UNIT NO. 1

CARDIOVASCULAR DISEASES: A 2016 PERSPECTIVE

A/P Goh Lee Gan

ABSTRACT

A review was made of the current literature on cardiovascular diseases. The following key findings were found: (1) CVDs need to be reduced in Singapore and worldwide. (2) CVD risk assessment tools are population specific – use the FRS modified score for Singapore. (3) New ideas about therapeutic lifestyle change as primary prevention are to take note of the individuals who fail in lifestyle change early and to direct them to alternative strategies; educating patients to reduce sitting time, increasing physical activity, and cardio-respiratory fitness is beneficial; higher protein diets help in creating weight loss and reducing weight regain; trans fats are associated with all-cause mortality, total CHD, and CHD mortality. (4) Paradigm shifts in secondary prevention are: statin treatment intensity recommended in the 2013 ACC/AHA cholesterol treatment guidelines; setting the blood pressure targets for patients with diabetes mellitus to be less than 140/90 mmHg; and noting that the older patient (beyond 70 to 74 years) with diabetes mellitus need to be managed as one would do so with a middle-aged patient. (5) The iCVH model as the 2020 impactful strategy for cardiovascular disease reduction for Americans provides food for thought as a potential Singapore strategy -- Promote in each patient especially the young patient, the simultaneous presence of optimal levels of 4 health behaviours (body mass index, physical activity, nonsmoking status, and diet quality) and reduction of 3 disease factors (total cholesterol, blood pressure, and fasting blood glucose).

Keywords:
Cardiovascular risk assessment; Therapeutic lifestyle change; Cholesterol management; Hypertension management; Diabetes mellitus management; Ideal cardiovascular health

SFP2016; 42(2): 8-15

INTRODUCTION

Objective

The objective of this paper is to provide an update on the current landscape of cardiovascular diseases (CVDs) and the actions that should be taken to reduce the mortality (and disability) caused by this group of diseases.

Importance

CVDs are "the number 1 cause of death globally"(WH0, 2015)[1]. WHO estimated that globally, 17.5 million people died from these diseases in 2012 (WHO, 2015)[1]. In the Asia Pacific region, CVDs are the leading cause of death and accounted for "about one-third of all deaths in 2012" (WHO/OECD, 2014)[2]. In Singapore the cardiovascular vascular diseases accounted for 29.9% (5,799 persons) of total deaths (19,393 persons) in 2014. (MOH, 2016)[3].

GOH LEE GAN
Professorial Fellow & Senior Consultant.
Division of Family Medicine, Department of Medicine.
National University Health Systems;
Director, IFM, College of Family Physicians, Singapore.

Classification

As a diagnostic category, the CVDs (WHO, 2011)[4]comprise of:

- **Ischaemic heart disease** or coronary artery disease -- myocardial infarction, angina pectoris, acute coronary syndrome, heart failure.
- **Cerebrovascular disease** – stroke, transient ischemic attack
- **Diseases of aorta and arteries** – including hypertension, and peripheral vascular disease.
- **Other CVDs** – congenital heart disease, rheumatic heart disease, cardiomyopathies, cardiac arrhythmias.

TABLE 1. CONTRIBUTIONS OF CVD ON PRINCIPAL CAUSES OF DEATHS, 2012 - 2014. SINGAPORE

Year	2012	2013	2014
Total No. of Deaths	18,481	18,938	19,393
% of Total Deaths			
Ischaemic Heart Disease	16.1%	15.5%	16.0%
Cerebrovascular Disease (including stroke)	9.3%	8.9%	8.4%
Hypertensive Diseases (including hypertensive heart disease)	2.8%	3.1%	3.6%
Other Heart Diseases	1.9%	2.0%	1.9%
Total % of Deaths from Cardiovascular Disease	**30.1%**	**29.5%**	**29.9%**
Total No. of Deaths from Cardiovascular Disease	**5,563**	**5,587**	**5,799**

Source: Ministry Of Health, 2016

TABLE 2. MORTALITY BY GENDER AND CAUSES OF DEATH, 2014. SINGAPORE

2014	Male	Female	Total
Total No. of Deaths in 2014	10,534	8,858	19,393
% of Total Deaths			
Heart & Hypertensive Diseases	23.3%	19.3%	21.5%
Cerebrovascular Disease (including stroke)	7.2%	9.8%	8.4%
Total % of Deaths from Cardiovascular Disease	**30.5%**	**29.1%**	**29.9%**
Total No. of Deaths from Cardiovascular Disease	**3,213**	**2,572**	**5,785**

Source: Report on Registration of Births and Deaths 2014 by the Registry of Births and Deaths, Immigration and Checkpoints Authority, Singapore

The contributions of the various CVDs on principal causes of deaths in Singapore for the period 2012 to 2014 are shown in Tables 1 and 2. (MOH, 2016)[3].

