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Global health

Addressing cardiovascular inequalities among indigenous Australians

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INTRODUCTION

Growing international interest has focused attention on the need to overcome health disadvantage experienced by the world's more than 370 million indigenous peoples [1]. Despite heterogeneity in history, culture, geography, sociopolitical context and in the relationships between indigenous people and their nation states, the existence of health and social disadvantage when compared to other populations within their countries remains almost ubiquitous [2].

Within Australia, the health and welfare of Aboriginal and Torres Strait Islander people (hereto referred to as 'indigenous Australians'—see Figs. 1–2) remains our nation's most obvious and enduring social and health divide [3]. Across virtually all social and health indicators, indigenous Australians live within poorer social environments and experience profoundly worse outcomes than non-indigenous Australians [4]. Despite representing only 2.5 per cent of the Australian population, indigenous Australians are overrepresented in the most disadvantaged strata of Australian society [5]. Indigenous children experience higher rates of mortality and morbidity, are more likely to be separated from their families, live in overcrowded housing and impoverished circumstances, and experience significantly worse educational outcomes than their non-indigenous counterparts.

As adolescents, indigenous Australians experience higher rates of mental illness and suicide, are more likely to engage in drug taking and come into contact with the justice system. As adults, indigenous Australians are more likely to be unemployed, receive lower income, attain lower education levels and have higher morbidity and mortality from virtually all causes of disease and death. As a consequence, relatively few indigenous Australians survive beyond the age of 65 years.

This high burden of disease is reflected in the demographic profile. The majority of indigenous Australians are aged less than 25 years, with a median age of 20 years (compared to 37 years in non-indigenous Australians) [6]. Life expectancy (LE) in the period 1996–2001, was approximately 59 years for indigenous males and 65 years for indigenous females. This is similar to that seen in Australian males and females almost a century ago [7], and compares to a current LE of 77 and 82 years among Australian males and females, respectively. Between the years of 2002–2006, about 70 per cent of deaths among indigenous Australians occurred prior to the age of 65 years, compared to only 20 per cent in non-indigenous Australians (Fig. 3).

The principal contributor to this profound disparity in LE remains chronic diseases. Chronic diseases—including cardiovascular disease (CVD), diabetes and chronic kidney diseases—remain the leading causes of mortality and morbidity in Australia. Importantly, it is the massive differentials at young ages that define the mortality profile of indigenous Australians. As can be seen in Fig. 4, for both men and women between the ages of 35–54, mortality among indigenous Australians due to diabetes, for example, is between 20–35 times higher than it is among non-indigenous Australians. Collectively, chronic diseases account for almost 80 per cent of the life expectancy gap between indigenous and non-indigenous Australians [8].

CARDIOVASCULAR CONDITIONS WITHIN INDIGENOUS AUSTRALIANS

Cardiovascular disease—including coronary heart disease (CHD), stroke, heart failure and rheumatic heart disease (RHD)—is the leading cause of death and one of the principal contributors to disability

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Figure 1. Map of Australia showing location of Alice Springs in the Northern Territories and Torres Strait Islands.



Figure 2. Map of Northern Territories and cross-border communities.

in most economically developed countries throughout the world, across all ethnic, racial, social and gender groups [9–11]. Despite the documented falls in cardiovascular mortality in Australia over the

