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■ **Opening Address for Singapore Diabetes in Pregnancy Conference & IPRAMHO Asia Meeting 2018**

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Diabetes and gestational diabetes mellitus (GDM) is an urgent global problem, where Asian & Oceania ethnicities are particularly prone. This is an issue which many countries in Asia & Oceania are rightly focusing on now. In Singapore, Prime Minister Lee Hsien Loong, in his National Day Rally speech on Aug 2071, highlighted three long-term issues (building up pre-schools, fighting diabetes and making Singapore a Smart Nation) which are integral to the future well-being of the nation. Health care professionals play a crucial leadership role in fighting diabetes. The Singapore Ministry of Health (MOH) declared 'War on Diabetes' in April 2016. Many worthwhile national initiatives have since started. The launch of College of Obstetrics & Gynaecology Singapore (COGS) National GDM Guidelines will add to the national effort.

We hope this meeting which brings together clinicians, nurses and health professionals to discuss on Gestational Diabetes Mellitus (GDM), obesity and metabolic diseases for women and children, can help with the battle against diabetes in Asia-Oceania. This meeting combines education, research, academic consensus & advocacy on the screening and management diabetes and GDM from the antenatal period to the postnatal period.

The keen support from various hospitals and organisations in countries of Asia-Oceania will help ensure the success of this very important meeting. The experts in this meeting can share their findings and perspectives with everyone in the meeting. Together we will be able to overcome the challenges of this new metabolic epidemic.

■ **Singapore's Perspectives of Diabetes in Pregnancy: IPRAMHO & Singapore-Asia Diabetes in Pregnancy Initiatives**

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Singapore MOH declared 'War on Diabetes' in April 2016 to reduce the heavy burden of this disease for our population in terms of prevalence, mortality and morbidity. The best preventive efforts start upstream from preconception and at conception in the womb to the early childhood years and thus the optimal strategy for the 'War on Diabetes' must necessarily begin with effective battles against diabetes at this early phase. Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children (IPRAMHO) & Singapore Diabetes In Pregnancy Program (SDIP) Initiatives focused preventive efforts at preconception, pregnancy and early childhood.

IPRAMHO is a Singapore National Medical Research Council (NMRC) funded joint collaborative pot centre grant awarded to KK Women's and Children's Hospital (KKH), SingHealth Polyclinics (SHP) & National Healthcare Group Polyclinics (NHGP). This is a unique collaborative centre grant where both Singapore public primary health care providers (SHP & NGHP) have come together to work with KKH, the largest tertiary and main referral centre for Paediatrics, Obstetrics and Gynaecology in Singapore, on collaborative metabolic health research in women and children, aligning with RIE2020 goals and KPIs.

IPRAMHO programs study & explore determinants of effective care and explore models of care for primary metabolic care as well as look at effectiveness of redesign of care to enable advancement in metabolic health. A metabolic registry for women and children in the primary care is envisioned to enhance metabolic health research for the hub and for the future. The prevention and management (and its evaluation of patient care, provider structures, systems and models) of on Gestational Diabetes Mellitus (GDM) and obesity must start early (fetus in the womb, infant & child) rather than at a later stage of life to gain the optimal preventive value and maximum leverage on life quality (QALYs). This research can propel Singapore primary care from segmented primary care providers to be a leading global multi-professional metabolic health research hub for the complex challenge of advancing metabolic health with effective population prevention strategies and

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optimal diabetes and weight reduction programs, supported by evidence based collaborative joint research. The Singapore-Asia Diabetes in Pregnancy is supported by the SingHealth-Duke NUS OBGYN ACP Singapore & Asia Diabetes in Pregnancy (SEADIP) Academic Program. SEADIP support this national war on Diabetes by bringing together clinicians, nurses and health professionals from local and international organisations to discuss on GDM, obesity and metabolic diseases for women and children. To move forward, it is important to have policy and management consensus at national, regional and international levels, incorporating evidence based practices. An Asian research network meeting on GDM and metabolic health to generate evidence to guide strategy can further aid the process.

◼ Gestational Diabetes Mellitus in China
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Introduction
Like in many parts of the world, China has also experienced a rapid rise in the prevalence of gestational diabetes mellitus (GDM) during pregnancy in recent years. We conducted a literature search and data analyses to examine the prevalence and risk factors of GDM in Chinese women.

Methods
We performed a systematic search in English and Chinese literature on the epidemiology of GDM in recent years. We also analyzed data from the China Labor and Delivery Survey and a large cluster randomized RCT with 20 hospitals in Shanghai.

Results
China used to use ADA diagnostic criterion but the Guideline changed to IADPSG criterion in 2014. Although there is no reliable statistics on how GDM is diagnosed in current clinical practice across China, anecdotal inquires revealed that some obstetricians are still using the ADA criterion. The prevalence of GDM varied from 0% to 24.4% in 75 hospitals participated in the China Labor and Delivery Survey with both mean and median of 9.8% in 2015-2016. In Shanghai, the mean prevalence was 13.6% in 2016, ranging from 4.8% to 32.8%. The main risk factors for Chinese women are older age, higher BMI and multiparity in a multivariable analysis. The main treatment of GDM is dietary management and insulin.

Conclusion
China has a GDM prevalence around 10% while Shanghai has 13.6%. However, there is a large variation among hospitals. Both ADA and IADPSG diagnostic criteria are currently being used in practice despite that the national Guideline has changed in 2014.

◼ Predictive Risk Models & Factors for GDM and the Subsequent Development of Type 2 Diabetes
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Gestational diabetes mellitus (GDM) is a major risk factor for type 2 diabetes. There is significant variation in the risk of GDM by race-ethnicity group. The incidence of both GDM and type 2 diabetes is exceedingly high in South Asian populations.

Prediction models are increasingly used to supplement clinical reasoning and decision making in modern medicine. Numerous prediction models for gestational diabetes mellitus (GDM) have been developed, but their methodological quality is unknown. There is a need to objectively review all studies describing first-trimester prediction models for GDM and assess their methodological quality. There is also a need to systematically review studies examining risk factors for the development of type 2 diabetes among women with previous gestational diabetes.

Risk prediction models use covariates or predictors to explain and estimate the absolute probability or risk that a certain outcome is present (diagnostic prediction model) or will occur within a specific time period

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(prognostic prediction model). These models are applied to an individual with a particular predictor profile. A model refers to the mathematical function which relates the presence or occurrence of the outcome of interest to a set of predictors. There are two outcomes of interest: GDM and type 2 Diabetes. Predictors may include variables from subject demographics (e.g., age, ethnicity and BMI), physical examination results, and may also include genetic markers.

Discrimination and calibration are key aspects of assessing the performance of prediction models. Calibration is the agreement between the probability or risk of developing the outcome of interest within a certain time period as estimated by the model and the observed frequencies of the outcome. Discrimination is the ability of a predictive model to distinguish individuals who experienced the outcome from those who are free of the outcome.

