

NUS Saw Swee Hock School of Public Health
**Public Health Thought Leadership Dialogue:
Driving Singapore's War on Diabetes**
Monday, 14 Nov 2016, 10:00AM to 12:00PM

SUMMARY

Panelists:

A/P Kenneth Mak
Deputy Director Medical Services, Health Services Group
Ministry of Health

Dr Sue-Anne Toh
Clinical Director
NUHS Regional Health System Planning and Development

Prof Paul Zimmet
Professor of Diabetes
Monash University, Australia

Panelist and Moderator:

Prof Chia Kee Seng
Dean
Saw Swee Hock School of Public Health

1 BACKGROUND

Based on projections by the Saw Swee Hock School of Public Health, Singapore will have 670,000 persons with diabetes by 2030 and close to 1 million persons with diabetes by 2050, if no action is taken. In April 2016, the Ministry of Health declared a national 'War on Diabetes' (WoD) to tackle the rising diabetes health threat in Singapore, and began public engagement to solicit ideas and feedback. At this Public Health Thought Leadership Dialogue, challenge questions related to prevention, screening and control of diabetes were posed to the panelists. Members of the audience were also invited to comment and give suggestions. The points raised at the dialogue would be compiled in a report and shared with the Ministry as input from the community of academics and practitioners. The Chatham House Rules were enforced for this session.

2 PREVENT DIABETES

Notable Quotes: Prevent Diabetes

- Only about half of new diabetes cases are from the high-risk groups...Hence, approaches that are focused only on high-risk groups miss the other half of potential new cases.
- Population-based interventions “shift the whole curve” and improve the overall health of the general population.
- We are all at high risk of diabetes, some are at higher risk.
- Diabetes begets diabetes.
- Interventions can have positive impacts on epigenetic mechanisms that can be passed down through generations.
- Young adults are at higher risk of diabetes than before.

A. Should we adopt a ‘population-based’ or ‘high-risk’ approach?

New cases

Studies in the USA, Japan and India have shown that targeting high-risk groups for interventions can reduce the incidence of progression to type 2 diabetes (T2D) by up to 50%. However, only about half of new diabetes cases are from the high-risk groups, and the remaining half are individuals who are not considered high-risk. Hence, approaches that are focused only on high-risk groups miss half of the potential new cases. Population-based approaches are more appropriate since they comprise of interventions for the general population and also include interventions for high-risk groups.

Shared risk factors with other chronic diseases

Given that diabetes shares similar risk factors to many other chronic diseases such as heart diseases and cancer, it is more efficient for health authorities to adopt interventions that target the shared risk factors in order to “shift the whole curve” and improve the overall health of the general population. Such an approach will not only benefit the entire population, but also reduce diabetes prevalence as a trickle-down effect.

Social element of diabetes

Unhealthy eating and lifestyle habits are significant risk factors for T2D. These risk factors are usually shared by family members and peer groups – due to similar cultural, economic and environmental exposures, as well as the tendency for the behavior of individuals to be influenced by these groups. The strong social element of T2D calls for community-level (i.e. population-based) preventive interventions. Efforts at behavioral modification should focus on impacting families and peer group networks to drive motivation for developing healthy lifestyles. Studies like Singapore’s Growing Up in Singapore Towards Healthy Outcomes

(GUSTO) will provide valuable insights into the societal factors that affect diabetes risk.¹ Diabetes interventions must be based on an understanding of not just the biology, but also the psychosocial factors behind the disease.

A population-based approach for preventing a disease can have positive impacts on both the disease and general population health. This was illustrated by Finland's North Karelia Project for cardiovascular disease (CVD) prevention. Reductions to population-wide levels of CVD risk factors (such as smoking, elevated cholesterol, elevated blood pressure) not only saw a corresponding decrease in coronary heart disease mortality rate, but also led to positive impact on cancer and all-cause mortality, as well as the general health of the population.²

Possible local deviation from strategic direction

Caution should be taken to avoid deviations from the strategic directions at the local implementation level due to pressures from the ground. For example, when lobby groups pressure local governments to prioritize the high-risk individuals, resources can end up being funneled away from population-based interventions to high-risk group interventions, even if the official direction is to adopt a population-based approach for diabetes prevention.