Risk factors

Risk factors that promote the process of atherosclerosis (WHO, 2011)4 are :

• **Behavourial risk factors (lifestyle factors)** – tobacco use; physical inactivity; unhealthy diet (rich in salt, fat, and calories); harmful use of alcohol.

• **Metabolic risk factors** – overweight and obesity; raised blood lipids; raised blood pressure; raised blood sugar.

• **Other risk factors** – advancing age; male gender; inherited predisposition; psychological factors e.g. stress, and depression; poverty and low educational status.

SOURCES OF INFORMATION

Three sources of medical literature contributed to the information in this update:

- PubMed – Searches of reviews published in the last 3 years, using combination of keywords of "cardiovascular diseases" with "risk assessment", "risk score", "primary prevention", "secondary prevention", "Asia", "Asia Pacific". Relevant citations were shortlisted and reviewed for information on concepts, and risk factor management of cardiovascular diseases -- 17 reviews.
- WHO & OECD publications – Google searches publications on CVD in the last 5 years -- 4 documents.
- Local information – Google searches for: MOH State of Health Report 2012; Principal causes of death 2012 to 2014; National Registry of Diseases Office reports - on myocardial infarction, and on stroke; Health Promotion articles on healthy diet – 8 documents.

FINDINGS

1. CVD TRENDS

Asia Pacific CVD age-standardized mortality trends

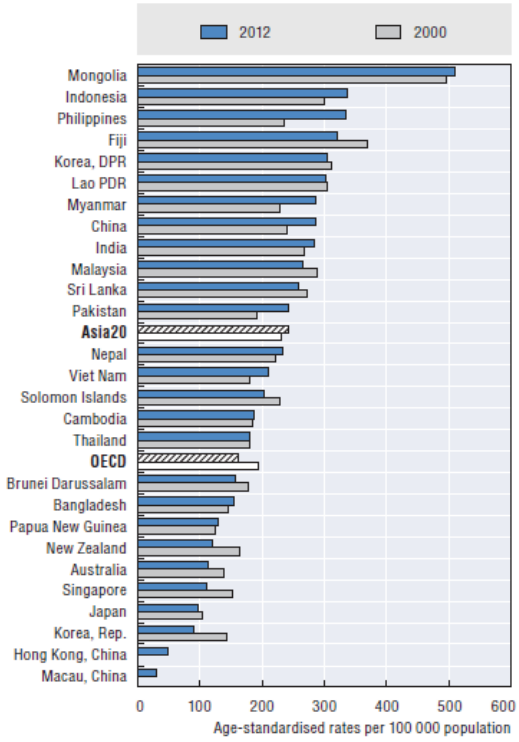
Figure 1 shows the CVD age-standardized mortality rates in Asia Pacific for 2012 and 2000 (OECD/WHO, 2014)[2]. Singapore stood at 15th in the world in 2012 with a CVD mortality rate of 108/100,000 population; Japan which has the world's lowest CVD deaths stood at 82/100,000 population in that same year.

The two key members of the CVD diagnostic group are ischaemic heart disease and strokes. Figure 2 shows the proportions of cardiovascular deaths in 2012 in Asia Pacific (OECD/WHO, 2014)[2]. Singapore had a larger proportion of deaths from ischaemic heart disease than strokes. This is unlike other countries in the Asia Pacific like Vietnam, Korea, Indonesia and Myanmar which have a larger proportion of deaths from strokes than ischaemic heart disease; Japan had about equal proportions of ischaemic heart disease and stroke in 2012.

Singapore trends of incidence and mortality from acute myocardial infarction (AMI)

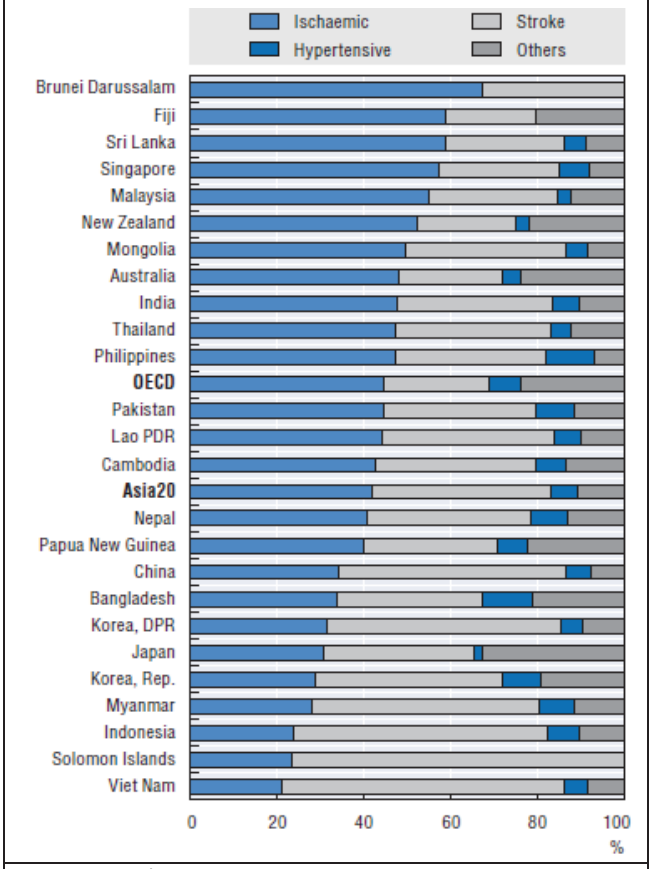
The top three symptoms reported by patients with AMI were chest pain, breathlessness, and diaphoresis. The overall age-standardized incidence rate of AMI had increased from 208.9 /100,000 population in 2007 to 221.1/100,000 in