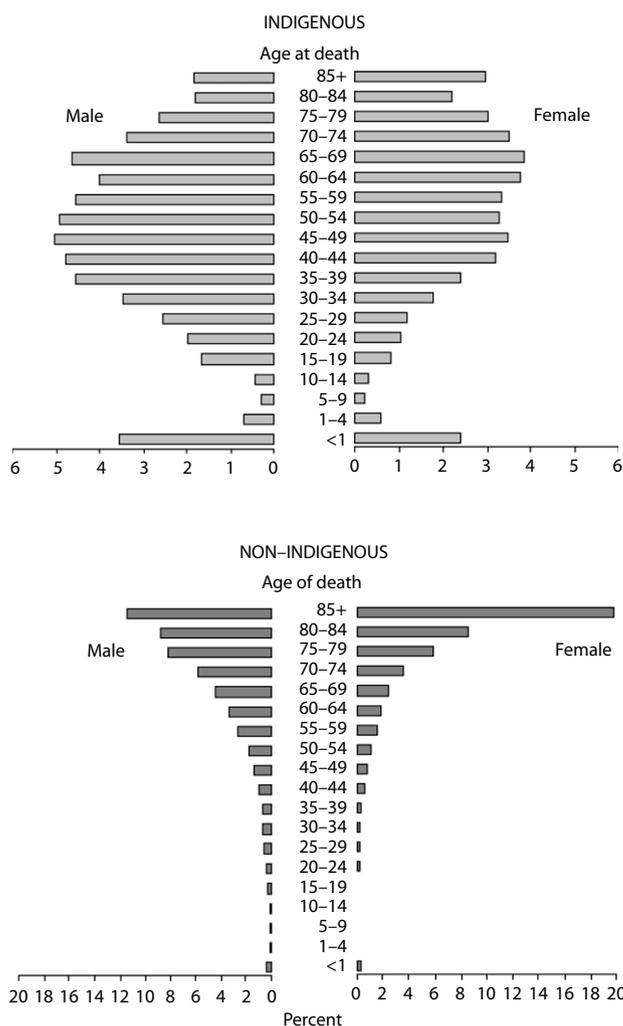


Figure 3. Age of death in Australia 2002–2006, by gender and ethnicity. Source: ABS and AIHW 2008 [3].

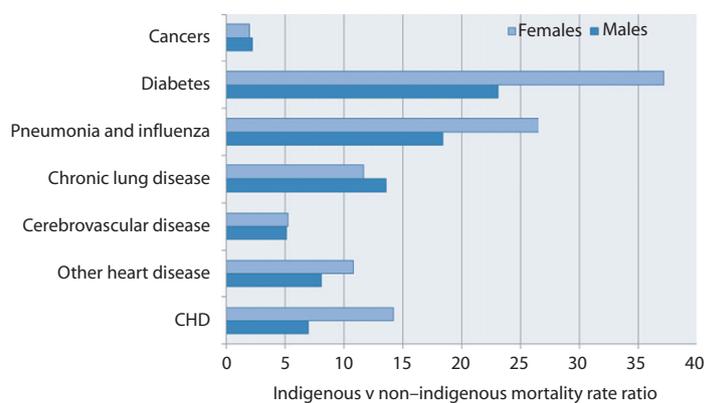


Figure 4. Age specific mortality differentials between indigenous and non-indigenous Australians, 35–54 years, by cause, 2001–2005. Source: AIHW National Mortality Database.

last four decades, CVD still accounts for over 35 per cent of all deaths [12] and conservatively costs Australian society \$14 billion in direct and indirect health costs [13].

Cardiovascular disease is the biggest single cause of death among indigenous Australians [14,15], accounting for 30 per cent of all deaths. Cardiovascular disease is also the single most important

contributor to LE differentials between indigenous and non-indigenous Australians, alone accounting for 33 per cent of the almost 20 year gap [16]. National data from 2001–2003 demonstrated that coronary heart disease (CHD) accounted for approximately 20 years of life lost among indigenous males and females [17].

Age-adjusted CVD mortality rates in indigenous Australians are approximately three times as high as in the non-indigenous population [3]. Importantly, the incidence and mortality pattern of CVD experienced by indigenous Australians is characterised by early onset and significant differentials, most notable at young ages [15,18]. Indigenous people between the ages of 35 and 44 years are 9 to 12 times more likely to die from CVD than their non-indigenous counterparts [3].