'Diabetes begets diabetes'

A baby's exposure to certain factors while in the womb affects his/her risk of T2D.³ Children in the womb who are exposed to nutritional deprivation, and high blood glucose levels in their mothers (as in the case of gestational diabetes, GDM) have higher risks of developing T2D later in life. The mechanisms through which this occurs are epigenetic and result in changes to gene expression⁴ that are associated with increased T2D risk. These epigenetic changes can be transmitted to subsequent generations. The generational impact of T2D lends additional impetus to prevent the onset of T2D in high-risk groups.

High-risk groups

The individuals who are at higher risk of diabetes are identified as those who:

- ❖ are obese;
- ❖ are overweight (different from being obese);
- ❖ have high blood pressure;
- ❖ have parents or siblings with diabetes;
- ❖ have a history of GDM; and

¹ GUSTO is a comprehensive birth cohort study looking at how a mother's diet and lifestyle during pregnancy impacts the growth of her child after birth. More information can be found at <http://gusto.sg/v2/index.php>.

² More information is available at the following webpages:

- a. World Health Organization. Community-based programmes. *Chronic Diseases and Health Promotion*. (http://www.who.int/chp/about/integrated_cd/en/index2.html)
- b. Puska P. Successful prevention of non-communicable diseases: 25 year experiences with North Karelia Project in Finland. *Public Health Medicine*. 2002;4(1):5-7. (http://www.who.int/chp/media/en/north_karelia_successful_ncd_prevention.pdf)

³ It is expected that the GUSTO study will provide valuable insights into this area as well.

⁴ "Genetic expression is the process by which the instructions in our DNA are converted into a functional product, such as a protein." - Yourgenome.org, <http://www.yourgenome.org/facts/what-is-gene-expression>. These functional products in turn affect the way cells in the body function.

- ❖ women with polycystic ovarian syndrome.

Diabetes awareness should be raised among these groups of individuals to increase the likelihood of early detection and intervention.

Other groups that require attention

- ❖ The elderly: the risk of developing T2D increases with age, making it necessary for there to be preventive measures targeted at the elderly. This is especially pertinent given the ageing population in Singapore and the expected rise in the prevalence of diabetes due to ageing.
- ❖ Children and working adults: Singaporeans are becoming diabetic at younger ages than before⁵ and obesity is on the rise among young children and working adults.
- ❖ Racial groups with higher diabetes risk: The prevalence of diabetes is higher in certain racial groups relative to other races. For example, the Aboriginal and Torres Strait Islanders in Australia are at higher risk than those of European extraction. In Singapore, prevalence for Indians and Malays are higher than for the Chinese. The differences between races may also be due to lifestyle and diet, and not solely genetic factors.
- ❖ People with depression: Those suffering from depression are more likely to develop diabetes. This could be due to the biochemical effects of certain types of medication for depression.⁶
- ❖ People with obstructive sleep apnea (OSA) and shift workers: OSA has been associated with higher risk of diabetes.⁷ Some of the postulated biological mechanisms involved in OSA patients developing T2D stem from the disrupted sleep patterns of those with OSA.⁸ It is also possible that shift workers, whose sleep patterns are regularly disrupted, are at higher risk of T2D for reasons similar to people with OSA.

Exposure and existence of a dose-response relationship

When a large number of people are exposed to a small risk, more cases are generated than when a small number of people are exposed to a high risk. For diseases such as diabetes where the former is true, a population-based approach is more effective.

In addition, Singapore's data also show a dose-response relationship between exposure to risk factors and the development of diabetes (i.e. there is no threshold effect). This implies that any degree of exposure to any diabetes risk factor places the individual at higher risk of diabetes. For diabetes, where most of the population are likely to be exposed to some of

⁵ Young Singaporean Diabetes on the Rise. Saw Swee Hock School of Public Health News. Published 18 May 2016.