The important and different aspects of model development, from design to reporting, how to estimate a model's predictive performance and the potential optimism in these estimates using internal validation techniques, and how to quantify the added or incremental value of new predictors or biomarkers to existing predictors, will be discussed. The assessment of model performance will be illustrated using the following measures: Area under the ROC curve (AUC or c-statistic), sensitivity, specificity, positive predictive value, and negative predictive value, internal and external validity.

Prediction model development should follow a rigorous methodology. Developed models first and foremost need to provide accurate and both internally and externally validated. External validation is recommended to enhance generalizability and assess their true value in clinical practice. The adoption of such models must guide physician's decision making and an individual's behaviour, and consequently improve individual outcomes and the cost-effectiveness of care.

■ Management of Transition Care for Gestational Diabetes Mellitus Patients in KKH
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Background
Gestational Diabetes Mellitus (GDM) is a common complication of pregnancy that affects about 15% of pregnant women which also impose them to a higher risk of developing T2DM later. Therefore it is important to ensure optimal care management of GDM through good antenatal care and compliance to postpartum follow up. This study aims to determine the uptake rate for antenatal and postnatal care programme and to identify the reasons and antecedent factors associated with non-compliance throughout the journey from diagnosis of GDM until postnatal, creating insights for early education and intervention for the GDM patients.

Oral Glucose Tolerance Test (OGTT): All pregnant women in KKH will undergo a universal screening of 3-point OGTT blood test using IADPSG guidelines at 24-28 weeks of gestation.
Supervised Blood Sugar Profile (SBSP): Patients who are diagnosed with GDM are advised to attend a 1 day educational programme in ODAC where they will be educated on the importance of monitoring the blood sugar level. They will be taught on how to perform self- monitoring using a glucometer at every pre and post meals. Dietary advice by dietician will also be emphasize.

Post Delivery: Patients are required to attend the 6 weeks postnatal checkup in KKH where 2- point OGTT blood test will be performed followed by doctor consultation.

Methods
Out of 11183 patients screened for OGTT in September 2016 to September 2017, 1599 have a positive IADPSG results and diagnosed with GDM. Nurse navigator will call to enrol them to attend the 1 day educational programme in ODAC. Out of the 12 months period, 87.5% attended the programme while 12.5% were defaulters.

Total of 12752 deliveries were recorded last year in September 2016- September 2017. Postnatal patients are

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tracked based on the delivery months which matched with the GDM numbers and the number of postnatal uptake rate for the postnatal follow up were manually extracted from the system provided.

The compliance rates were determined by matching delivery records of GDM patients with OGTT test done within 3 weeks from the delivery date. Antecedent factors such as patient demographics, antenatal OGTT results and reasons for no-show and declining appointments were analyzed to determine any significant risk factors for defaulting on the postnatal OGTT.

Results
The mean SBSP attendance rate and postnatal OGTT compliance rate over the study period were about 76.2% and 50.3% respectively. Common reasons for the defaulters include childcare issues, work commitments, financial difficulties, patient felt unnecessary to attend the 1 day programme, not delivering in KKH and while some patients remained uncontactable.

Postnatal patients will be required to come back within 3 weeks for the checkup and PN OGTT. Tracking of patients shall be continuous annually after delivery. Collaboration with other healthcare institutions are encouraged to ensure the patients are consistent in the follow up. This shows a well- developed model system for optimal care of the GDM and follow up.

Conclusion
The results of the analyses identified possible reasons and factors that are associated with non-compliance and no-shows for various care programme. These insights can potentially aid in guiding interventions and processes to improve the care of GDM patients.

▪ How do Physicians Engage their Patients in Obesity Management? Insights from the 5'A"s Approach

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Introduction
Primary care (PCP) or Family physicians (FP) are the first line of contact for individuals with overweight or obesity. The latter may not bring this topic up for discussion easily due to stigma or being overshadowed by other acute or pressing concerns. Nonetheless, there are strategies for the PCP or FP to engage and open up channels for deliberation of this prevalent risk factor for many metabolic disorders. The 5As approach is one such strategy.

Methods
FPs from public primary care department and institutions in Singapore (KKH, SHP, NHGP) led a qualitative study to explore the strategies used by polyclinic physicians or private general practitioners to interact with their patients on weight management. The qualitative data from the interviews were then analyzed to identify emerging themes, which the authors framed under the 5As model (Ask, Assess, Advise, Agree and Assist)

Results
The results have been published in Proceedings of the Singapore Healthcare, which are adapted for presentation at this meeting. PCP and FPs faced challenges in engaging individuals with weight issues but they had implemented strategies to address these challenges.

Conclusion
PCP and FP varied in their engagement of patients in obesity management. The 5As model, if adopted consistently by physicians, presents an opportunity to systematize our approach towards managing obesity in the community.

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■ **Challenges of Gestational Diabetes Management in Primary Care**

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Gestational Diabetes Mellitus has been shown to have potential serious, long-term consequences for both mother and baby, including a predisposition to obesity, metabolic syndrome, and Type 2 diabetes mellitus. The role of primary care in the long-term management of patients with gestational diabetes mellitus has often been overlooked. A review of the literature on the challenges of gestational diabetes management and diabetes prevention programmes will be presented and applications to primary care in Singapore discussed.

■ **Launch of College of Obstetrics & Gynaecology Singapore (COGS) National GDM Guidelines Welcome Address**

Gestational Diabetes Guidelines for Singapore
Yong Tze Tein, Department of Obstetrics and Gynaecolgy, Singapore General Hospital

Hyperglycemia, one of the common conditions in obstetrics, parallels the occurrence of obesity, impaired glucose tolerance and diabetes in a population. The obesity and diabetes epidemic plus the later age of childbearing is predicted to cause a further rise in this condition.

Worldwide prevalence of gestational diabetes varies widely (between 1-28 %) due to ethnic differences and differing screening and diagnostic criteria used. The International Diabetes Federation estimates that one in six livebirths are to women with hyperglycemia, 84% due to gestational diabetes mellitus and 16% due to existing diabetes.

It is hypothesized that an abnormal intrauterine environment can mediate lifelong changes through epigenetic changes. Hence, hyperglycemia in pregnancy affects not only the individual but has a potential far reaching effect on the offspring and hence the family and the community. Although we know of the effects of hyperglycemia and its implication on pregnancy, there is still much to learn. And it is with this in mind that the College of Obstetrics and Gynaecology (Singapore) commissioned the guideline on Gestational Diabetes so that we all have a nationwide criteria and screening to ensure optimal outcome for our mothers and their babies. Most mothers would be able to acquire optimal glucose control with changes in diet and increased exercise, all of which may prevent or delay development of frank diabetes. As health professionals, we should also support mothers to breastfeed as this has been shown to reduce diabetes and obesity in the offspring and mother.