Secular trend analysis across several jurisdictions within Australia demonstrated some improvements in CVD mortality over the last two decades [7,12]. However, these improvements are not keeping pace with those demonstrated within Australia's non-indigenous population. As a consequence, the large mortality differentials and hence relative disadvantage is growing rather than contracting.

From available self-report data [19], 12 per cent of indigenous respondents report having a long term cardiovascular condition [15] (most commonly hypertension), with an estimated 1.2 per cent of indigenous Australians reporting a prior diagnosis of CHD, with between 5 per cent and 11 per cent among indigenous Australians between the ages of 45–64 years and over 65 years, respectively [20]. Importantly, in individuals over the age of 55 years, more than half of surveyed indigenous respondents admitted suffering from heart or circulatory conditions.

Cardiovascular disease was the primary reason for hospitalisation in about four per cent of all separations among indigenous people across Australia in 2005–2006 [3]. As can be seen in Fig. 5, it is not merely the number and costs associated with CVD hospitalisations, but the much higher rate of hospitalisation when compared to non-indigenous Australians. In the case of CHD, indigenous people were two to four times more likely to be hospitalised in 2005–2006, and for RHD, between 8 and 13 times more likely.

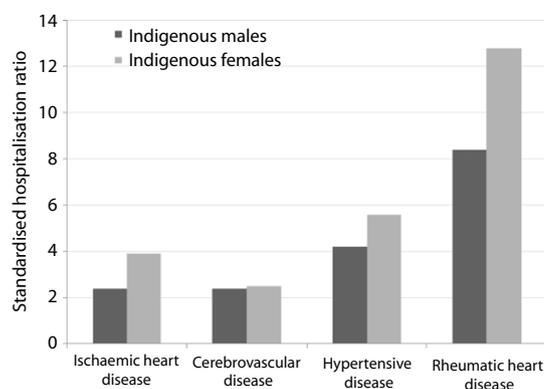


Figure 5. Standardised rates of hospitalisation among indigenous versus non-indigenous Australians 2005–2006, by specific cardiovascular cause and gender [3].

Cardiovascular conditions are frequently the primary diagnostic classification for conditions managed in routine primary care encounters within Australia. Between 2001/02 and 2007/08, CVD was managed in 13 per cent of general practice attendances by indigenous people [21]. Despite their higher risk of CVD, indigenous Australians demonstrate similar overall attendance rates when compared to non-indigenous Australians. However the pattern varies, with similar rates for management of hypertension and cardiovascular ‘check-ups’ yet higher rates for management of CHD and heart failure (two and three times, respectively) [15].

Coronary heart disease (CHD), remains the leading cause of CVD mortality, responsible for 17 per cent and 13 per cent of deaths among indigenous men and women, respectively [20]. Further, CHD is the greatest single contributor to premature death, accounting for about nine per cent of all potential years of life lost among those under the age of 75 years [22]. Between 2002 and 2005, in the Northern Territory, South Australia, Western Australia and Queensland, CHD accounted for 58 per cent of all CVD deaths.

Indigenous Australians are three times more likely to suffer major coronary events than their non-indigenous counterparts and 1.5 times more likely to die as a consequence [23]. Despite this, disparities in the delivery of evidence-based care exist [24]. Indigenous Australians are 40 per cent less likely to receive angiography or percutaneous coronary interventions and 20 per cent less likely to undergo coronary artery bypass grafting than non-indigenous Australians [23]. Further, their access to cardiac rehabilitation [CR] is limited [25].

TOWARDS A CVD RESEARCH AGENDA

In order to overcome the significant gaps in LE experienced by indigenous Australians, it is clear that a reduction of the burden of CVD is a critical priority. Unfortunately, it has not been until recent years that attention has focused on community and health system responses to the high chronic disease burden. Approximately six years ago, a strategic and inter-connected research program commenced, which was based within indigenous communities of Central Australia (Table 1). The program was established with two fundamental research objectives: 1) To understand why indigenous Australians experience such poor cardiovascular outcomes, and 2) to delineate what must be done to reduce the unacceptable suffering experienced.