<https://www.sph.nus.edu.sg/news-events/news/young-singaporean-diabetes-rise>.

⁶ Another possible reason is that the symptoms of depression (e.g. lethargy, lack of motivation, extreme mood swings, low energy) negatively impact physical health (e.g. low physical activity, unhealthy diet, unhealthy behavior such as smoking and binge drinking) in ways that raises the risk of diabetes. (Diabetes.co.uk. Diabetes and depression. Available at <http://www.diabetes.co.uk/diabetes-and-depression.html>.)

⁷ This is independent of obesity. (Sleep-disordered breathing and type 2 diabetes. A report from the International Diabetes Federation Taskforce on Epidemiology and Prevention. Diabetes Research and Clinical Practice. 2008;81:2-12. Doi:10.1016/j.diabres.2008.04.025. p4-5.)

⁸ The report by the International Diabetes Federation highlighted six possible biological mechanisms through which the intermittent hypoxia and sleep fragmentation in OSA may lead to insulin resistance and T2D. (Sleep-disordered breathing and type 2 diabetes. A report from the International Diabetes Federation Taskforce on Epidemiology and Prevention. Diabetes Research and Clinical Practice. 2008;81:2-12. Doi:10.1016/j.diabres.2008.04.025. p5-6.)

the risk factors (e.g. overweight, low physical activity, sedentary lifestyle, parent or sibling is diabetic, unhealthy eating habits), a population-based approach is more effective.

We are all at high risk

We are all at high risk, and some groups are at higher risk (e.g. Indians, Malays, those with GDM, sedentary workers). However, the interventions needed are the same for all – lifestyle interventions should be used to help women avoid GDM in the first place by preventing excessive weight gain during pregnancy, and similar lifestyle interventions are needed for reducing the risk of those with prediabetes developing T2D.

Diabetes is a multifactorial disease

Diabetes is caused by the interplay of multiple factors – genetic, lifestyle and environmental. Rather than attempting to identify individual risk factors that could cause diabetes, it is more effective to look at risk factors in baskets.

Importance of strong government commitment

The messages in Singapore's awareness campaign seem to be centered around the responsibilities of the individual. However, bearing in mind that diabetes prevention strategies involve systemic changes over a long period of time, strong all-of-government commitment is necessary. For example, the changes will include the healthcare system and financing model, food choices and accessibility, and the physical environment. These will require the active contributions of agencies in charge of health, finance, trade, the food industry, urban planning, building and construction, and so forth. In fact, a lack of clarity on the government's roles and responsibilities in diabetes intervention has been a problem faced in other countries.

Buy-in on all levels

On the other hand, in order for the WoD to be successful, there cannot be a top-down approach and individuals must be encouraged to take responsibility for their health. Furthermore, the comprehensive strategies in the WoD require not just the buy-in of the population, but also that of the private sector as well as the third sector (voluntary and community organizations).

Summary:

- I. We need to take a population-based approach; notably, that does not exclude having concurrent high-risk approaches, but the converse is not true. In seeking to positively impact the overall health of a population, population-based strategies have different baskets of interventions that are deemed to be most suitable for achieving the desired outcomes for each sub-group of the population, including high-risk groups. The messaging should therefore be that we are taking a population-based approach and where we have programmes targeted at high-risk groups, it is against the larger backdrop of a population-based approach.*
- II. Be clear about who are in the "higher" risk groups.*
- III. Diabetes involves a complex interplay of numerous factors; we should be mindful that interventions in one area can have unintended unwanted consequences in other areas.*

B. How do we measure success in the WoD?

It will take time before results can be seen

Diabetes prevention interventions have long latency periods and will take an extended amount of time before significant effects can be seen (similar to interventions for curbing tobacco-use). Thus it is advisable to manage expectations and educate people that for some interventions, it may take decades to see significant results.