■ **GDM Screening Rationale**

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From 1 January 2016, KK Women's and Children's Hospital (KKH) and Singapore General Hospital (SGH), started to provide universal gestational diabetes (GDM) screening to all pregnant patients at 24 to 28 weeks gestation using the International Association of the Diabetes and Pregnancy Study Group (IADPSG) criteria, a switch from the past 1999 WHO criteria after many decades. This has since led to all hospitals in Singapore following suit. The changes were in response to the high and increasing prevalence of GDM, and in line with recommendations from the several local studies (including cost effectiveness study) and international studies, calling for universal screening with evidence based criteria.

Our local incremental cost-effectiveness analysis of GDM screening strategies revealed that universal screening is cost effective and is highly dependent on 2 parameters – the prevalence of GDM and estimated effectiveness of intervention.

Unlike pre-eclampsia which is known as a disease of theories, gestational diabetes mellitus (GDM) is literally a disease of criteria. The plethora of criteria has confused and confounded evidence based medicine

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practices in GDM screening, seriously delaying their introduction and entrenching old non-evidence based practices.

An important source of evidence based data is from the international HAPO (The Hyperglycemia and Adverse Pregnancy Outcome) study of which KKH was one of the 15 participating centres of this multinational, ethnically diverse cohort of 25,000 women. Each glycaemic value time point is independently pegged to a certain odds ratio of adverse outcome, on a linear progressive basis. The mmol/l (mg/dl) threshold criteria of IADPSG of FPG 5.1 (92); 1-h PG 10.0 (180) and 2-h PG 8.5 (153) corresponded to the predefined value for OR of 1.75 based on consensus. As an example, the old WHO criteria of FPG 7.0 & 2-h PG 7.8 mmol/l has internal inconsistency as FPG was pegged at a high > 3 OR and 2-h PG at a low 1.5 OR, resulting in disproportionate vast majority of 'GDM' picked up by 2-h PG value.

Each of the 3 IADPSG time points is vital and contributes independently to detection of GDM. In our first cohort of 366 patients screened with the three-point IADPSG criteria, the added 1-h parameter contribution, from the two-point test of 0-h & 2-h to three-point 0-h,1-h & 2-h, increased the incidence of GDM from 17.4% to 23.2% (an absolute increase of 5.8% with a relative increase of 32.8%).

The change for more evidence based in screening has finally come worldwide, although the dust has not fully settled yet as more research and evaluation of the IADPSG criteria still need to be done, to convince the rest. In addition, with rapidly advancing technology and the advent of non-invasive continuous automated glucose profiling, this will push us to new boundaries of more precise evidence based criteria in the near future.

■ **Clinical Management of GDM**
Tan Lay Kok
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Clinical management of GDM has the following objectives:
1. prevention and surveillance for adverse maternal and fetal/neonatal outcomes secondary to uncontrolled maternal hyperglycaemia
2. education about long term consequences to maternal health and the necessary interventions to optimise outcomes.

Management is multi-pronged and is best effected through a multi-disciplinary effort involving the obstetrician, endocrinologist, dietician, nurse coordinator, diabetic counsellor, anaesthetist and neonatologist. Education of the GDM patient is most important as a practical problem encountered in clinical practice is poor patient compliance and adherence to management. Dietary management or medical nutrition therapy (MNT) is the cornerstone of management, and has to be individualized to the patient taking into account her daily work and meal schedules, physical activity, body mass index and cultural characteristics, while aiming to achieve euglycaemia and preventing ketosis, providing adequate maternal weight gain and contributing to fetal wellbeing. Patients are engaged in self-monitoring of blood glucose levels, with targets similar to those for pre-existing diabetes. This in itself is a common issue with patient compliance and adherence, and serial Hba1c is often used in clinical practice as a concomitant surveillance tool, granted its limitations in pregnancy. Failure to achieve targets with MNT and exercise alone will then require pharmacological intervention, either with oral hygoglycaemic agents (most commonly metformin), or a basal-bolus regimen of insulin, or both. Dosages need to be titrated individually to patients and also with progression of pregnancy as the pregnancy induced insulin resistance increases.

GDM is associated with an increased risk of pre-eclampsia which has to be looked for at every antenatal visit. Fetal surveillance, particularly the detection of abnormal fetal growth and macrosomia, is very important and will be covered by the other speakers. The degree of control of GDM plays an important role in the timing of delivery. The use of tocolytics and antenatal corticosteroids in preterm labour and birth can worsen glucose control and adjustments in insulin may be necessary.

The issue of the timing and mode of delivery (covered by the other speakers) requires careful consideration

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of both medical and obstetric factors, and must involve the wishes of the patient, the importance of the latter being highlighted recently by the Montgomery vs Lanarkshire case significantly changing informed consent. Postpartum care in the form of repeating the OGTT and annual testing is often the weakest link in GDM management, and is extremely important given that many GDM women may in fact by undiagnosed pre-existing diabetics, and that GDM itself increases the woman's lifetime risk of developing Type 2 diabetes.

■ In-utero Issues of Gestational Diabetes in KK Hospital

Ann M Wright
Department Obstetrics and Gynaecology, KK Women's and Children's Hospital, Singapore

This talk will cover the risks posed to mother and fetus prior to delivery once a diagnosis of gestational diabetes has been made and aims to show how these risks differ from those facing low risk mothers as well as pregnant women with pre-existing diabetes.

■ Delivery Issues of GDM - Prevention & Management

Shephali Tagore
Department of Maternal Fetal Medicine, KK Women's and Children's Hospital

Good glycemic control is important in labor. The mode and timing of delivery depends on the control of GDM. Women with poorly controlled GDM may have to be delivered earlier depending on the severity. Strict adherence to the protocol for intravenous fluids and insulin is essential in labor to avoid both hyper and hypoglycemia. Detailed counselling is essential with regards to mode of delivery in ultrasound diagnosed macrosomia, major complication being shoulder dystocia. Women should be managed with multidisciplinary team of obstetricians, anesthetists and endocrinologists.

■ Diabetes in the General Population

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Diabetes is fast becoming a global health problem, with an estimated 422 million people living with diabetes in 2014. Singapore is not spared from this impending epidemic. The prevalence of diabetes in Singapore among those aged between 18 and 69 has risen from 8.2% in 2004 to 11.3% in 2010. This parallels the rising prevalence of obesity in Singapore. The number of adult diabetic patients in Singapore is expected to rise to 1 million in 2050. Diabetes is a costly disease to manage. Diabetes cost Singapore more than $1 billion in 2010 and this is expected to soar beyond $2.5 billion by 2050.

Diabetes can adversely affect the vasculature in multiple organs. Despite extensive and intensive research, it is disappointing that vascular complications of diabetes continue to compromise the quantity and quality of life for patients with diabetes. A local study has shown that 1 in 5 patients with diabetes die within a year of lower limb amputation. Therefore, any strategy to curb the diabetes epidemic has to start upstream.