Table 1. Strategic CVD research within Central Australia.

“WHAT DRIVES CARDIOVASCULAR DIFFERENTIALS BORNE BY INDIGENOUS AUSTRALIANS?”		
BURDEN/RISK	HEALTH SYSTEMS	CONTEXT
Patterns and predictors of risk Performance of risk algorithms Impact of chronic disease co-morbidity	Quality of care Evidence/practice gaps System correlates of improved CVD outcomes	Social determinants Psychosocial correlates of CVD Understanding ‘atherogenic’ environments
“WHAT MUST BE DONE TO REDUCE THIS UNACCEPTABLE DISPARITY AND SUFFERING?”		
Reducing risk	Building better systems and alternate models of care	Supporting the role of family in management and prevention
TOWARDS COMPREHENSIVE, HOLISTIC, SYSTEMATIC APPROACHES TO CVD CONTROL		
“WHAT ARE THE NATIONAL AND INTERNATIONAL IMPLICATIONS?”		

This work progressed through a number of projects aimed at several key pillars or work focused on exploring the drivers of risk; understanding the role of health care systems in contributing to (and overcoming) CVD disparity; and better understanding the context in which CVD is experienced by indigenous Australians to inform prevention and health system reform.

EXPLAINING CV DIFFERENTIALS

The first target for research was to better understand the drivers of cardiovascular disparity. The reasons for high CVD burden among indigenous Australians are multi-factorial and complex [18]. Population differences in traditional risk factors are likely to be important contributors to disparity in cardiovascular health. The INTERHEART Study [26] demonstrated that smoking, diabetes, hypertension, abdominal obesity, psychosocial “stress”, dietary fruit and vegetable intake, exercise, alcohol consumption and adverse lipid profiles accounted for most if not all of the population attributable risk of myocardial infarction (MI), regardless of sex and age, across 52 countries. In relation to these predictors, indigenous Australians fare worse than their non-indigenous counterparts [27]. Rates of smoking, diabetes and metabolic syndrome (MetS) are much higher than for non-indigenous Australians (Fig. 6).

However, these well-established drivers of incidence of CVD *within* populations may not be the only or even primary drivers of differentials *between* populations. Differences in rates of hypertension, raised total cholesterol, self-reported excess weight and obesity, and physical activity between indigenous and non-indigenous Australians are relatively small [27–31] and are unlikely to account for the 10 to 20 fold difference in mortality seen in young indigenous populations. These findings support consideration of other predictors of CVD among indigenous Australians, particularly the contribution of inflammatory markers [31], albuminuria [32], and insulin resistance as well as the metabolic syndrome [33]. Reform should be informed by a more complete understanding of the potential contribution of a range of factors (Table 2).