Impact of interventions may be dampened by risk factors that cannot be controlled

It is also important to note the possibility that despite interventions, Singapore may still see a rise in diabetes prevalence. While interventions may successfully reduce the levels of lifestyle risk factors, the risk factor of ageing will be unchanged and Singapore's trend of an ageing population may still push up prevalence rates.

Higher risks of diabetes were seen in the children and grandchildren of women who were pregnant during the 'Dutch Hunger Winter' 40-50 years after the tragedy. This led scientists to believe that exposure to nutritional deprivation during the gestation period resulted in epigenetic mechanisms that led to increased diabetes risk in the offspring's adult years. Furthermore, the fact that there was also an increased risk in the grandchildren implied that the epigenetic changes were passed to the next generation. By the same token, 'The Great Chinese Famine' in the late 1950s could explain the large number of persons with diabetes seen in China today (114 million⁹). Similarly, the rising numbers of persons with diabetes in Singapore could be due to epigenetic mechanisms that were passed down from parents/grandparents who suffered nutritional deprivation during the Japanese Occupation in World War Two. The implication for the WoD is that the effectiveness of preventive interventions could be dampened by epigenetic mechanisms that are at play.

Possibility of interventions impacting future generations epigenetically

However, it is also possible that the reverse is true and interventions can have positive impact on epigenetic mechanisms that can be passed through generations. There is a long way to go in the bid to better understand the relationships between lifestyle risk factors and epigenetic mechanisms that impact diabetes risk. The first step is to identify the genetic markers that will indicate an individual as the offspring of mothers who had GDM or experienced nutritional deprivation during pregnancy. Data on diabetes lifestyle risk factors from prospective studies like GUSTO can then be used to provide insights into the questions raised by studies of communities that had seen severe famine. Epigenetics is a nascent field and there is currently very little understanding of its link with diabetes. Nevertheless, it highlights the importance of preventive strategies to pay special attention to mother and child health in diabetes prevention.

Growing risk of diabetes in young adults

At 13%, the current prevalence rate of diabetes in Singapore is worrying. However, perhaps the worst is yet to be seen, as the young adult population is becoming more overweight. If nothing is done, this trend will add to the already rising diabetes prevalence. It is crucial that preventive interventions focus on children and young adults.

⁹ Reported by the International Diabetes Federation. <http://www.idf.org/BRIDGES/map/china>. Accessed 17 November 2016.

Prediabetes and costs

Fifty percent of those aged 65 years or older in the USA have prediabetes.¹⁰ Singapore may face a similarly high prevalence of prediabetes in the future and should factor that in when planning for the prevention, detection and management of diabetes. The USA relied on significant resources and intensive commitment by health professionals to achieve some of the successful outcomes seen in their diabetes prevention programmes. Medicare (the USA's federal health insurance programme) coverage was also recently expanded to cover the costs of diabetes management. Singapore needs to decide on the distribution of roles and responsibilities regarding personnel ("Who will work with the people?") and financing ("Who will pay for what?")¹¹.

Need not settle for process indicators

Even though we should accept that reducing diabetes incidence is aspirational and is an aim that is far in the future, we need not settle on process indicators to measure success. We can still measure progress by using nearer term indicators such as overweight/obesity prevalence in young adults, and the proportions of undiagnosed persons with diabetes, GDM, prediabetes, unmanaged persons with diabetes and poorly managed persons with diabetes.

Summary:

- I. Admittedly, there is limited certainty on many of the risk factors linked to diabetes and there is much potential for research. However, what is known is sufficient to give impetus for action. The message to the public must reflect this tension effectively.*
- II. Given the complex interplay of equally complex factors associated with diabetes, the results of interventions can be hard to measure. Nevertheless, we must not settle for process indicators of progress, but focus on short-term and mid-term outcome measures instead.*

¹⁰ Based on fasting glucose or hemoglobin A1c levels. (Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes | the United States, 2011. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2011. https://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf.)