Pre-diabetes is characterized by the presence of blood glucose levels that are higher than normal but not yet high enough to be classified as diabetes. Both impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) are pre-diabetic states. Around 14% of Singaporeans have IGT, and without lifestyle changes, at least 35% will progress to develop diabetes within 8 years. Pre-diabetes is asymptomatic but predisposes individuals to cardiovascular disease. Evidence from other countries has shown the efficacy of lifestyle interventions for reducing diabetes conversion among individuals with IGT. SingHealth Duke-NUS Diabetes Centre has commenced a new study to understand the effectiveness of a diabetes prevention programme in Singapore. The data that we gather from the study will be critical in helping us understand the impact of such interventions on our local population.

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■ **Postpartum and Lifetime Metabolic Prevention & Management Perspectives**

Ang Seng Bin
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Prevalence of Gestational Diabetes Meillitus (GDM) in Singapore was at a high of 17.6% in the GUSTO study. Women with a history of Gestational Diabetes Mellitus have a 7-fold increased risk of developing diabetes mellitus (DM) later in their lives. Strategies to decrease the risk of progression of women with history of GDM are crucial to improve the cardiovascular health of women. Breast feeding in terms of intensity and duration has been shown to lower the progression to DM in women with history of GDM over 2 years and as such should be strongly encouraged. Lifestyle modifications in terms of diet and physical activity has been should to reduce the progression to DM in the Dibetes Prevention Program and the Nurses' Health Study II. Metformin use has also been associated with reduced progression to DM in the Diabetes Prevention Program. With good evidence for early intervention, a good strategy to improve the health of women with GDM to reduce or even prevent the progression to DM.

■ **Gestational Diabetes in Australia**

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Gestational diabetes is an increasingly common diagnosis in Australia. Changes in maternal demographics including older age of pregnancy, increasing BMI and increasing ethnic diversity have contributed to this increase. In addition, Australia adopted the IADSPG criteria for Gestational diabetes in 2015, having previously used the ADIPS criteria.

The increasing rates of GDM have placed additional burden on hospitals, with increasing requirements for endocrinologists, diabetes educators and increasing rates of induction, ultrasound services and electronic fetal monitoring in labour.

Recent data suggest that rates of GDM in many metropolitan hospitals are around 15%. This is a significant increase on previous rates in Australia of 12 %.

Controversy exists in Australia over treatment targets for gestational diabetes and management strategies including the use of insulin and of oral hypoglycaemics.

The detection of undiagnosed Type 2 diabetes in pregnancy, and long term follow up to prevent and detect Type 2 diabetes after pregnancy remains an important facet of pregnancy care.

■ **Maternal Lipid Profiles and Gestational Diabetes Mellitus**

Wang Dongyu
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According to the result of the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) reset the diagnostic cut-off of the OGTT to 5.1-10.0-8.5 mmol/L in 2010. Further, the American Diabetes Association (ADA), WHO and the International Federation of Gynecology and Obstetrics (FIGO) also adjusted their criteria for screening GDM in 2011, 2013 and 2015, respectively. After using the IADPSG criteria since 2011, GDM affects about 17.5% of pregnant women in the Chinese population. The prevalence is also growing in the global population. In these two years, the government in China has ended the one-child per family policy and instead implements the universal two-child policy. Thus the maternal age is increasing and GDM prevalence is rising further.

Increasing risks of GDM and its complications were associated with increasing BMI in the Chinese pregnant

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population, which were similar to the other ethnic studies. Considering the prevalence of obesity in China and other Asia countries are lower than those in the western countries, the risks of GDM and other complications should be decreased in Chinese pregnant women. Nevertheless, the facts are on the contrary. The occurrence rate of GDM is relatively higher than many western countries in spite of the larger proportion of underweight and normal weight pregnant women in China. Whether the factors associated with GDM in the underweight group are different from those in the overweight and obese group need to be addressed. Dyslipidemia is a key metabolic abnormality related to insulin resistant status, which may lead to short- and long-term complications for both mothers and their offspring, like gestational diabetes mellitus, preeclampsia, preterm birth and large-for-gestation-age infants. A previous prospective observational study in our hospital has showed that triglyceride to high-density lipoprotein cholesterol (TG/HDL-C) ratio in combination with HbA1c and pre-pregnancy BMI can be good markers to predict the risks of GDM and delivering LGA infant. In the last year, a retrospective cohort study was performed to evaluate the correlation between maternal lipid profiles at second trimester and pregnancy outcomes after grouping pregnant women by pre-pregnancy BMI. Pre-pregnancy BMI was classified into three groups (underweight, normal weight and overweight/obese). Lipid profiles were measured at the time of oral glucose tolerance test during 24-28 gestational weeks.

We analyzed the data in the last two years. The occurrence of GDM was 21.9%, pregnancy-induced hypertension was 4.1%, large-for-gestational-age infant was 5% and small-for-gestational-age infant was 10.3% in this study. Triglyceride and TG/HDL-C ratio were both independently associated with GDM and other complications in different pre-pregnancy BMI groups. But the associations between other lipid parameters and GDM or other adverse pregnancy outcomes (such as LGA) were inconsistent in different pre-pregnancy BMI groups.

■ **Clinical Features of Gestational Diabetes at Keio University Hospital in Japan**

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Introduction: In Japan, the International Association of Diabetes and Pregnancy Study Group (IADPSG) recommendation was adopted since July 2010, although the screening strategy depends on hospitals. The aim of this study is to investigate clinical features of gestational diabetes (GDM) by the new IADPSG criteria.

Methods: We retrospectively reviewed a total of 2314 women (GDM, 364; normal glucose tolerant [NGT], 1952) with singleton pregnancy who underwent perinatal care between 2011 and 2015 at Keio University Hospital. Excluded from the study were cases with type 1 or type 2 diabetes, overt diabetes in pregnancy, fetal anomalies, and insufficient clinical information. All women found to have GDM underwent self-monitoring of blood glucose measurements as well as dietary management. Insulin treatment was initiated when dietary treatment did not achieve the glycemic goal. Perinatal outcomes were compared between the GDM and NGT groups.

Results: Of 364 women with GDM, 131 needed insulin treatment. There were no significant differences in the occurrence of preeclampsia (PE) and gestational hypertension (GH) between the GDM and NGT groups (2.5% vs 2.4% and 1.1% vs 1.4%). The prevalence of large-for-gestational age (LGA) and small-for-gestational age (SGA) were comparable between the GDM and NGT groups (9.4% vs 9.1% and 7.7% vs 5.5%). When analyzing term deliveries (GDM, 297; NGT, 1665), there were no significant differences in the occurrence of PE, GH, LGA, and SGA between the two groups.

Conclusion: Perinatal outcomes were comparable between women with GDM under the optimal glycemic control and NGT.

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■ **The Screening and the Management of Gestational Diabetes and Diabetes Complicating Pregnancy in the State of Negeri Sembilan and Specifically the Tertiary Hospital of Hospital Tuanku Jaafar Seremban, Malaysia**

Krishna Kumar Hari Krishnan, Obstetrics & Gynaecology Department, Hospital Tuanku Jaafar Seremban, Malaysia

Introduction: This will be an introduction on the current system of the screening, treatment and the management of women who have gestational diabetes and diabetes complicating pregnancy in the state of Negeri Sembilan and specifically in the main state hospital of Hospital Tuanku Jaafar Seremban
Methods: It is a retrospective review as well as experience in the system and the changes over the years in changing the screening and the management of patients of the 2 above diseases.

