FOCUS: MANAGING OBESITY

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Obesity Surgery: An Evolving Field of Modern Medicine

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The last National Health Survey in 2010 found that 11% of Singaporean adults aged between 18 and 69 were obese, up from 7% in 2004. Assuming another 5% increment from 2010 to 2016, this would have amounted to a staggering total of half a million people living with obesity in Singapore today.

In 2007, as a surgical resident at Hopkins assigned to a bariatric surgical rotation, one would typically see 3 to 4 gastric bypass operations a day. That would give a rough estimate of 20 cases a week, and in a month – 80 cases!

The World Health Organization (WHO) indicates that there are over 1.9 billion overweight adults in 2014 alone. There are approximately 2.8 million obesity-related deaths each year.

In 2013, the American Medical Association recognised obesity as a disease. The decision was to improve access to weight loss treatment, reduce the stigma of obesity and underscore the fact that obesity is not always a matter of self-control.

Obesity is a significant risk factor for death. A myriad of studies have demonstrated an inverse relationship between BMI (body mass index) and lifespan. Studies from the National Institutes of Health found extreme obesity to shorten life expectancy by 14 years. Obesity not only affects lifespan, but in itself is a significant burden on the quality of life of each afflicted person and their families.

Obese patients often have a multitude of associated medical conditions e.g.:
- Lymphoedema
- Osteoarthritis
- Chronic back pain
- Gastro-oesophageal reflux disease
- Urinary stress incontinence
- Sleep apnoea
- Metabolic/endocrine conditions such as diabetes mellitus, high cholesterol, fatty liver, gallstones
- Infertility
- Irregular menses
- Cancers like breast, stomach, pancreas, uterine, prostate and colon
- Cardiovascular diseases like hypertension, coronary heart disease, congestive heart failure
- Deep venous thrombosis
- Stroke
- Psychologically, obese patients tend to experience a higher incidence of depression and anxiety. They are often the object of social isolation and discrimination.

At a fundamental level, obesity occurs when people eat more calories than they would normally burn. Eating behaviour in itself is complex and is driven by the combined actions of genes, hormones and neural circuits. To think that it is purely a function of willpower is oversimplistic. Promotion of lifestyle change i.e. eating less calories and increasing physical activity, has notoriously high recidivism rates and inter-individual variability.

Many studies have shown that surgery leads to significantly greater and more sustained weight loss than lifestyle modifications. Coincidentally, surgery also demonstrated higher remission rates of type 2 diabetes and metabolic syndrome. As a result, these patients demonstrate better performances on quality of life studies compared to non-surgical patients.

MANAGEMENT

On a practical level, bariatric patients are tricky to manage. Weight alone poses a significant challenge for the patient, physicians and allied health professionals. In the US, bariatric patients can weigh anywhere between 200-300 kg. Most of them require assistance to go from point A to point B. Often, they are wheelchair- or bed-bound. Transferring such patients often require the help of 6-7 staff. Customised hospital beds and armchairs have to be created for their use whilst in hospital. But with surgery, after only 6-12 months, many patients walk into the clinic unaided.

Currently, the two commonest procedures in Singapore are Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy. Both types of bariatric procedures have demonstrated excellent long-term weight loss. Surgery is performed via small incisions in the abdominal wall ranging from 0.5-1.5 cm with the help of a small camera (laparoscopic surgery).

After surgery, our patients stay overnight for observations and are usually fully recovered in 3-4 weeks. On average, patients will lose 25-30% of their initial body weight within 6-12 months (Figures 1 & 2).
Figure 2: Our study showed no significant differences in weight loss and diabetes control in different Asian ethnicities when compared to Caucasian/Eurasian counterparts within Singapore 1 year after vertical sleeve gastrectomy.
Focus: Obesity

The technical aspects for each surgery are as follows:

**Roux-en-Y Gastric Bypass (RYGB)**
1. On one hand, for RYGB, a small stomach pouch, approximately 30 millilitres in volume, is created by dividing the top of the stomach from the rest of the stomach.
2. Next, the first portion of the small intestine is divided, and the bottom end of the divided small intestine is brought up and connected to the newly-created small stomach pouch.
3. The procedure is completed by connecting the top portion of the divided small intestine to the small intestine further down so that the stomach acids and digestive enzymes from the bypassed stomach and first portion of small intestine (duodenum) will eventually mix with the food (Figure 3).

