inability to attend clinics due to circumstances within the extended family dynamic or cultural stigmas of embarrassing side-effects are important considerations.

Comorbidities that Alter Pharmacotherapy Prescription or Efficacy

Medical conditions that co-exist with CHF are common among Indigenous Australians. Risk factors for CHF are also at epidemic levels where, diabetes rates are 3-10 times, obesity rates twice and renal impairment 4-10 times those of non-Indigenous Australians [63-66]. In addition alcohol consumption is excessive and rheumatic heart disease rates are among the highest in the world [31]. Metabolic syndromes including impaired glucose tolerance, diabetes and hyperlipidaemia are more likely to be adversely affected by beta-blockers. Furthermore, ACE-I and spironolactone are under prescribed in patients with kidney disease [67].

Box 6. Theoretical constructs for clinician-scientist collaborative development of an indigenous-Australian chronic care model.



Clinician-Scientist Collaboration is required to shape enough questions, the right questions, test these hypotheses and implement findings both robustly and widely. Implementing a program of work is not new and is factored in through the various grant schemes of the NHMRC. The NT is unique in that is has all the problems described with a process in place where clinical and research care is already outsourced. The new paradigm involves these various groups collaborating, finding areas of expertise to focus and thus reduce overlap and maximise efficiency. The scope of research required is highlighted in various publications. While this does not guarantee that the desired goals will be achieved, it highlights a desire for a novel approach. Control over data accumulation and implementation in the same working group will allow for more efficient means to test models of care and decide on its validity and applicability and design steps to improve or innovate in a step locked fashion. This diagram highlights the continuity of all aspects of research themed around implementation within a health care system. At the heart of this, is a clinical observation, studied, understood and a plan tested that results in a new paradigm of care implemented in the community with the goal of improving an individual's and their society's physical and spiritual health and wellbeing. Aspects modified from Ref 93.

Different Basis for CHF

Potential antecedents to CHF among Indigenous Australians are also poorly studied. Key risk factors include coronary artery disease, hypertension, diabetes mellitus, obesity, rheumatic heart diseases [31], and renal impairment [66]. Pharmacokinetic differences should also be considered. We have previously described differential cytochrome P450 metabolism for metoprolol as one example. Polymorphisms of adrenergic and RAAS receptors could affect therapeutic efficacy and side-effect profiles. Specifically differential responses to beta-blockers [68, 69] and RAAS blockade have been reported [16, 70, 71]. Hypertension, present in more than half of CHF patients, has a different pathophysiological basis in African Americans. In these patients diuretics, aldosterone blockade and vasodilators appear more efficacious. The A-HEFT study extended this evidence to the CHF population [72]. Rheumatic heart disease contributes to CHF in early life, with the burden of illness being particularly high in women of childbearing age. Diabetic and renal impairment contributes to CHF in unique ways that may require additional consideration for the use of reno-protective agents, different drugs within a class and more aggressive anti-thrombotic agents. Myocardial energetics [73] is another example of an important area to consider in the complex pathophysiological milieu that exists in HF patients with comorbidities.

Patient Reported Outcomes

Finally it also worth investing in understanding how patient reported outcomes are different for the Indigenous Community [153].

POTENTIAL DIFFERENTIAL TREATMENT STRATEGIES

Whether our current approach needs an overhaul or a tweak, the process to get there is the same. We are practising medicine in a climate where diseases are increasing in chronicity and complexity; all the while the evidence gathering process and guidelines have become more rigid. However we feel the process moving forward should be a simple, but is perhaps easier said than done. If we suggest that the guidelines should be more culturally sensitive, we first need to ask, what could such cultural sensitivities be? Answering this question takes us back to the '*Hippocratic Oath*' of first do no harm, and secondly informed prescribing practices. This would imply understanding the impacts of a treatment and treatment plan on an individual's quality of life and their way of life. Three important examples of this are pill burden, dosing frequency and chronology in decision making for procedures. Pushing for guidelines-based therapies may necessitate rapid decision-making and polypharmacy chronically. The different chronological views in the 'Aboriginal Model of Causation' may see a client accept an acute intervention but reject making a decision for surgery at a later date. Similarly hospital compliance is good but not out of hospital, which could range from missing parts of one's treatment such as the night-time dose, to omitting larger pills..Storage of medicines may also be an issue. A new treatment strategy must partly incorporate traditional Indigenous values. Before we can define the treatment strategy we need to explore the measures that took us here. Let us explore this from three perspectives:

Research and the evidence gathering process

A literature review in PubMed and Medline database using the words 'Aboriginal' and/or 'Australian Health' and/or 'Indigenous' and/or 'Health' identified 1848 references dating back to 1907, with 236 references from 2013-2014. The majority of references were themed under pregnancy, child and adolescents, covering domains of alcohol and tobacco, cardio-renal-metabolic and inflammatory diseases with minimal studies presenting positive data. There were 35 references for CHF from 3 main health services in Australia, Canada and New Zealand, published within the same language and paradigm (Box **5**). Specific focus through the CSANZ and National Heart Foundation, have addressed coronary heart disease, risk factors and rhematic heart diseases, at the national level [55, 74-82]. The majority of the themes are focused on how we are failing to deliver best practice and introducing cultural sensitivities at the interpersonal level. There has been more sustained and increasing research in the last few years, but little evidence of continuity of findings from a successfully implemented programme at the population level. Rheumatic Heart Disease may be one exception to this, where some health professionals feel that in-roads have been made. There still remain overall concerns and in cardiology much research occurs without significant clinical cardiology input [83-88]. In summary the research process is fractured, lacking involvement of clinicians and thus generates few findings that are implementable.