FIGURE 1. CARDIOVASCULAR DISEASE, ESTIMATED MORTALITY RATES, 2000 AND 2012. ASIA PACIFIC REGION



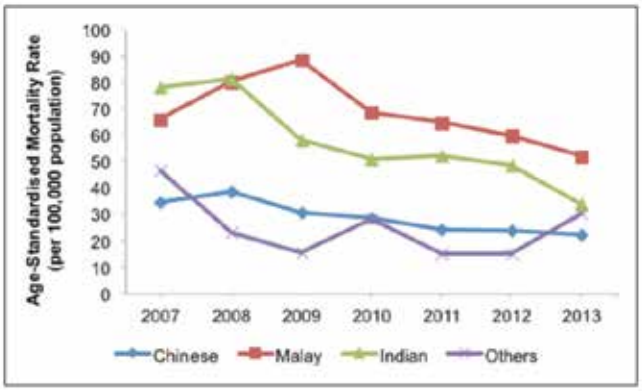
Source: OECD/WHO. OECD: Paris, 2014; WHO Global Burden of Disease, 2014; Department of Health, Hong Kong, China, 2014; Disease Registry, Macau, China, 2014.

FIGURE 2. PROPORTIONS OF CARDIOVASCULAR DISEASE DEATHS, 2012. ASIA PACIFIC REGION



Source: OECD/WHO, 2014; WHO Global Burden of Disease, 2014

FIGURE 3. AGE-STANDARDISED MORTALITY RATE OF AMI PER 100,000 POPULATION BY ETHNIC GROUP. SINGAPORE



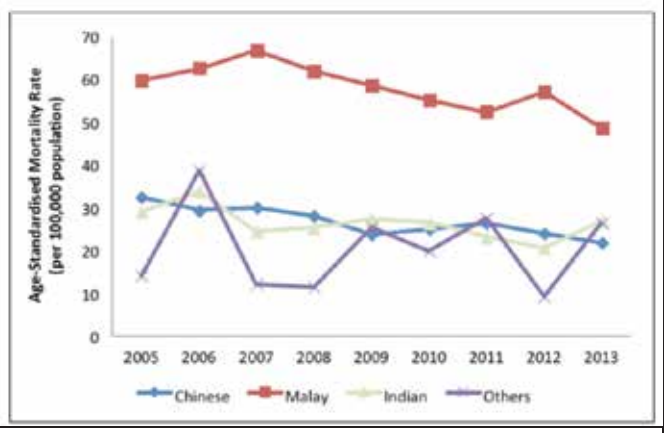
Source: Singapore Myocardial Infarct Registry Report No 3. Trends in Acute Myocardial Infarction in Singapore 2007 – 2013. National Registry of Diseases Office, 2013

TABLE 3. AGE-STANDARDISED MORTALITY RATE OF AMI PER 100,000 POPULATION BY ETHNIC GROUP. SINGAPORE

Ethic Group	2007	2008	2009	2010	2011	2012	2013
Chinese	34.4 (32.2-36.6)	**38.4** (36.1-40.7)	30.4 (28.4-32.4)	28.4 (26.6-30.3)	24.2 (22.5-25.8)	23.6 (22.0-25.3)	22.1 (20.6-23.6)
Malay	65.6 (56.7-74.6)	80.1 (70.1-90.1)	88.1 (77.9-98.4)	68.4 (59.5-77.2)	64.6 (56.0-73.2)	59.5 (51.6-67.4)	51.7 (44.6-58.8)
Indian	78.1 (65.7-90.5)	81.2 (68.9-93.5)	58.1 (47.9-68.3)	51.0 (41.6-60.4)	52.1 (42.8-61.3)	48.7 (40.1-57.3)	33.6 (26.5-40.7)
Others	46.3 (26.2-66.4)	22.8 (8.9-36.7)	15.3 (5.7-24.9)	28.1 (13.9-42.3)	15.0 (5.7-24.3)	14.9 (5.9-23.9)	30.0 (16.5-43.6)

Source: MOH. Singapore Stroke Registry Report No 4. Trends in Stroke in Singapore 2005 – 2013, National Registry of Diseases Office, 2013.

FIGURE 4. AGE-STANDARDISED MORTALITY RATE OF STROKE PER 100,000 POPULATION BY ETHNIC GROUP. SINGAPORE



Source: Singapore Stroke Registry Report No 4. Trends in Stroke in Singapore 2005 – 2013. National Registry of Diseases Office, 2014.