The gastric bypass works by several mechanisms. Firstly, the newly-created stomach pouch is considerably smaller and therefore the patient experiences early satiety, translating into fewer calories consumed per meal. Secondly, due to the exclusion of a length of proximal small intestines, only a percentage of the ingested volume of food is absorbed, further reducing the amount of effective calories the body uses.

In addition to the physical barrier provided by surgery in preventing calories from being absorbed, at a cellular level, re-routing the gut produces changes in gut hormones that promote satiety, suppresses hunger, and reverses one of the primary mechanisms by which obesity induces type 2 diabetes.

Therefore RYGB not only produces excellent weight loss but also results in improvement of blood sugar and causes a reversal in metabolic syndrome (average of 32% baseline weight loss, 62% remission of dyslipidaemia and 38% remission of hypertension).

In the literature, Schauer et al. from Cleveland, Ikramuddin et al. from Minnesota and Mingrone et al. from Rome demonstrated superior remission rates of uncontrolled diabetes in obese patients undergoing RYGB, vertical sleeve gastrectomy (VSG) or biliopancreatic diversion compared to intensive medical therapy alone in prospective randomised trials.

The Swedish Obesity Subjects study and Adams et al. similarly demonstrated superior long-term (18 years and 15 years respectively) resolution of obesity-related comorbidities in patients who underwent RYGB versus non-surgical interventions.

**Vertical Sleeve Gastrectomy (VSG)**
VSG on the other hand, is the commonest weight loss procedure performed in Singapore due to its high weight loss and low risk of surgery profile.

Advantages of VSG include:
1. Lower risk of bowel leak although there is a staple line along the length of the stomach to contend with – the risk of leak from this line is lower compared to traditional bowel-bowel anastomosis.
2. Lower risk of malabsorption from crucial vitamins, minerals and of course calories as the bowel is not re-routed as in RYGB.
3. Shorter procedure time and shorter learning curve due to the reduced technical complexity of this surgery compared to RYGB.
Short-term results of the randomised prospective multi-centre study comparing laparoscopic sleeve gastrectomy and gastric bypass in the treatment of morbid obesity demonstrates that weight loss, resolution of diabetes, hypertension and hypercholesterolemia are not significantly different between RYGB and VSG.¹

Like the RYGB, the vertical sleeve gastrectomy, reduces the size of the stomach and therefore reducing the amount of calories one can consume therefore promoting weight loss via a physical mean. Unlike gastric bypass, this surgery is purely restrictive and does not alter the gut anatomy. At a cellular level, though it does not have as big an impact as gastric bypass, some effects have been shown (Figure 4).

Overall, recent analysis by international bariatric surgery studies provides reassurance that bariatric surgery is safe with an acceptable mortality rate of 0.08% and leakage rate below 2%.

Since 2008, our weight loss program has seen 650 cases in Singapore General Hospital. We have had no mortality to-date and our complications rate is well below 1%. This is comparable to most United States Centers of Excellence.

I hope emerging data on obesity surgery will raise awareness in other medical specialties and also in the general public. We also hope that it can been seen that there is some value in surgery for the treatment of not only obesity but also related medical diseases such as diabetes and therefore should be considered not only as ‘last resort’ but mainstream therapy.

The German philosopher Arthur Schopenhauer stated, “All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident.”
REFERENCES


Dr Lim Chin Hong is a Consultant Surgeon in the Department of Upper Gastrointestinal & Bariatric Surgery, Singapore General Hospital (SGH). He completed his medical degree and basic surgical training at the University College of Dublin, Ireland in 2006 following which he embarked on a year-long research with Professor Desmond Winter and the esteemed Professor John Hyland at the St Vincent’s University Hospital.

Dr Lim was granted a training position at the Johns Hopkins Hospital, Baltimore in 2009 and has had the privilege to work with the grandmasters of surgery – Dr John Cameron and Dr Pamela Lipsett. Following this, Dr Lim returned to SGH to complete his advanced surgical training in 2014 and joined the Department of Upper Gastrointestinal & Bariatric Surgery as Associate Consultant.

Under the expert tutelage of bariatric surgeon, Dr Sayeed Ikramuddin and advanced endoscopist, Dr Martin Freeman, he completed a year of accredited fellowship at the University of Minnesota in 2015 in which he gained hands-on experience of over 200 cases of complex bariatric surgical cases and advanced foregut endoscopy.