¹¹ Currently in Singapore, a significant part of the funding is given through the Community Health Assistance Scheme (CHAS) and the Chronic Disease Management Programme (CDMP). However, the government is looking into how current funding should be augmented to better support the WoD.

3 SCREEN FOR DIABETES

Notable Quotes: Screen for Diabetes

- Help individuals see the personal implications of diabetes and Singapore's rising diabetes prevalence to motivate them to take the appropriate actions.
- There remains a need to change the public's perspective, to view their primary care doctors as their partners for disease prevention and early detection.
- Capitalize on available windows of opportunities at the workplace for diabetes engagement.
- The belief that being diagnosed with diabetes will lead to discrimination, is a major barrier to community screening via the workplace - regardless of whether the belief is well founded.
- National policies and systems must be aligned with the campaign in order for the WoD to succeed.

A. How can we reduce the number of undiagnosed persons with diabetes?

B. How do we strengthen the follow-up of our screening programme?

Selective screening

It is generally recognized that screening an entire population is not cost-effective. Rather, it is better to identify high-risk groups for screening (e.g. people with polycystic ovarian syndrome, certain ethnic groups, those who are on drugs that may lead to diabetes).

Most of the current screening efforts in Singapore focus on the elderly. However, to prevent the complications associated with diabetes, the unidentified persons with diabetes in the younger age groups need to be sought out so that intervention can be given before the onset of complications.

Questionnaires

In order to identify the undiagnosed, questionnaires can be developed to help individuals know if they should get themselves screened for diabetes. Such questionnaires have been developed by Finland (the Finnish Type 2 Diabetes Risk Assessment Form) and Australia (the Australian Type 2 Diabetes Risk Assessment Tool, AUSDRISK). Singapore can adapt existing questionnaires and create one that is valid for the local population.

Individuals' current lack of willingness to go for screening contributes to the challenge in identifying undiagnosed persons with diabetes. For many, messages on the high burden of diabetes and the urgent need to address its growing prevalence are distant and general concepts, irrelevant to their personal realities. Moreover, diabetes is asymptomatic at the start and many persons with diabetes, unaware of their condition, assume they are healthy and do not go for screening. The availability of a questionnaire, coupled with the relevant

public education messages, can help individuals see the personal implications of diabetes for themselves and understand their own risk of the disease.

The use of a questionnaire must be accompanied by two cautions about the possible effects on individuals whose questionnaire results indicate they do not require screening: a) they may become complacent and less likely to maintain healthy lifestyles, and b) they mistakenly think that the results are applicable for life and do not realize that their risk levels may change over time. Thus, it will be crucial to educate the public on the importance of a healthy lifestyle regardless of their questionnaire results, and the need to do the questionnaire at regular intervals.

Change patient perspective of the relationship to their primary care doctor

At present, most diabetes screening is conducted by primary care providers. Yet, people generally only see their primary care doctors for episodic medical issues. There remains a need to change the public's perspective, to view their primary care doctors as their partners for disease prevention and early detection. This will help to anchor the functions of prevention, detection and follow-up in the primary care setting.

WoD strategies for workplace health

There should be efforts to partner employers to weave diabetes prevention interventions into their 'workplace health' initiatives. It is important to raise employers' awareness of these interventions and actively encourage their participation.

An approach that proved effective was Health Promotion Board's identification of a specific target group (taxi drivers, an occupation that is highly sedentary) and capitalizing on an available window for engagement (the one hour spent waiting for their taxis to undergo inspection). The exercise saw greater engagement and a high take-up rate for screening.

It bears considering if Singapore requires a 'top-down' approach in behavior modification efforts, similar to that seen in Japan – where an organization's senior leaders are the first to change their behavior and overtly encourage employees to follow suit, resulting in employees adjusting their behavior to "fall in line" with the new norm.