TABLE 4. AGE-STANDARDISED MORTALITY RATE OF STROKE PER 100,000 POPULATION BY ETHNIC GROUP. SINGAPORE

Ethic Group	2007	2008	2009	2010	2011	2012	2013
Chinese	**29.8** (27.8-31.9)	**28.0** (26.0-29.9)	**23.7** (30.0-34.5)	**24.8** (23.1-26.6)	**26.2** (24.5-28.0)	**23.9** (22.2-25.5)	**21.8** (20.2-23.3)
Malay	**66.6** (57.4-75.9)	**61.8** (53.0-71.7)	**58.4** (49.9-66.8)	**55.0** (47.2-82.8)	**52.3** (44.7-59.9)	**56.9** (49.2-64.6)	**48.4** (41.6-55.2)
Indian	**24.4** (17.3-31.5)	**25.2** (25.1-42.4)	**27.3** (20.4-34.3)	**26.4** (19.8-33.1)	**23.0** (16.6-29.5)	**20.5** (14.9-26.2)	**26.8** (20.6-32.9)
Others	**12.1** (2.8-21.4)	**11.4** (19.5-57.7)	**25.3** (10.9-39.6)	**19.9** (7.1-32.7)	**27.5** (13.9-41.1)	**9.2** (1.9-16.4)	**26.3** (14.5-38.1)

Source: Singapore Stroke Registry Report No 4. Trends in Stroke in Singapore 2005 – 2013. Note only data 2007 onwards are shown

2013. However, the overall age-standardized mortality rate had decreased from 40.8/100,000 in 2007 to 26.0/100,000 in 2013. (MOH, 2014)[5]. Age-standardized mortality rates of the Chinese were lower than those of the Malays and Indians. (See Figure 3 and Table 3).

Singapore trends of incidence and mortality from strokes

Hypertension and hyperlipidemia were the two most common risk factors among the stroke patients. (MOH, 2014)[6]. The overall age-standardized incidence of strokes from 2005 to 2013 have decreased then stabilized. The age-standardized mortality rate has also declined. Malays had the highest age-standardized incidence rate for stroke from 2005 onwards, followed by Indians and Chinese, whose rates are similar. Figure 4 and Table 4 shows the age-standardized mortality strokes in the different ethnic groups in Singapore from 2007 to 2013.

Prevalence of adverse lifestyle and high risk diseases in Singapore.

National surveys in Singapore across the last 25 years provide information on trends of cardiovascular risk factors from 1992 to 2010. See Figure 5 and Table 5. (MOH, 2013)[7]. With regards to lifestyle changes over the period 1992 to 2010, there has been a decrease in prevalence of smoking, drinking, and increase in exercise. With regards to high risk diseases, prevalence of hypertension and total cholesterol have declined from 1992 to 2010. Obesity has on the other hand experienced stepwise increase from a prevalence of 5.5% in 1992 to 10.8% in 2010. Diabetes mellitus has also shown only marginal decrease in prevalence from 11.5% in 1992 to 11.3% in 2010. Clearly, these two high risk diseases – diabetes and obesity -- require attention in controlling their prevalence in the present and future.

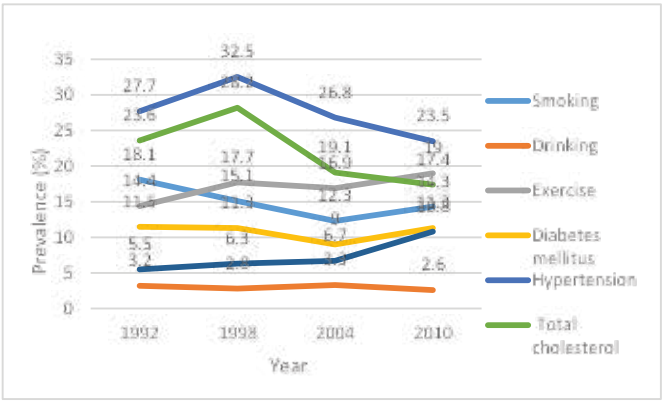
2. Screening - Global Cvs Risk Assessment And Risk Scores

Since atherosclerosis is a slowly progressing disease with a long asymptomatic period of several decade and have modifiable risk factors that can reduce the incidence of CVD, various cardiovascular screening tools for asymptomatic individuals aimed at the intermediate or high risk individuals have been created. Degrell et al (Degrell et al, 2015)[8] have recently reviewed the tools that could be used for such screening.

The original Framingham risk score (FRS) consisting of six easily available items namely, sex, age , cigarette smoking, blood pressure, lipid profile, and diabetes mellitus, allow an estimation of the relative and absolute 10-year risk for coronary artery disease. It should be noted that cardiovascular risk is different across populations and a risk score is only applicable in the population it was validated. Hence, the FRS is validated for American population.