Results: Screening
Initially screening was risk based on the first national perinatal care manual which was risk factors based. The perinatal care manual was updated and the age of 35 was reduced to 25 years. Later, universal screening was implemented.

Monitoring: The patients were referred to the dietician and a repeat Blood Sugar Profile (BSP) was done after 3days. If 2 BSP were abnormal, they were referred to the hospital for insulin initiation. BSP was repeated every 3 days in the health centre until controlled and repeated after 2 weeks if normal. This was continued till delivery.

Treatment: First line of treatment was Medical Nutrition Therapy (MNT). If that failed insulin was initiated. If control was difficult initially basal insulin was initiated. In the past few years, metformin was introduced in the management.

Delivery: Those stable on MNT were delivered by dates. Those requiring medical treatment were initially induced at 38 weeks gestation. Based on the local perinatal mortality audits, this was subsequently reduced to 37 weeks gestation. Mode of delivery was based on obstetric indications

Outcomes: The perinatal mortality on the hospital has dropped from 22/ 1000 deliveries in 1991 to 8/1000 deliveries in 2016. The perinatal mortality of the 2 group of diabetics was similar to the normal population. Even though all babies of mothers on treatment were admitted to the special care nursery for observation, majority were discharged well within 24 hours.

Conclusion: With the continuous audit and change of management as the evidence is obtained, we appear to have reduced the morbidity and mortality of babies of GDM and diabetic complicating pregnancies.

■ **Management of Gestational Diabetes (GDM) in Kuala Lumpur General Hospital, Malaysia**

Muniswaran Ganeshan
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The maternal and fetal implications of GDM is significant. The physical, social and emotional implications are substantial and the burden of the disease is enormous. A recent nationwide registry based (National Obstetric Registry of Malaysia) study showed that the incidence of GDM in Malaysia is 8.4%.

Despite recommendations for universal screening, the 2015 Malaysian Clinical Practice Guidelines recommend universal screening where appropriate; but also suggests a selective risk based screening for GDM as cost and resources are perceived to be limiting factors. The screening criteria includes maternal BMI ≥27kg/m2, previous GDM or fetal macrosomia, first degree relative with diabetes, glycosuria at booking or those with obstetric complications such as polyhdramnios, fetal anomaly or unexplained intrauterine death. The diagnostic criteria is based on a 75g glucose load at O and 120 minutes with a fasting level of 5.1mmol/L and a 2 hours post prandial of 7.8mmol/L taken as significant levels for diagnosis. Targets of initiating therapy are fasting >5.3mmol/L and 2 hours post prandial value of >6.7mmol/L. Certain hospitals in Malaysia on the

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other hand adopt the National Institute of Health and Care Excellence (NICE) guidelines for diagnosis and management of GDM.

Our own study which was published this year showed that maternal age of ≥ 25, booking BMI ≥27kg/m2, booking weight ≥80kg and previous hypertension are non-significant risk of developing GDM in Malaysia. Parity >5 was only associated with an OR of 1.02 (0.90-1.17, p value 0.717) while stillbirth has no significant association with the risk of GDM. An ideal screening criteria should precede disease complications and recent evidence does suggest that screening is a cost effective measure, especially among high risk population such as South Asians.
Kuala Lumpur General Hospital uses a universal screening approach as per the 2015 NICE guidelines for diabetes in pregnancy. In light of the recent evidence, we use O, 60minutes and 120 minutes for screening following a 75g glucose load and we adopt a "tight" glycaemic control and advocate daily home glucose monitoring. Although the adherence is not 100%, we are in the midst of auditing our own practice and outcomes as the policy was only recently reviewed in July 2017.

Universal Screening for GDM in Malaysia should be the way forward, especially with regards to reducing maternal and fetal complications as per World Health Organization, International Diabetic Federation, International Federation of Gynecology and Obstetrics and NICE guidelines. We are yet to adopt the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recommendations. Although guidelines should be tailor-made based on local resources; there is an urgent need for standardization of care based on up to date evidence as the burden of GDM can be significantly reduced with the aim of improving maternal and fetal outcomes.

■ **Gestational Diabetes Mellitus (GDM) Screening and Management in Central Women's Hospital, Yangon, Myanmar**
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GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. GDM represents 90% of all cases of diabetes in pregnancies and prevalence of 1-14% has been noted. The prevalence has increased significantly. It was 7.5% in 2002 (Sandar win, 2002) and 12.19% in 2003 (Tint Swe Latt, 2003) in our hospital. The reasons for the rise were increased maternal age, increased obesity and increased screening.

GDM screening is done to pregnant women with risk factors according to WHO criteria at booking visit by using 75 gram OGTT (2 point WHO 1999 criteria). If the result is normal, repeat screening is done at 24-28 weeks gestation. In cases of healthy pregnant women, 75g OGTT is offered when fetal macrosomia and polyhydramnios are developed in current pregnancy.

Pregnant women with GDM are managed by joint care with physician regarding life style changes and medication (Metformin /+ Insulin) if necessary. Extra care is provided to monitor maternal and fetal well-beings and to reduce morbidity and mortality. Intra-partum care plan is discussed. Life style changes (diet, exercise), importance of post-natal follow-up, contraception and risk of GDM in subsequent pregnancy are also counselled before discharged from hospital. At 6 weeks post-natal appointment, fasting blood sugar is measured to exclude Type II diabetes and referred to physician for further treatment if it is diagnosed. If not, HbA1c is offered annually.

As the prevalence of GDM in Myanmar is increasing, universal GDM screening to all pregnant women at 24 to 28 weeks gestation, using the International Association of the Diabetes and Pregnancy Study Group (IADPSG) criteria need to be considered to detect more cases .However, it should be outweighed with costs of screening and extra workload as a developing country.

In conclusion, further research and international collaborations are needed to find out the actual prevalence of this disease and to reduce the morbidity and mortality. Central Women's Hospital, Yangon, as the main tertiary hospital for maternal care, plays a central role and need to involve in various research for better understanding of this important disease.

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■ **Gestational Diabetes Mellitus (GDM) Screening and Management in Myanmar Hospitals**

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In Myanmar, prevalence of obesity and Diabetes Mellitus is rising in general population according to National Survey on DM and risk factors for non-communicable diseases (NCDs) in Myanmar, 2014. The prevalence of GDM is also increasing ranging between 2.4% and 32.5% depending on the area of study and method and criteria of screening used. There is no data on prevalence of GDM in the whole country.

In Central Women's Hospital, Yangon, the prevalence of GDM ranged between 7.5 % (Sanda Win, 2002) and 12.19% (Tint Swe Latt, 2003).The prevalence of GDM in North Okkalapa General hospital, Yangon ranged from 18.6% (Win Pa Pa, 2012) to 32.5% (Kyar Nyo Soe Myint , 2017).