It is also key to establish the necessary follow-up support for these workplace interventions, and ensure that there is alignment and readiness among providers in the healthcare system to follow through. The current lack of such support was illustrated by the experience of an organization that, through its annual voluntary health screening exercise, identified members of its staff who suffered from chronic diseases. The organization approached its Regional Health System (RHS) to discuss partnering the RHS to follow-up with these staff members. However, the RHS declined, citing that the task was not within its work plan. The organization approached several other RHSs before meeting one that was willing to assist.

Allay fears of stigmatization and discrimination

Health and safety personnel from various organizations highlighted that the fear of stigmatization was preventing some employees from going for the health screenings offered by their employers. Specifically, employees feared that they might lose their jobs if they were diagnosed with an illness. Another commonly held belief was that pre-employment

screening was used by potential employers to weed out candidates who were suffering from illnesses or identify those who should not be given health insurance coverage.

Regardless of whether the fears that workplace health screening may jeopardize a person's job are true, the perception itself will be a major barrier to community screening via the workplace. The WoD public messaging should aim to allay such fears by educating people and employers on living with chronic diseases (that these can be managed in a way that will not compromise functioning). The narrative used in public messages must avoid stigmatizing persons with diabetes.

National policies and systems must be aligned with the campaign in order for the WoD to succeed. Perhaps it is even time for Singapore to look into anti-discrimination legislation. The topic of stigmatization goes beyond diabetes and can be said of many other medical issues (e.g. HIV/AIDS, genetic screening for predisposition to disease). Anti-discrimination and de-stigmatization are policy matters that extend beyond healthcare and require a national conversation.

Fasting is a possible barrier to screening

The fasting blood sugar test is used in Singapore to screen for diabetes. The need to fast for at least eight hours prior to the test could be deemed too inconvenient by individuals and a major deterrent to screening. Offering screening methods that are less demanding and easily accessible, such as the HbA1c measure that does not require fasting, could improve take-up rate.

The WoD is an opportunity for improving the system

Diabetes is a complex multifactorial disease that necessitates an all-of-government and whole-of-society approach with involvement across the health system. A national public health endeavor such as the WoD requires a complex ecosystem, of numerous players at all levels, to contribute to its success. Early responses to the WoD has been heartening; with cross-ministry participation in the national Diabetes Prevention Taskforce, active engagement of the private sector to innovate solutions, the use of societal levers to impact the whole community, ministers and members of parliament stepping forward to contribute, and private-public partnerships initiated by Industry.

The WoD has also surfaced challenges that are indicative of systemic issues. For example, private primary healthcare providers have been slow to get onboard and proposed policy changes have met with constraints. Clearly, the WoD is an opportunity to improve the overall system as gaps are seen and addressed.

Four perspectives on the progress of the WoD

Individuals: There is a need to understand what the WoD means to people's day-to-day lives. It is evident that the level of awareness has been raised but it remains to be seen if individuals feel more empowered to take action.

Providers: Providers have shown more interest in diabetes than before the WoD.

Agencies: Agencies have begun discussions to launch concerted efforts to battle diabetes. There is still a long way to go but the initial steps have been taken.

Private sector: Private sector players have expressed admiration for Singapore's willingness to launch a national WoD.

Summary:

- I. *Help individuals see the personal implications of diabetes and Singapore's rising diabetes prevalence to motivate them to take the appropriate actions.*
- II. *Consider an incentive structure for RSHs to reduce the number of undiagnosed persons with diabetes within their catchment.*
- III. *Study the barriers to screening. In particular, investigate if the need to fast is a deterrent and consider alternative screening tests.*

4 CONTROL DIABETES

Notable Quotes: Control Diabetes

- Diabetes management in the community is a team effort; the responsibilities should be shared among all in the primary care sector (e.g. dieticians, physiotherapists, pharmacists) and not placed only on the shoulders of family doctors.
- The current financing model should be reviewed and made to align with the WoD's goal for diabetics to have a regular family doctor.
- Diabetes management cannot be a one-size-fits-all formula and patients should be engaged to participate in customizing their management plans.
- Address patient attitudes that hinder self-care, and empower patients for self-management.