For Singapore a validated FRS risk score for Singapore use which is adjusted to the three ethnic groups of Chinese, Malay, and Indian is in use. Also, in the same 6 parameters as the FRS,

FIGURE 5: AGE-STANDARDISED PREVALENCE OF CHRONIC DISEASES/ RISK FACTORS, 1992, 1998, 2004 AND 2010.SINGAPORE



Source: MOH: State of Health. DMS Report 2003 - 2012

TABLE 5. PREVALENCE (%) -- LIFESTYLE RISK & HIGH RISK DISEASES, 1992 TO 2012. SINGAPORE

Risk	1992	1998	2004	2010	Remarks on trends
Lifestyle					
Smoking	18.1	15.1	12.3	14.3	- 3.7% (but increase of 2% from 2004 to 2010)
Drinking	3.2	2.8	3.3	2.6	- 0.6% (decrease from 1992 to 2010)
Exercise	14.4	17.7	16.9	19.0	+ 4.6% (increase from 1992 to 2010)
High risk diseases					
Diabetes mellitus	11.5	11.3	9.0	11.3	- 0.2% (small decrease only since 1992)
Hypertension	27.7	32.5	26.8	23.5	- 4.2% (decrease from 1992)
Total cholesterol	23.6	28.2	19.1	17.4	- 6.2% (decrease from 1992)
Obesity	5.5	6.3	6.7	10.8	+ 5.5 (Stepwise increase)

instead of total cholesterol both cholesterol and HDL are used. See the MOH Clinical Practice Guidelines 1/2011 on Screening of cardiovascular disease and risk factors for details of the FRS risk score adapted for Singapore (MOH, 2011)[9] . A review of the CPG is also published in SMJ (Goh et al, 2011)[10].

In Europe, in order to adapt to the mortality rates of the region, similar to the FRS, the European Society of Cardiology (ESC) developed a risk score to predict the 10-year risk of fatal CVD stratified by high and low risk regions in Europe, called SCORE. Similarly the QRISK2 score, an updated version of the QRISK score, should be used to estimate the 10-year risk of CVD in the UK.

These risk scores are not, however, perfect prediction tools, and new methods for assessment of cardiovascular risks have been developed. Overall, the added value of emerging risk markers on top of standard risk score appears limited. As a consequence, their systematic use is currently not recommended (Degrell, et al, 2015)[8].

3.Therapeutic Lifestyle Changes As Primary Prevention Of CVD

Physical activity, sedentary time, and cardio-respiratory fitness

Currently, there are national and international guidelines to for physical activity level that are highly concordant. The weekly recommendations include 150 minutes of moderate-intensity activity, 75 minutes of vigorous-intensity activity, or some combination of moderate and vigorous activity with 2 days of resistance exercise. (Bouchard et al, 2015)[11].

There is also a need to pay attention to reduce sedentary time, increase regular physical activity, and set goals for respiratory fitness. (Bouchard et al, 2015)[11]. A meta-analysis by Kodama et al, show that low cardio-respiratory fitness is a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women followed up for a median of more than 14.2 years (Kadoma et al, 2009)[12].

Weight reduction

With modern abundance of transport, sedentary life, and abundance of food, weight management can be a difficult issue. As obesity rates increase, so too do the risks of onset of type 2 diabetes, cardiovascular disease, and other detrimental conditions. Osteoarthritis and chronic kidney disease are examples of two such detrimental conditions. A Diabetes Care Editors' Expert Forum concluded that a high level of physical activity appears to be particularly important in weight reduction. It was noted that in general lifestyle interventions appear to be moderately successful in inducing initial weight loss; however weight regain often begins to occur after 6 months, as was noted in both the DPP and Look AHEAD trials. It was also concluded that there is a need to identify who will fail to respond to lifestyle change interventions. Presently, it was noted that early success predicts long-term success. Individuals were fail lifestyle intervention early on may be better served by pursuing alternatives such as pharmacotherapy or bariatric surgery rather than by continuing in a behavorial program in which they may be destined to fail. (Cefalu et al, 2015)[13]

Dietary intervention

There are several diets that have been offered as being beneficial in therapeutic lifestyle change of patients at risk of cardiovascular disease namely, My Healthy Plate (HPB, 2015)[14], the Mediterranean diet, and also the DASH diet. The principles are broadly the same namely, a balanced diet with attention complex carbohydrates, liberal intake of vegetables, and adequate protein intake.

Mediterranean diet. The Mediterranean diet consists of fruits, vegetables, whole grains, legumes/nuts, fish, monounsaturated fats from olive oil, and moderate alcohol consumption. The primary advantage of the Mediterranean diet appears to lie in its synergy among various cardioprotective nutrients and foods. (Widmer at al, 2015)[15].