Myanmar National guideline for screening of DM is high risk screening using two point test of 0 hour and 2 hour 75 g OGTT and WHO criteria at first antenatal visit and at 24 to 28 weeks gestation. Universal screening is not practiced yet in Myanmar due to low resources.

Management of Diabetes in Myanmar hospitals is provided by joint care with Diabetic Physician and Obstetricians. Life style management (diet and exercise), pharmacological management (metformin or Insulin therapy) self- monitoring of blood glucose and pre-pregnancy, intrapartum and postpartum care are provided by obstetricians. Midwives from rural areas refer mothers with DM and those with high risks for DM to district and regional hospitals for screening and further management.

Myanmar Ministry of Health is aiming to reduce the prevalence, morbidity and mortality of DM and improve the maternal and fetal outcomes of Diabetes in pregnancy as part of the non- communicable disease control programme. The participation in IPRAMHO- Asia research network and survey to develop a consensus and study of point prevalence in obesity and GDM in our hospitals will provide an opportunity to improve the management of Diabetes in pregnancy in Myanmar.

■ **Diagnostic Criteria for GDM in the Philippines and the IADPSG Criteria: Comparison of Maternal and Neonatal Outcome**

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Introduction: The Philippines belong to the countries with the highest prevalence of gestational diabetes mellitus. Many of these pregnancies end up with poor outcomes, partly due to inaccessible proper healthcare. The cut-off values for the diagnosis of GDM in the Philippines was based on both the WHO and the IADPSG, but with lower values with the objective to catch the pregnancies complicated with diabetes earlier for intervention. A recent study by Dr. Marie Antonette Calinawagan and Dr. Joselito Santiago was done in the University of the Philippines-Philippine General Hospital comparing the maternal and neonatal outcomes using the Philippine standard with that of IADPSG.

Methods: The study was a prospective cohort study done in a tertiary academic institution in the Philippines. The Philippine Obstetrical and Gynecological Society recommended the cut-offs of >92 mg/dl (fasting plasma glucose) and > 140 mf/dl (2 hour plasma glucose) for the 75 g OGTT in its Clinical Practice Guidelines published in 2011. The diagnosis of gestational diabetes mellitus is given when there is at least one value elevated. The 2 groups (those diagnosed using the Philippine criteria and those diagnosed using the IADPSG criteria) were compared according to the mode of delivery, need for insulin, preterm delivery, postpartum hemorrhage, cost of medical care, birthweight, birth trauma, neonatal hypoglycemia, jaundice, congenital anomaly and stillbirth. Descriptive statistical analysis was done.

Results: Compared with the Philippine criteria, those diagnosed using the IADPSG had less cesarean sections and a higher need for insulin therapy. There are no significant differences in the other outcome measures compared.

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Conclusion: There is no significant difference in maternal and neonatal outcome among those diagnosed using the two criteria compared. Using the IADPSG criteria enabled the identification of patients who are at a higher risk for difficulty in controlling their blood sugar values.

■ **Screening for Hyperglycaemia in Pregnancy in Raffles Women's Centre, Singapore**
Tony Tan Yew Teck   Clinical Director, Maternal Fetal Medicine, Raffles Women's Centre, Singapore

Upon the release of the FIGO 2015 recommendations on hyperglycaemia in pregnancy, obstetricians in Raffles Women's Centre, Singapore had a meeting in April 2015 and had the following consensus:
1. Adopt the FIGO 2015 terminology:
    a. Diabetes in pregnancy (DIP) where there is pre-existing DM or if FPG is >= 7.0 mmol/l and / or 2nd hour PG is >= 11.1 mmol during pregnancy; and
    b. Gestational diabetes mellitus (GDM) as any one of the following: FBG from 5.1-6.9 mmol/l, 1st hour PG is >=10.0 mmol/l, and/or 2nd hour PG is 8.5-11.0 mmol/l.
2. As recommended by FIGO 2015, we will offer routine screening for DIP in early pregnancy. The following blood tests would be included with the routine antenatal screening blood tests: random blood glucose (RBG) and HbA1c either at 10 weeks together with our free bhCG/PAPP-A, or at booking (if booked after 10 weeks). If RBG >= 11.1 with DM symptoms or HbA1c >= 6.5% (confirmed on repeat testing), then manage as for DIP.
3. For the rest, we should perform 75 g OGTT at 24-28 weeks either through a targeted approach (i.e. for those with PH GDM, FH DM, past adverse outcome associated with GDM, past big baby >3.6 kg (for local) or >4 kg (for Caucasian), AC > 95th centile, glycosuria x 1 or 2, AMA >= 35 years old at booking, Indians) or via a universal approach (i.e. every patient). [Most obstetricians in the centre now offer routine screening for all patients.]
4. Once diagnosed with DIP or GDM, we will refer to the dietitian for diabetic diet, and advise regular appropriate physical exercise and BSP.
5. BSP should be performed at least 7 x a week if patient on diet only, and 14 x a week if patient on medication. We aim for fasting H/C at <5.3 mmol/l, 1st hour postprandial H/C at <7.8 mmol/l and 2nd hr post prandial H/C at < 6.7 mmol/l.
6. If BSP persistently higher than the ranges for 1-2 weeks (for about 50% of readings or more) despite optimal diet and physical activity, consider treatment with metformin and/or insulin.
7. If for metformin, counsel the patient that metformin may or may not adequately control the BSP, and whilst increasingly prescribed, does not yet have long term safety data in pregnancy. If patient wants metformin, start low with metformin 250 mg tds for 1-2 weeks, and adjust upwards to 500 mg tds if BSP not well controlled, and then to maximum of 750 mg tds.
8. If metformin does not achieve good control or if insulin were to be started first line, refer to endocrinologist.
9. Aim to deliver at 38-40 weeks for well controlled DIP or GDM. For those on insulin or are poorly controlled, it has to be individualised. Offer elective CS if EFW > 4kg.
10. Check OGTT postnatally at 6-12 weeks visit for those with hyperglycaemia first diagnosed in pregnancy. Counsel of the increased risk of developing type 2 DM later in life for the mother and the baby.

■ **Gestational Diabetes Mellitus (GDM) in KK Women's & Children's Hospital Singapore**
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The prevalence of GDM has increased significantly over the years. A KKH study (Tan KT & Tan KH, SMJ) in 1994 showed a GDM rate of only 2.8% based on targeted screening of high-risk patients. From 1 January 2016, KK Women's and Children's Hospital (KKH) and Singapore General Hospital (SGH) started universal gestational diabetes mellitus (GDM) screening for all pregnant patients at 24 to 28 weeks of gestation, using the International Association of the Diabetes and Pregnancy Study Group (IADPSG) criteria, switching from the previous 1999 WHO criteria after many decades. This has since led to all hospitals in Singapore following suit. These changes were in response to the high and increasing prevalence of GDM, and in line with

recommendations from several local studies (including cost effectiveness studies) and international studies that called for universal screening with evidence-based criteria. With routine screening using the 2-point WHO 1999 criteria, Koh et al. (SJOG 2017) showed a GDM prevalence of 15.5%. The reasons for the rise were identified to be due to rising obesity, increasing maternal age and increased GDM screening.