A. How do we equip and enable our family doctors to manage diabetes effectively?

Close knowledge gaps

The range of available diabetes drugs is immense, and the scientific findings for diet and physical activity can be confusing or controversial. A challenge that family doctors face is tailoring management plans to individual patient needs, and knowing the appropriate permutation of drugs, diet and lifestyle advice to give. Equipping family doctors with the resources to make such decisions is vital to enabling them to effectively manage diabetes patients.

Establish multi-disciplinary teams

Diabetes management requires expertise from multiple disciplines, to varying extents depending on patient needs. Eighty percent of Singapore's primary care is provided by private family doctors, a majority of whom are solo-practitioners operating their own clinics. Whereas the public family doctors are supported by a multi-disciplinary team of nurses and

allied health professionals, solo-practitioners have little access to such resources. It is vital to communicate that diabetes management is a team effort; responsibilities should be shared among all in the primary care sector (e.g. dietitians, physiotherapists, pharmacists), and not placed only on the shoulders family doctors. Efforts must be made to provide family doctors with the support resources and structures that they will need.

Access to information on patient's care journey

For a family doctor to effectively manage a diabetic patient, the doctor must have sight of all the care that the patient receives and have grasp of the patient's overall progress. Unfortunately, this is currently a challenge for family doctors for the following reasons: a) patients are not tied to specific doctors and tend to hop among family doctors, specialists and hospitals for various aspects of their care, and b) patient records and case notes are generally not shared among providers from different organizations. Even though steps toward addressing this has been taken in the form of the National Electronic Health Record system and the establishment of partnerships between family doctors and hospitals, more can be done to close the gap.

Align financing model

The consultation time for diabetes management is often longer than the consultation time for episodic ailments. The labor resource that is taken up by case-managing a diabetic patient is also more intense. The imbalance between effort and financial incentive is a major barrier to higher levels of participation by family doctors in diabetes management. The current financing model should be reviewed and made to align with the WoD's goal for persons with diabetes to have a regular family doctor.

Summary:

- I. Understand the barriers faced by family doctors in order to close the resource gaps.*
- II. Recognize that managing persons with diabetes is a team effort by family doctors, specialists and allied health professionals, the responsibility should not be placed solely on the shoulders of family doctors.*
- III. Review the funding model and bring it to alignment with the goals of the WoD, in particular, for patients to be cared for by a regular family doctor.*

B. Control diabetes: How do we educate and empower our persons with diabetes to have greater ownership of their management?

Tailored management plan

Diabetes management cannot be a one-size-fits-all formula and patients should be engaged to participate in customizing their management plans. Treatment must be prescribed according to patient needs, and advice on diet and physical activity should be relevant to their habits and lifestyle. A management plan that is tailored to fit the patient's life (commitments and constraints) will ensure the highest chance of sustained adherence.

Funding

It seemed easier to get medical financial assistance for patients from the extreme end of the low socioeconomic group than for the rest of the low socioeconomic group. The high cost of the newer diabetes drugs has also made them inaccessible to this group of patients.

The government is exploring ways to address issues of affordability and access to diabetic care. Some of the considerations relate to the increase in funding through the Chronic Disease Management Programme (CDMP)¹², providing adequate access to drugs, partnerships with private family doctors, and transferring patients who no longer need specialist treatment to primary care settings.

Address patient attitudes that hinder self-care

It was noted that those who sought medical financial assistance for chemotherapy would diligently follow up with medical social workers to seek alternative funding options if their applications failed, whereas those whose applications for diabetes financial assistance would give up once their applications were unsuccessful. This could be indicative of a perception that diabetes is a less serious disease than other major chronic diseases like cancer, leading to a willingness to compromise on self-care. Furthermore, some had shared that being healthy was less of a priority than avoiding illnesses and the need to see a doctor; implying that they saw diabetes as a state of 'being not-healthy' instead of as a serious condition to be actively managed.