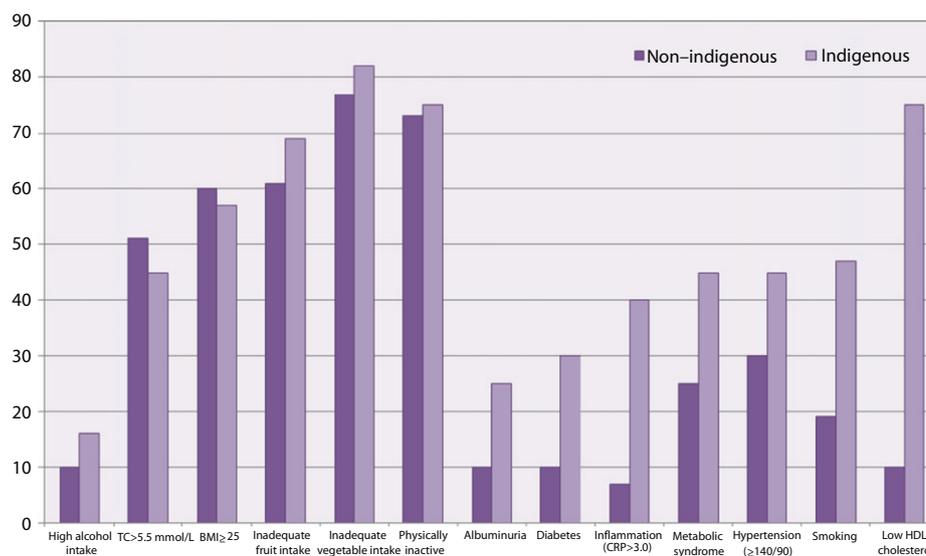


Figure 6. Risk factor differentials between indigenous and non-indigenous Australians [3,8,12,17,47–51].

Table 2. Explaining cardiovascular differentials experienced by indigenous Australians

- Elevated prevalence of conventional risk factors
- Elevated prevalence of inflammatory, dietary and renal markers
- The contribution of high rates of chronic disease co-morbidity
- Outlining the impact of socioeconomic disadvantage
- Exploring the role of psychosocial factors (e.g. chronic stress and depression)
- Inequity in access to available services
- Inequitable healthcare resourcing
- Differential application of existing evidence-based care

OUTLINING THE DRIVERS OF RISK

The determinants of CVD in indigenous Australians are wide ranging—and as has been well documented in other indigenous populations, including North American Indians and Alaskan Inuit people [34]—are associated temporally with loss of traditional lifestyle and culture and the adoption of Western lifestyles, with associated significant increases in the prevalence of conventional cardiovascular risk factors. However, CVD is also influenced by the physical, social, and political environment in which people live as well as a person's exposure to a range of early life determinants. As a consequence, improving maternal and child health, educational outcomes, access to employment opportunities, the availability of healthy food, opportunities for physical activity and high quality, appropriate health care across the life course are all essential targets for the prevention of chronic diseases.

Despite awareness of the contribution of social, economic, geographical, educational and environmental factors to the burden of CVD, much of the primary prevention response to CVD remains bound to the identification and management of CVD risk factors. Despite the nationwide trend of reducing the prevalence of established cardiovascular risk factors, indigenous Australians have demonstrated little if any decline in the rates of smoking, hypertension, elevated cholesterol and poor dietary behaviours [17]. In addition, the rising prevalence of obesity and diabetes is likely to impart upward pressure on CVD incidence and mortality rates into the future.

Data from the United States [35] would suggest that about half of the decline in CHD deaths in the US between 1980 and 2000 was secondary to population level reductions in major risk factors, and half of the decline was attributed to evidence-based medical therapies. Specifically, reductions throughout the population of total cholesterol, systolic blood pressure, smoking rates and physical inactivity accounted for 24 per cent, 20 per cent, 12 per cent and 5 per cent of the decline in mortality, respectively. Extrapolation to indigenous Australians, who may have significantly different baseline risk profiles to US adults should be done with caution; however, the role of risk factor modification on reducing the burden of CHD cannot be ignored.

ACCESS, QUALITY OF CARE AND DISPARITIES IN CVD OUTCOMES

Data exploring the differences in access and availability of appropriate cardiovascular therapies for indigenous Australians is limited. Access to specialist cardiology services, appropriate interventional diagnostics and acute care modalities is limited in remote and regional areas where large proportions of the indigenous population reside [36]. Even when health care facilities are available, indigenous Australians are less likely to receive cardiac procedures than non-indigenous people during hospital admission, with significant disparities in access to, receipt of, and outcomes from care following acute coronary events [23,37]. Mathur and colleagues found that indigenous people are three times more likely to suffer major coronary events than non-indigenous Australians, 40 per cent more likely to die out of hospital from CHD, and experience case fatality rates 1.5 times that of non-indigenous Australians. Further still, even when indigenous Australians are admitted to hospital, they are twice as likely to die during hospitalisation, 40 per cent less likely to receive angiography or percutaneous coronary interventions and 20 per cent less likely to undergo coronary artery bypass grafting [23]. Additionally, access to CR is impaired [25,38].