An important source of evidence-based data is from the international HAPO (The Hyperglycemia and Adverse Pregnancy Outcome) study of which KKH was one of the 15 participating centres. This was a multinational, ethnically diverse cohort comprised of 25,000 women. The Singapore (KKH) HAPO prevalence of GDM in Singapore was 25.1% among the 1787 participants in Singapore, based on the 3-point IADPSG criteria. In comparison, the other South-East Asian country, Thailand (Bangkok field centre) with 2,499 participants had a GDM frequency of 23.0%. HAPO demonstrated a linear relationship between glycaemic levels and adverse outcomes. It is also important to note that each of the 3 IADPSG time points contributes independently to the detection of GDM. In our first cohort of 366 patients screened with the three-point IADPSG criteria, the added 1-h parameter contribution from the two-point test of 0-h & 2-h to three-point 0-h, 1-h & 2-h, increased the incidence of GDM from 17.4% to 23.2% (an absolute increase of 5.8% with a relative increase of 32.8%).

Ministry of Health (Singapore) declared a War on Diabetes in April 2016, aiming to reduce the heavy burden of this disease for our population in terms of prevalence, mortality and morbidity. The availability of data from routine screening of mothers for GDM will be a boon for our health service improvement and research. It will help us to better define our pregnant population for future pregnancy studies and allows us to embark on the next level of research to tackle the challenges that diabetes brings. These include determining the best follow-up strategy for patients with GDM, and prevention of diabetes in our population starting from the womb. KKH as the main hospital for maternal care plays a central role and is involved in various research cohorts (GUSTO, NORA, S-PRESTO, BIOMA & IPRAMHO) to better understand this important disease.

◼ Gestational Diabetes Mellitus (GDM) – National University Hospital Singapore
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Gestational diabetes mellitus (GDM) affects approximately 20% of pregnancies in Singapore, one of the highest rates in the world. The Growing Up in Singapore Towards healthy Outcomes (GUSTO) birth cohort study, which recruited 1136 pregnant women from KK Women's & Children's Hospital and National University Hospital (NUH) in 2009-2010, found risk based screening failed to detect half of the GDM cases in Asian women.

In January 2017, GDM screening at the National University Hospital (NUH) had changed from risk based screening to universal screening at 24-28 weeks' gestation. The GDM diagnostic criteria used was also switched from the World Health Organization (WHO) 1999 criteria to the International Association of Diabetes and Pregnancy Study Groups (IADPSG) 2010 criteria.

Among the first 1894 pregnancies screened for GDM since January 2017, use of the IADPSG criteria did not result in more pregnancies being diagnosed with GDM as compared to the WHO 1999 criteria (22.2% and 22.4% respectively). About a third of the GDM cases diagnosed by the IADPSG criteria would have been classified as normal by the WHO 1999 criteria. Conversely, about a third of the GDM cases previously identified as GDM by the WHO 1999 criteria were classified as normal by the IADPSG criteria. Of all the GDM cases diagnosed with the IADPSG criteria, the majority (70%) had abnormal 1-hour glucose levels and 57% had abnormal 2-hour glucose levels. Almost a third (28%) of the GDM cases identified using the IADPSG criteria had abnormal 1-hour glucose levels alone.

Adopting the new IADPSG criteria did not increase our rate of GDM. Instead, the introduction of the 1-hour glucose level had identified a unique group of women who would have been treated as normal by the WHO 1999 criteria. On the other hand, a similar proportion of women previously identified as GDM were classified as normal by the IADPSG guidelines. Further studies are needed to evaluate the risks of adverse pregnancy and neonatal outcomes related to GDM in these women.

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Currently two smartphone APP-based randomized controlled trials are on-going at NUH for women with GDM. One examines the effects of a smartphone-based lifestyle coaching program on gestational weight gain in pregnant women with GDM (SMART-GDM study). The other examines the efficacy of an interactive smartphone APP in restoring optimal weight post-delivery in women with recent GDM. Women with GDM are at increased risk of developing type 2 diabetes years after pregnancy; optimizing weight gain during pregnancy and restoring optimal weight after delivery can help to reduce the risk of future diabetes.

■ Gestational Diabetes Screening & Management Overview in Singapore General Hospital
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Gestational diabetes (GDM) is recognized as an important obstetric condition in the patient mix which is drawn from a population with a high prevalence of Type 2 diabetes. Routine and universal screening for GDM is now practiced since January 2016, using the diagnostic criteria of the IADPSG. The three point test rather than the 2 point one is used, and this is justified by the increased numbers of GDM patients identified. Around 60% of women who tested positive had an elevated 1 hour value, of which a third had normal fasting and 2 hours value, and therefore would have been missed by the previous 2 point test. Overall the prevalence of GDM has increased from 18% to 21% with the 3 point test. Patients are managed at the Gestational Diabetes Joint Clinic, a multidisciplinary collaboration between our department and the department of Endocrinology. Challenges faced include achieving euglycaemia, patient compliance and attendance issues, and timing and mode of delivery in the context of suspected macrosomia, sub-optimal glucose control, pre-eclampsia and the impact of the recent Montgomery ruling.

■ Gestational Diabetes Mellitus in Sri Lanka

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Introduction
There is an exponential rise in the occurrence of Gestational Diabetes (GDM) in South Asia. Being South Asian places women in Sri Lanka at higher risk for diabetes during pregnancy. The prevalence of GDM was shown to be 5.5% in a previous study carried out in Sri Jeyawardene General Hospital while in another study done at North Colombo Teaching Hospital GDM prevalence was found to be 5.7% and pre gestational Diabetes at 7.1%.

In Sri Lanka, the Sri Lanka College of Obstetricians and Gynaecologists (SLCOG) issued a Hyperglycaemia National Consensus criteria which is used to diagnose gestational diabetes. In women with negative pre-pregnancy screening and who had normal range of FBS/PPBS in early pregnancy, 75 g 2 hour OGTT is to be carried out between 20 to 28 weeks of gestation. If that is normal, the need to repeat OGTT in third trimester is only if clinically indicated. Standard 75g 2 hour OGTT (Fasting - minimum of 8 hour / 1 hour / 2 hour) is used for diagnosis of GDM (FBS≥100mg/dl or 5.6 mmol/l, 1hPG≥180mg/dl or 10mmol/l, 2h≥ 140mg/dl or 7.8 mmol/l).

The International Association of Diabetes and Pregnancy Study Groups (IADPSG) proposed that a fasting plasma glucose of 5.1mmol/l or over at any time of pregnancy is sufficient to diagnose gestational diabetes besides the 1 hr value of 10 mmol/l and the 2 hr value of 8.5 mmol/l. We evaluated the impact of IADPSG criteria on the prevalence of gestational diabetes in eastern province of Sri Lanka.