The current generation of elderly had survived wars and other hardships. As a result of their experiences, many are highly resilient, possess a tendency to face pain with a stiff upper lip and view self-care as unnecessary 'fuss'.

The above observations highlight the importance of understanding the values, beliefs and attitudes of persons with diabetes for effective messaging and delivery of interventions.

Summary:

- I. Engage patients in developing management plans that are relevant to their needs and lifestyle.*
- II. Address barriers related to access, affordability and mindsets.*

¹² CDMP is a government programme aimed at improving the management of chronic diseases in the community. It includes evidence-based, structured Disease Management Programmes, where applicable and the option for patients to tap on government subsidies or draw on their medical savings account (Medisave). It enables patients to receive continuous care from their regular family doctor. (Ministry of Health. Chronic disease management programme handbook for healthcare professionals 2014. https://www.moh.gov.sg/content/dam/moh_web/HPP/all_healthcare_professionals/Handbook%20for%20Healthcare%20Professionals%202014.pdf.)

Notable Quotes: Final Comments

- It is vital to understand the serious negative impact of diabetes and the immense cost of losing the WoD.
- Due to the complexity of the disease, the level of resources and commitment required to successfully deal with diabetes should not be underestimated.
- Technology and social media are powerful tools for intervention.
- Positive reinforcement is more effective in the long run than scare-tactics.
- The diabetes threat in Singapore is a 'wicked' problem and we should avoid oversimplifying the issues and turning to quick and easy solutions for immediate

The immense cost and burden, to society and individuals, of losing the WoD

It is vital to help the government, public health community and population at large understand the serious negative impact of diabetes and the immense cost of losing the WoD. With the second highest prevalence among developed nations and growing incidence rate, the burden facing Singapore will be immense if we do not successfully curb the diabetes threat. To illustrate the magnitude of the potential burden, consider that 30%-40% of persons with Type 2 diabetes are depressed, 30%-40% are associated with obstructive sleep apnea, it is expected that diabetes and obesity will surpass alcohol as the leading cause of future liver cirrhosis in the future and road accidents have been caused by diabetic drivers who fall asleep at the wheel (seen in Australia).

Due to the complexity of the disease, the level of resources and commitment required to successfully deal with diabetes should not be underestimated, and must be communicated to policymakers and practitioners. Leadership, education, data, financing, partnerships and a good size workforce are some of the crucial factors for winning the WoD.

Leverage technology and social media

Technology and social media are powerful tools that should be leveraged for diabetes interventions. Telehealth, telemedicine and other health technologies are designed to improve accessibility and convenience to patients, reduce the manpower resources required of healthcare institutions, and increase overall efficiency of the system. This is especially relevant for the WoD, given that the range of interventions is expected to be comprehensive requiring intense manpower resources.

Social media is also expected to be an increasingly key component of engagement and empowerment, primarily with the younger age groups now but progressively with all age groups as the current middle-age group ages.

The use of positive reinforcement (e.g. showing individuals the incremental improvements to their health status as they make changes to their lifestyle) will be more effective than the use of scare-tactics (e.g. showing pictures of complications that lead to amputations) for achieving sustained behavior modifications. Interventions that capitalize technology and social media to deliver near real-time positive reinforcement for healthy lifestyle choices can be very powerful.

The diabetes threat is a 'wicked' problem that necessitates long-term sustained efforts

The characteristics of a 'wicked' problem consist of the following – there is no definitive way of formulating or explaining the problem, it occurs in a complex environment, is interconnected with other equally complex issues (e.g. sociocultural, psychoemotional, behavioral, economic, genetic), and is unique. Addressing a wicked problem takes time and the way forward largely consists of constant adjustments and innovations. The results of interventions are often hard to measure, and success can be elusive.

The diabetes threat in Singapore is one such problem and we should avoid oversimplifying the issues and turning to quick and easy solutions for immediate results. We will need to address gaps and ensure sustainability. No doubt, the WoD will be long and will not be easy. However, with patience, stamina, commitment and innovation, we can turn the tide and positively impact current and future generations.