DASH diet. DASH is a flexible and balanced eating plan. The DASH eating plan requires no special foods and instead provides daily and weekly nutritional goals. Based on these recommendations, the following table shows examples of daily and weekly servings that meet DASH eating plan targets for a 2,000-calorie-a-day diet. (NIH, 2015)[16]. A systematic review and meta-analysis of 6 studies on the longitudinal effects of a DASH diet on the incidence of CVDs showed that DASH-like

diets can protect against CVDs, CHD, stroke, and HF risk by 20%, 21%, 19% and 29%, respectively. Implementation of such a diet would be beneficial to individuals at high risk of cardiovascular disease. (Salehi-Abargouei et al, 2013)[17].

TABLE 6. DAILY AND WEEKLY DASH EATING PLAN GOALS FOR A 2,000-CALORIE-A-DAY DIET

Food Group	Daily Servings
Grains	6–8
Meats, poultry, and fish	6 or less
Vegetables	4–5
Fruit	4–5
Low-fat or fat-free dairy products	2–3
Fats and oils	2–3
Sodium	2,300 mg*
	Weekly Servings
Nuts, seeds, dry beans, and peas	4–5
Sweets	5 or less

Notes:
(1) *1,500 milligrams (mg) sodium lowers blood pressure even further than 2,300 mg sodium daily.
(2) When following the DASH eating plan, it is important to choose foods that are: Low in saturated and *trans* fats; Rich in potassium, calcium, magnesium, fiber, and protein; Lower in sodium.

Source: NIH. Heart, Lung Blood Institute, 2015.

Population strategy: Working with supermarket outlets and food and beverage industry.
In 2015, Health Promotion Board partnered 235 supermarket outlets to promote healthier eating at home through the Healthier Choice Symbol (HCS) to guide grocery purchase choices to promote healthier options in the Singaporean diet. Products with the symbol are in general lower in fat, saturated fat, sodium, sugar, and higher in dietary fibre, calcium, and whole-grains. There are a total of 6 nutrient specific HCS. A media factsheet on the details of what does each HCS symbol mean can be downloaded from the HPB website. See reference (HPB, 2015)[18]. In 2014, Health Promotion Board partnered 18 Food & Beverage organisations which together had some 700 outlets in delivering 500 kcal meals which is some 200 to 300 kcal lower in the usual fast food meals. (HPB, 2015)[19]

Role of protein in weight loss and weight regain. Over the past 20 years, higher protein diets have been touted as successful strategy to prevent or treat obesity through improvements in body weight management. Recent evidence also supports higher protein diets for improvements in cardio-metabolic risk factors. The paper by Leidy et al (Leidy, 2015)[20] provides an overview of the literature that explores the mechanisms of action after acute protein consumption and the clinical health outcomes after long-term, higher protein diets. Diets that contain between 1.2 and 1.6 g protein/kg/day and potentially include meal-specific quantities of 25 – 30 g protein/meal provide improvement in appetite, satiety weight loss, fat mass loss, and/or the preservation of lean mass. There is less weight regain compared to a diet with higher carbohydrate content. Research is needed to examine whether the satiety effects of protein promote voluntary reductions in energy intake and improved body weight management over the long term.

Fat intake and risks. The concerns for the risk of all-cause mortality, cardiovascular disease (CVD), CHD, and type 2 diabetes from fat intake formed the research question to systematically review these associations, if any. Saturated fats were found not associated with all-cause mortality, CVD, CHD, ischemic stroke, but the evidence was heterogeneous with methodological limitations. Trans fats on the other hand are associated with all-cause mortality, total CHD, and CHD mortality. (De Souza, 2015)[21]

4. SECONDARY PREVENTION IN PATIENTS WITH HIGH RISK OF CVD AND CVD PATIENTS

Management of high risk diseases as secondary prevention will be necessary for individuals with high risk for CVDs or have already experienced CVD events.

The obesity paradox
The controversy of the obesity paradox arose from observational studies that a low body weight in patients with established coronary artery disease (CAD) have the highest mortality risk, while being overweight or obese have a lower risk (Lavie et al, 2015)[22]. It is also pointed out by Lavie that "fitness is more important than fatness for long-term prognosis; in the obesity paradox , fitness markedly alters the relationship between adiposity and long-term health outcomes.".

The obesity paradox is attenuated when patients are followed up for a longer period of time. A systematic review and meta-analysis of patients with coronary artery disease by Wang et al (Wang et al, 2015)[23] showed that initially a J-shaped relationship between BMI categories and risk of mortality existed – that it, lower BMI had the greater mortality risk.

This inverse relationship between higher BMI and mortality was however attenuated in long term follow-up. The survival benefit of obesity (0.68 (0.61 to 0.75)) disappeared after 5 years of follow-up ((0.99(0.91 to 1.08)). The conclusion of Wang et al was that the lack of obesity as a cardiovascular risk factor in non-obese patients with CAD should not be assumed to predict a better outcome as compared to obese patients. (Wang et al, 2015)[23]. This is an important statement.