The utilisation of standard treatment guidelines and clinical pathways for the assessment, treatment and prevention of CHD is an important part of controlling CVD [39]. The value of standardised treatment guidelines, however, is impeded by gaps that exist between best practice and usual practice. In the USA [40] and Australia [41] routine hospital practice remains less than ideal.

Extensive registry data, collated across a number of local [17,22] and quasi-national projects [41] has helped to define the clinical features and differential application of existing evidence-based care for indigenous Australians. Until recently few data described the quality of care and outcomes following acute coronary syndromes (ACS) among indigenous Australians. The Central Australian Secondary Prevention of Acute Coronary Syndromes (CASPA) Project [24,42] collated the quality of care for clients suffering from ACS and mapped clinical outcomes, as well as the proportion of patients receiving standard processes of care and achieving secondary prevention targets. Indigenous patients experiencing ACS were significantly younger (almost 10 years on average), demonstrated higher rates of background risk factors, and were more likely to have co-morbid chronic disease at time of presentation than their non-indigenous counterparts. More than half of all indigenous patients had previously diagnosed diabetes, and almost 40 per cent had chronic kidney disease. Indigenous patients were less likely to be discharged on lipid lowering therapy, be offered cardiac rehabilitation and less likely to undergo invasive therapy. However, the greatest differences were observed in outcomes. Indigenous patients were significantly more likely to die from any cause (30.0 per cent v 17.8 per cent; $p = 0.002$), or from a CVD event (17.0 per cent v 9.9 per cent; $p = 0.026$) within 2-years. In multivariate analyses, controlling for demographic, clinical, in-hospital and discharge treatment, indigenous males were 4 times more likely to die and females 2 times more likely to die following ACS than their non-indigenous counterparts [24].

Indigenous and non-indigenous patients from Central Australia both experience high rates of major adverse cardiac events (MACE) following acute coronary syndromes (Fig. 7). In particular, up to 70 per cent of remote dwelling indigenous males and females experience MACE, within four years of discharge from hospital. The need for long-term management of patients after surviving their acute event remains critical.

These gaps exist not only in acute hospital settings. An audit of the identification and management of vascular risk showed significant opportunities for improvements in the delivery of evidence-based care for indigenous people at high cardiovascular risk in primary care [43].

CURRENT HEALTH CARE SERVICES

Our extensive mixed methods research has identified many failings of current health systems with respect to the manner in which indigenous people experience and engage with care [18,44]. Existing service provision remains unwieldy and overly complex. Despite the emerging health system reform mantra of 'improving patient journeys', current services are provided by multiple players, in a fragmented and uncoordinated fashion and usually accompanied by poor communication between patient and provider and between various levels of health care delivery (e.g. primary care, regional hospital and tertiary facility). Many cardiac services, particularly in rural and remote hospital settings, lack clear clinical governance and leadership, with services largely delivered according to provider preference rather than any objective assessment of patient and population level of need. The delivery of evidence-based care also remains highly variable. Unfortunately, the structural contributors to