Methods
This is a retrospective study of 252 pregnancy records collected from the MOH area (Kattankudy) from 2016 to 2017. These women underwent standard 75g 2-hour OGTT between 20 to 28 weeks gestation. The IADPSG fasting/1 hr/2 hr plasma glucose criterion was used to reclassify these 252 women.

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Results

The GDM prevalence rate based on WHO 1999 criteria was 15.8% (40/254) while the prevalence rate based on the NICE criteria were 24.0% (61/254). A total of 102 out of 252 met the IADPSG criteria and the IADPSG GDM prevalence rate was 40.2%.

Conclusion

The IADSPG criterion increased significantly the Sri Lankan population with gestational diabetes. This may or may not lead to higher cost with expanded diagnosis of gestational diabetes with appropriate treatment or potential unnecessary medical intervention. This requires evaluation of the IADPSG criteria to diagnose gestational diabetes and associated perianal mortality and morbidity in South Asian population.

■ **Gestational Diabetes Mellitus (GDM) at Sonklanagarind Hospital, Prince of Songkla University, Hat Yai, Songkhla, Thailand**

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Head of Maternal and Fetal Medicine Committee of the Royal Thai College of Obstetricians and Gynecologists

The global prevalence of hyperglycaemia in pregnancy in women (20–49 years) is 16.9%, or 21.4 million live births in 2013. The highest prevalence was found in the Southeast Asia Region at 25.0% compared with 10.4% in the North America and Caribbean Region. More than 90% of hyperglycaemia in pregnant women are estimated to occur in low- and middle-income countries.

In Thailand, the Royal Thai College of obstetricians and Gynaecologist has recommended two guidelines for screening of GDM. The first guideline uses the 5th American Diabetes Association (ADA) International Workshop-Conference on Gestational Diabetes to classify each woman by risk identification. At first ANC, in moderate and high-risk group are screened with 50-g 1 hr GCT. If abnormal result, the GDM diagnosis is based on 100 g OGTT with Carpenter and Coustan criteria. If normal result, re-screening at 24-28 weeks of gestation, either by one-step approach, or two-step approach can be done. The second guideline follows the International Association of Diabetes and Study Group (IADPSG), by universal screening in every pregnant woman. However, the screening methods are varied in different area according to the policy and facility of each hospitals.

Since 2008, Songklanagarind Hospital has adapted the GDM screening guideline from the 5th American Diabetes Association (ADA) International Workshop-Conference on Gestational Diabetes. For 5 years period from 2014-2016, at Songklanagarind Hospital, the prevalence of gestational diabetes mellitus increased from 10% to 14-15%, with the prevalence of overt DM 1-3%. This clinical practice guideline is more suitable for our hospital due to lower cost of screening.

■ **Gestational Diabetes Mellitus: Experience from Siriraj Hospital, Thailand**

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Siriraj Hospital is the largest university-based tertiary care hospital in Thailand with approximately 8,000 deliveries per year. A clinical practice guideline for GDM has been developed and implemented since 2000. A risk factor-based selective screening is used with 50-g GCT at >140 mg/dL cutoff. A 100-g OGTT is used as diagnostic test, using Carpenter and Coustan criteria. Screening is offered to at-risk pregnant women at their first antenatal visit and repeated at 24-28 weeks of gestation for those who has negative first screening. All women with GDM receive dietary counselling and insulin therapy is initiated if glycemic target is not reached. Glycemic control is evaluated by 2-hour postprandial blood glucose (<120 mg/dL) and FPG in individual case (<95mg/dL). GDM is also diagnosed and dietary counselling and therapy are initiated if 50-g GCT result is >200 mg/dL since 80-90% of these women will eventually have abnormal 100-g OGTT. The guideline is evaluated and amended intermittently, based on the evidence from both local and international researches,

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to facilitate the more effective care process that best fit local practice, to improve the outcomes, and to be applicable to other settings in Thailand.

Currently, prevalence of GDM is approximately 8-10% of all pregnant women and 15% among at-risk women. Approximately 50-60% of GDM cases can be diagnosed early in pregnancy (<20 weeks of gestation). The risk of GDM after negative first screening is approximately 15%. Majority of GDM cases can be managed successfully by dietary therapy alone and only 10-15% need insulin therapy. The need of insulin therapy is associated with pre-pregnancy overweight and obesity. For GDM related complications, approximately 5% have preeclampsia, 3% have macrosomic infants, and 20-25% have LGA infants.

Weight gain control during pregnancy is found to be an important modifiable factor for developing GDM and LGA infants, regardless of pre-pregnancy BMI status and timing of GDM diagnosis. The risks are significantly increased when gestational weight gain is above IOM recommendation and when second trimester weight gain is >7 kg. More attention is now paid to the issue of weight gain control during pregnancy, in addition to other measures, in order to prevent GDM and related adverse outcomes.

Postpartum follow up for DM screening at 6-12 weeks is offered to all GDM women. A study in Siriraj Hospital shows that 10% have diabetes, 35% have impaired glucose tolerance, and only 55% are normal. However, follow up rate is still disappointing at 30-40% and a more effective means to improve the rate are being considered.

■ **The Need for a Consensus Update on Gestational Diabetes Mellitus (GDM)**
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It is estimated that by 2018 the population in Indonesia will be 265,015,300, and 49.8% of whom are women, with a total of 4,810,000 births. If the estimated prevalence of GDM is 2% -5%, then there are at least 96,200 to 240,500 cases of GDM annually. Based on Riskesdas (Basic Health Research) data in Indonesia there has been an increase of almost 2 times the prevalence of DM (entire population) from 1.1% in 2007 to 2.1% in 2013. DIY province in 2013 is the highest prevalence area in Indonesia that is 3%.

The perceived barriers in the improvement of diabetes services in Indonesia are mainly based on awareness, accessibility, availability, affordability, and quality of patient issues. It is fortunate that in 2014 Indonesia has implemented a national health insurance scheme that guarantees the financing, among others, for the services of diabetic patients. Although access difficulties due to service financing can be overcome, but the biggest challenge is on awareness. As many as 59% of patients are unaware that they have diabetes, there is still any misconceptions about diabetes, and the lack of trained health workers treating diabetes.

In Indonesia there are currently two sources that can be used as a reference for the consensus of diabetes management that is the consensus of management and prevention of diabetes mellitus type 2 in Indonesia (Perkeni, 2015) and Obstetric Case Management Guidance (HKFM, 2012). Until now there is still disagreement about the criteria of screening / diagnosis and new developments, especially about the physiology and use of metformin in pregnant women.

Based on the increasing burden of diabetes and ongoing development in terms of health and clinical services, there are three priorities to focus on: awareness (health personnel and patients), the revision of consensus on management of GDM, and monitoring & evaluation of consensus implementation.