Pack et al, in a systematic review and meta-analysis of observational studies also found that weight loss in patients with CAD is associated with worse long term outcomes. They found that when weight loss occurs intentionally in the setting of lifestyle changes it is protective; when weight loss is spontaneous, it is not protective. Their findings support national guidelines that lifestyle change for weight loss can be confidently recommended to overweight and obese patients with CAD. (Pack et al, 2015)[24]

Cholesterol management
The 2013 ACC/AHA Cholesterol treatment guidelines are a paradigm shift; they differ from prior guidelines in that they:
• Rely on only the highest quality data (e.g. RCTs) to inform

recommendations on treatment decisions.
- Focus on hard cardiovascular outcomes – known as the 4 "statin benefit groups" – see Table 7.
- Move away from focusing on low density lipoprotein-cholesterol (LDL-C) goals and instead focus on the appropriate intensity of statin therapy -- high intensity statin therapy; moderate intensity statin therapy; and low-density statin therapy -- see Table 8.

Essentially, the guidelines focusses on the right quality evidence; the right patient; and the right statin intensity (Ziaeian et al, 2016)[25].

TABLE 7. THE RIGHT PATIENT AND THE RIGHT STATIN INTENSITY

Statin-benefit group	The right statin intensity (see Table 8)	Other considerations
Secondary prevention Adults with clinically established ASCVD	Age < 75 – High intensity statin Age >75 – Moderate intensity statin	
Primary prevention Adults with primary LDL-C – more or equal to 190 mg/dl	High intensity statin	
Diabetes mellitus (Type 1 & 2) Adults (40 – 75) and LDL-C 70 – 190 mg/dl	10 year ASCVD risk < 7.5% -- Moderate intensity statin 10 year ASCVD risk ≥ 7.5% -- High intensity statin	Consider statin even if <40 or >75 years of age
Primary Prevention Adults (40 – 75) and ≥ 7.5% 10-yr CVD risk	Consider high or moderate statin therapy	Consider statin if between 5% and 7.5% 10-yr CVD risk

Source. Ziaeian et al, 2016. Slightly modified.
ASCVD = Atherosclerotic cardiovascular disease.

TABLE 8. INTENSITY CLASS OF COMMONLY USED STATINS BY DOSE

High-intensity statin therapy	Moderate-intensity statin therapy	Low-intensity statin therapy
Daily dose lowers LDL-C on average by approx. ≥ 50% Atorvastatin 40 – 80 mg Rosuvastatin 20 – 40 mg	Daily dose lowers LDL-C on average by approx. 30 to <50% Atorvastatin 10 – 20 mg Rosuvastatin 5 – 10 mg Simvastatin 20 – 40 mg Pravastatin 40 – 80 mg Lovastatin 40 mg Fluvastatin XL 80 mg Fluvastatin 40 mg BID Pitavastatin 2 – 4 mg	Daily dose lowers LDL-C on average by <30% Simvastatin 10 mg Pravastatin 10 – 20 mg Lovastatin 20 mg Fluvastatin 20 -- 40 mg Pitavastatin 1 mg

Source. Ziaeian et al, 2016.

Blood pressure targets in patients with diabetes mellitus

The most recent guideline statements by the 2014 Expert Panel of the National Institutes of Health and the American and International Societies of Hypertension recommend a blood pressure goal of <140/90 mmHg in patients with diabetes mellitus. This contrasts with earlier guidelines which recommended a BP treatment goal of <130/90. The major evidence driving the recent change in BP goals in patients with diabetes is the ACCORD BP trial. Published in 2010, this randomized study of 4733 subjects with DM2 and a baseline of 139/76 mm Hg targeted systolic BP of <120 mmHg in the intensive control group and <140 mmHg in the standard therapy group. The primary composite outcome was nonfatal myocardial infarction, nonfatal stroke, or deaths from cardiovascular causes. The mean follow up was 4.7 years. Both groups achieved the desired BP (119 and 133 mmHg, respectively). There was no significant difference in the annual rate of the primary endpoint and no difference in all-cause mortality. The lower BP goal was associated with significant reductions in total and nonfatal strokes; however, there were significantly more serious adverse events in the intensive therapy group. (Laffin & Bakris, 2015)[26].

The choice of antihypertensive medication is significantly less important. Use of beta-blockers is appropriate if a compelling indication exists such as coronary artery disease. Carvedilol and nebivolol are the two-beta blockers that do not increase risk for diabetes development. Thus if beta-blocker therapy is required in patients with diabetes, carvedilol or nebivolol is likely the best choice of therapy. (Laffin & Bakris, 2015)[26].

The older patient with diabetes mellitus – treat his/her diabetes as for middle aged patient

The paradigm shift in thinking that is needed in the older patient with diabetes mellitus is that the latter exerts a strong effect on atherosclerotic cardiovascular disease risk into older age (beyond the ages 70 to 74 years). This effect is particularly noticeable with regard to coronary artery disease and cerebral microvascular disease. Thus diabetes mellitus in older age deserves the same careful medical attention as it does in middle age. This is based on the evidence from the ongoing Cardiovascular Health Study, an ongoing observational study of cardiovascular risk factors in adults age 65 and older. (Barzilay et al, 2015)[27].