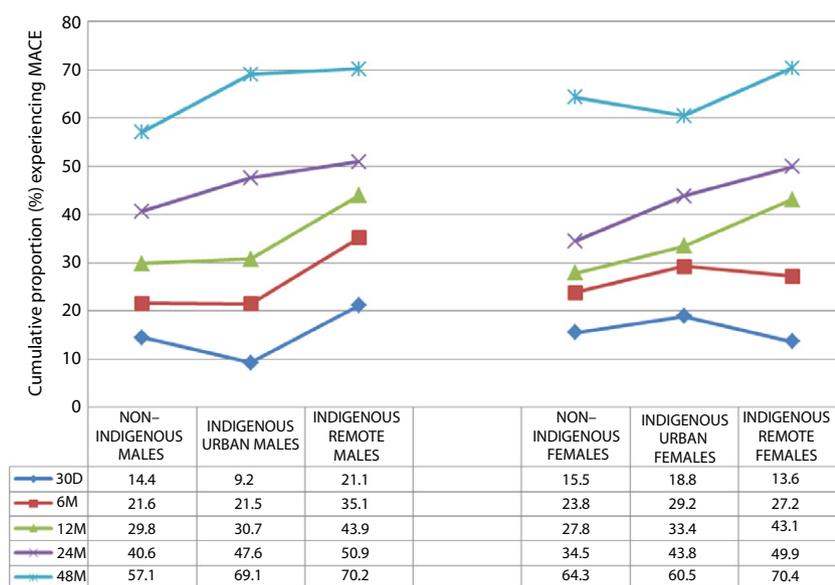


Figure 7. Cumulative prevalence of major adverse cardiovascular events following ACS in the NT (2001–2002) by ethnicity, gender and location (*MACE includes death, non-fatal acute coronary syndrome, stroke or unplanned cardiac admission).

differential application of evidence remain to be adequately outlined. As can be anticipated, the uncomfortable consequence of these factors is that many people in need, whether defined by ethnicity, socioeconomic status or geographical location, are falling through the gaps of existing care provision. Unfortunately, indigenous Australians are over-represented casualties of our failing system.

HEALTH REFORM IN AUSTRALIA

Despite the damning evidence, opportunities for making a difference in poor cardiovascular outcomes among indigenous Australians exist. The last few years have seen an unprecedented focus on reform across the national health care landscape. Initial targets will concentrate on the way in which hospitals deliver the back-bone of health care to the nation, through to the shifting and long overdue reorientation towards a proactive prevention agenda, and a future visioned, appropriately resourced, dynamic, primary health care system.

Several distinctive but all too frequently stated and inadequately delivered statements of intent have been raised – ‘Enhancing jurisdictional/federal cost sharing arrangements’, ‘accountability’, and ‘outcome directed policy’. These words, in and of themselves justifiable, will take significant theoretical, practical and philosophical rethinking to achieve. Within this reform agenda, indigenous health has been acknowledged as both a critical target and a key rubric by which our health system should be measured and held to account.

This is long overdue. Recent attention to overcoming indigenous health disadvantage has seen unheralded investment in improving health and social outcomes for Aboriginal and Torres Strait Islander people and their communities. However, despite widespread good will, there remains an ever-widening chasm between mainstream Australia and members of our most vulnerable communities. Progress, whilst notable in some instances, remains agonizingly slow, piecemeal, poorly monitored, fragmented and at times imperceptible.

The reasons for this inherent and seemingly intractable system level ‘blind-spot’, as is the case with indigenous health disadvantage itself, are widespread, multifactorial, ingrained and often convenient. Unfortunately, despite the rhetoric of accountability, the reality remains that the brunt of our collective failures is borne disproportionately against society’s most vulnerable.

WAYS FORWARD

Whilst incomplete, the following are key targets for indigenous health policy development.

Reducing Risk

Strategies for reducing risk factors for CVD require broad activities including national planning, advocacy, targeted programmes, environmental and social interventions, as well as legislation and health system activity from the primary care through tertiary sectors. Cardiovascular disease prevention requires activity outside of the health sector, the contribution of key risk factors to the population burden of disease, the feasibility of delivering health system prevention activity and the central role of primary care in mitigating CVD. Our key targets include the surveillance and management of raised blood cholesterol, blood pressure, smoking, control of blood sugar levels and reducing excess weight and obesity. Reducing population levels of risk require activity focused on a) identifying risk; b) managing risk; and c) early identification of disease in asymptomatic individuals or in those who have not yet developed acute cardiovascular events.