Emotional and Intellectual Disconnect

The ongoing negative outlook presented and fears of doing nothing often lead to calls for an immediate response, which cluster in silos of individuals or small groups. Well planned, group based decision making by stakeholders including communities, service providers and researchers with a plan backed by regular audits are more difficult but is a more sensible approach. In this regard, who sits at the table and acceptance of wide and varied opinions is important. It is also important that planning takes us ahead of the curve and we factor in tomorrow's problems in today's solutions.

An Australian Approach for an Australian Problem

The majority of guidelines have been informed by large RCT's from international evidence. The only way to muster evidence for clients outside the inclusion criteria of the major trials is widen enrolment or generate local evidence. This evidence has to have an implementation flavour with system-wide relevance, thus ensuring that scarce research funds are not seen to be targeting fringe issues. The techniques used have to be novel so that while questions remained focused, findings could have a broad appeal. A memorandum of understanding for a program of work with local and external partners could address many of the issues raised.

DEVELOPING EVIDENCE FOR A NEW TREATMENT STRATEGY

A new strategy has to have an Australian focus implementing locally generated evidence from an Indigenous perspective fused with the existing Western paradigm of chronic ambulatory care (Box **6**). Three areas need to be addressed:

1. *Readiness for Reform (R4R):*
    - Initially, a mapping exercise of both the communities and the currently available health services should be performed. This should be supplemented by gathering evidence if it is lacking or lobbying if there is already evidence. As an example, enrolment of Indigenous communities in large RCT's has historically been poor. Clinical trialists need to develop strategies to ensure enrolment of indigenous patients in large RCT's and secure industry funding for post marketing audit should new treatments be implemented in communities via the Pharmaceutical Benefits Scheme. In addition, efforts to open communication lines into ongoing taboo areas such as transplantation or medical genetics are required.
2. *Defining an appropriate care model and finding evidence for it:*

- Identifying key stakeholders from the community and medical systems:

Separation of primary health care (PHC) and tertiary health care is an area that needs to be looked at closely. Indeed, there is considerable overlap between PHC clinics and tertiary centres, such that they should be viewed as a continuum rather than separation. We need to increase our understanding of Indigenous medical practices and allow elements of it in tertiary centres rather than seeing clients discharged to seek such care.

- Movement/Migration (Nomadic Patients): We should develop suitable models to account for nomadic traditional lifestyles. Biometrics, centralised storage and accessibility of information are perhaps some elements to address. In Australia where health care funding and delivery are shared between state and federal governments, we need to be open to more cooperative models.
- Defining suitable research studies for the program: Broadening the questions may also broaden answers. Obtaining the right sample sizes guided by appropriate power calculations will increase both the internal and external validity of the findings. As this may not always be achievable, alternative strategies such as quasi-experimental design, with novel statistical approaches e.g. pseudo-randomisation techniques such as regression adjustment, propensity matching, inverse probability weighting and instrument variables to name a few could be explored [89]. Medical genetics could also be important [154].
- Clinical (Bedside) Research: We have previously highlighted clinical audits, self-care, client-journey/experiences, staff skills, technologies and simplifying therapeutics as priorities [15, 16, 18, 90-92]. Finding ways to relinquish care to clients, extended social networks, increasing staff skills and expertise, utilising technology appropriately and simplifying the medical experience are important considerations.
- Basic (Bench) Research: We have previously highlighted biomarkers, pharmaceuticals with extra class effects and genetics in the cardio-renal-metabolic axis as priorities [93]. It could be an avenue to fine-tune existing evidence to ensure greater external appeal or find new evidence to take to the bedside.
- Phase 4 Studies - Health Economics and Translational Research: In addition to a drugs clinical effectiveness and cost-effectiveness, we also need to consider total healthcare costs and how new models of care will be implemented in the metropolitan, regional, rural and remote settings [94-100, 155].
- Traditional Therapies and Medical Anthropology: Efforts must be made to archive traditional knowledge and factor these into the medical curriculum. Its use within the western paradigm could then evolve.

CONCLUSION

With any therapy we should be sensitive of its impacts on our client's way of life. Far too often treatments are provided with guidelines in mind first and clients preferences second. These issues can be accentuated when there are language and cultural differences. Not acknowledging cultural differences and not finding ways for services to accommodate marginalised groups are important contributors to the problems. However to define a program of work and succesfully implement them requires an understanding between key stakeholders such as the service providers, researchers and administrators. This document aims to describe part of that journey in improving CHF care for Indigenous Australians, with the lessons we learnt and the solutions we propose. Finally in any solution the treatment modality must be responsible and responsive to the cultural affiliations and socioeconomic realities of culturally distinct groups. To this extent it is incumbent on the Australian medical profession to invest in local studies that will tailor to the needs of this community, and similarly other countries for their Indigenous peoples.

ABBREVIATIONS

ATSI = Aboriginal and Torres Strait Islander Peoples
CHF = Chronic Heart Failure

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CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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