Four points are notable (Barzilay et al, 2015)[27]:
- Although the relative risk for cardiovascular events and mortality appears to be less pronounced in older than middle aged adults, diabetes remains an important risk factor for these outcomes, particularly mortality, well into old age (namely, beyond age 70 to 74 years).
- The presence of subclinical vascular disease is an important determinant of who develops and who does not develop clinical CVD.
- Newly detected diabetes poses a near-term risk of CVD.
- Diabetes affects not only the large arteries of the brain but the small arteries and arterioles too.

5. CONCEPT OF IDEAL CARDIOVASCULAR HEALTH (ICVH)

A bold and audacious goal of the American Heart Association is to set up the 2020 Strategic Impact Goal which states that "By 2020, to improve the cardiovascular health of all Americans by 205 while reducing deaths from cardiovascular diseases and stroke by 20%". To monitor progress towards this goal, a new model of "ideal cardiovascular health (iCVH) was defined. This is the simultaneous presence of 4 health behaviours (physical activity, nonsmoking status, healthy dietary intake, and heathy body mass index) and absence of 3 disease factors (total cholesterol, blood pressure, and fasting blood glucose) (Shay et al, 2015)[28]. It was found in a study of 2164 young adults in the Coronary Artery Risk Development in Young Adults study is ideal CVH profile, that optimal lifestyle components in young adulthood are associated with maintaining the ideal cardiovascular health profile into middle age (Gooding et al, 2015)[29].

DISCUSSION

This review which is based on current literature in PubMed, WHO & OECD documents, and also local Singapore information uncovers old and new information for further action.

What are known?

- Reduction of cardiovascular diseases face challenges in therapeutic lifestyle change in particular obesity reduction and adoption of a healthy diet.
- The control of hyperlipidemia, hypertension, and diabetes remain challenging.

What are new?

Primary prevention

- Psychological factors as cardiovascular disease risk factors e.g. stress, depression; and social economic factors as cardiovascular disease risk factors e.g. poverty and low educational status – may not be appreciated. Attempts to reduce these should not be overlooked.
- There is a need to pay attention to reduce sedentary time, increase regular physical activity, and set goals for cardio-respiratory fitness.
- With regards to promoting weight loss, individuals who fail lifestyle change on may be better served by pursuing alternatives such as pharmacotherapy or bariatric surgery rather than be continuing in a behavioural program in which they are destined to fail.

Secondary prevention

- There is a need to lose weight and caregivers be able to explain the obesity paradox.
- Paradigm shifts in hyperlipidemia management guidelines of the right evidence, the right patient, and the right intensity in statin therapy.
- Change of blood pressure target in patients with diabetes to less than 140/90 as compared to prior guidelines of less than 130/80 mm Hg.
- Treat diabetes mellitus in the older patient (beyond 70 to 74) like that in a middle aged person.

The iCVH model provides food for thought for implementation in the Singapore setting too -- America's 2020 Impactful strategy for CVD reduction seeks to strive for the simultaneous presence among all Americans of 4 health behaviors (physical activity, nonsmoking status, healthy dietary intake, and desired body mass index) and the absence of 3 disease factors (total cholesterol, blood pressure, and fasting blood glucose).

CONCLUSION

CVD can be reduced, in Singapore and worldwide. Attention to what is new in therapeutic lifestyle change, recognition and incorporation of paradigm shifts in cholesterol management, paradigm shift of blood pressure target of 140/90 mmHg for people with diabetes mellitus, and treating the older adult with diabetes like that for a middle aged person will be needed. Striving to work with patients to promote the ideal cardiovascular health (iCVH) will have impactful strategic outcome in reducing CVD. This is food for thought whether or not for introducing this American idea into Singapore as well.

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LEARNING POINTS

- **CVDs need to be reduced in Singapore and worldwide.**
- **CVD risk assessment tools are population specific – use the FRS modified score for Singapore.**
- **New ideas about therapeutic lifestyle change as primary prevention are to take note of the individuals who fail in lifestyle change early and direct them to alternative strategies; educating patients to reduce sitting time, increasing physical activity, and cardio-respiratory fitness is beneficial; higher protein diets help in weight loss and reducing weight regain; trans fats are associated with all-cause mortality, total CHD, and CHD mortality.**
- **Paradigm shifts in secondary prevention are: 2013 ACC/AHA cholesterol treatment guidelines; the blood pressure targets for patients with diabetes mellitus is less than 140/90 mmHg; and the older patient (beyond 70 to 74 years) with diabetes mellitus need to be managed as one would do so with a middle-aged patient.**
- **The iCVH model as 2020 impactful strategy for cardiovascular disease reduction provides food for thought. Promote in each patient especially the young patient, the simultaneous presence of optimal levels of 4 health behaviours (body mass index, physical activity, nonsmoking status, and diet quality) and reduction of 3 disease factors (total cholesterol, blood pressure, and fasting blood glucose).**