Building better systems

We must also, as health practitioners and advocates for society's most vulnerable, be agents of change for building better health care systems within our communities. Understanding that decisions to engage in care for vulnerable people who are complex and framed by prior negative experiences may reframe the way we develop health systems. We must accept and overcome the rigidity, fragmentation and inhumane performance of hospital systems. If we accept that patients are the centre of, and reason for, our daily practice, the face and manner of how we organise, implement and transparently evaluate what we do will necessitate other ways of providing cardiovascular care.

We must accept that building a sustainable, supported and well-trained workforce remains a critical rate-limiting step in health system reform, particularly in rural and remote communities where low staff levels, high staff turnover and inadequate professional support structures are a common reality. We must also accept that disadvantaged people, particularly those from ethnic minorities, must work hard to access, afford and receive the care we offer within modern medical institutions. The vast distances many people must traverse to access the most basic of services, and the negative social and emotional impact of dislocation from their communities and families is a key narrative of indigenous patients with chronic disease and it must be addressed if we are to reduce the unacceptable divide between society's 'haves' and 'have nots'. We must listen to our patients about how important their families are in their health, healing and recovery from acute CVD. Our obsession with the 'individual' comes at the cost of engaging their family in care. Not only do we miss out on maximising opportunities for secondary prevention for our patients, but we also often lose the chance to modify risk in other at-risk individuals within the family and community network.

TOWARDS A CHRONIC DISEASE AGENDA

Finally, given the growing global chronic disease epidemic we now face, in both high income and low to middle income countries [45], moving beyond a CVD specific focus to engaging a more connected and comprehensive chronic disease prevention agenda is essential. Recent estimates suggest that up to 80 per cent of global deaths due to non-communicable chronic diseases will be borne by populations within low to middle income countries [46].

The global burden of chronic disease will pose agonisingly difficult questions to our collective political, research, clinical and social will. As it currently stands, we have a health care system still locked into an acute care mindset; obsessed with rapid throughput, high-end therapy and intervention, and reactive, 'sickness' framed mentalities. Yet the challenge of chronic disease poses more pressing and fundamental challenges. We are yet to develop a proactive health care system, we are still waiting for connected care across various sections of the health system, we continue to label our patients as badly behaved, whilst we try and make them do as we suggest through fear and incomplete attempts at communicating risk. All the while we continue to focus on sickness and labelling the patient as their disease (the 'diabetic', the 'vasculopath'). In direct contrast, our patients ruminate about wellness and autonomy despite illness, on their family and the broader social realities in which their conditions are created and sustained.

In recognising these competing mind-sets, a chronic disease agenda must, at its core, understand the environments in which chronic disease is enabled and start at the start of the life-course, through improving maternal environments, overcoming childhood disadvantage, and improving trajectories for adolescents in terms of supporting the genesis of lifelong, healthful behaviours. From a systems perspective, we must ensure that we can make the job of chronic disease prevention, identification

and management easier (rather than adding to the already complex evidence base). We must outline the essential elements and structures of chronic disease care; particularly how these can support the delivery of what we already know must be delivered. For vulnerable members of society, we must develop alternate models of care because there remains overwhelming evidence that the current system leaves too many people behind. Further, our ongoing efforts to reduce existing, and in many instances rising, levels of risk factors must be doubled, particularly as we witness the march of chronic disease across the globe. We need to accept that families must be the centre of our interventions, operating as the support structure of our patients, experiencing the same 'atherogenic' environments, and representing the next preventable cardiovascular event. We must equip ourselves with skills that reach beyond 'fear and loathing' as a primary tool to 'scare' the community into reducing their risk. Finally, we must resist the temptation to label people with chronic disease as the product of their own poor choices, when we are yet to ensure that every citizen can access and afford the healthy choices we wish for them to choose.

Understanding and overcoming disparity in CVD experienced by indigenous Australians may offer insights into the nature and prevention of the rising tide of chronic disease across the globe.

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