His main clinical interests include alimentary tract surgery, with a special interest in minimally invasive surgery, upper gastrointestinal and bariatric surgery.

GPs can call for appointments through the GP Appointment Hotline at 6321 4402 or scan the QR code for more information.
Obesity and Type 2 Diabetes

Dr Lee Phong Ching, Consultant, Department of Endocrinology; Obesity and Metabolic Unit, Singapore General Hospital

Obesity is a serious global public health crisis that is associated with significant morbidity and mortality. Excess body fat accumulation leads to metabolic and mechanical complications, notably type 2 diabetes (T2DM), hypertension, hyperlipidaemia, non-alcoholic fatty liver disease (NAFLD), cardiovascular disease, obstructive sleep apnoea (OSA), osteoarthritis and certain cancers.

In Singapore, the prevalence of obesity (BMI ≥ 30 kg/m²) has doubled from 5.5% in 1992 to 10.8% in 2010, and this is mirrored by a rise in T2DM. The case vignette below illustrates a typical scenario that is encountered by the general practitioner and highlights some of the issues when managing a patient with obesity and T2DM.

LIFESTYLE MODIFICATION

Although Mr T’s weight is substantially above his ideal weight range, it is worth noting that he does not have to lose all his excess weight to derive clinical benefit, and that even a modest weight loss of 5-10% of his body weight could result in significant clinical benefit and improvement of many of the obesity-related complications, including T2DM.

This amount of weight loss can be realistically achieved with lifestyle interventions focusing on healthy diet and exercise, which remain the foundation of obesity and diabetes management. Several randomised controlled trials (RCTs) have shown that intensive lifestyle interventions can prevent or delay onset of diabetes, as well as improve glycaemic control in those with T2DM.

However, the efficacy of lifestyle modification alone is limited due to physiological neurohormonal changes that drive weight regain and a variety of other therapies is often required.

PHARMACOTHERAPY FOR OBESITY AND DIABETES MELLITUS

In conjunction with lifestyle modification efforts, Mr T’s diabetes therapy was intensified to address the suboptimal glycaemic control in order to reduce risks of long-term microvascular complications.

The selection of appropriate anti-hyperglycaemic agents involves consideration of various factors, including efficacy, costs and side effect profile such as hypoglycaemia risk and propensity for weight gain.

Metformin is the established first-line therapy given its good efficacy, low cost, low hypoglycaemia risk and weight neutrality. There are numerous options that can be considered if combination therapy is required or if metformin is contraindicated or not tolerated, but it is logical that the preferred choice in individuals with obesity would be agents with a favourable weight profile.
In Mr T’s case, an SGLT-2 inhibitor was added. He lost 3 kg in body weight and his HbA1c improved to 8.2%. Liraglutide was subsequently commenced, with dual aims of promoting weight loss and improvement in diabetes control. The dose was started at 0.6 mg, and gradually escalated to 1.2 mg daily. He was unable to tolerate higher doses due to gastrointestinal side effects. The medication improved his adherence to caloric restriction, and he achieved an additional 5 kg weight loss bringing his weight to 110 kg, and his HbA1c improved to 6.9%.

**METABOLIC-BARIATRIC SURGERY**

Two years later, Mr T’s weight had increased to 130 kg (BMI 41.7 kg/m²). His HbA1c had also risen to 9.2%. He had discontinued liraglutide 6 months ago due to cost constraints. He presented to the clinic as he was interested in metabolic-bariatric surgery (MBS).

### Evidence and Guidelines on MBS in T2DM

At this point, it is useful to review the evidence and guidelines on the utility of MBS in T2DM.

In patients with T2DM, significant improvements in glycaemic control are observed after bariatric surgery in the majority of cases. Many patients are able to achieve remission of diabetes, defined as stable non-diabetic glycaemia off all diabetes medications. Several algorithms have been proposed to predict diabetes remission, and factors that are associated with increased likelihood of diabetes remission include higher baseline BMI, higher c-peptide levels (a marker of beta-cell function) and shorter duration of diabetes.

Recent cardiovascular outcome trials have also reported encouraging results with the use of some of these newer types of medications in T2DM patients at high cardiovascular risk.

The EMPA-REG trial has shown that empagliflozin, a sodium/glucose cotransporter 2 (SGLT-2) inhibitor, significantly decreased cardiovascular events by 14% (10.5% vs. 12.1% with placebo) and cardiovascular death by 38% (3.7%, vs. 5.9% with placebo) after 3.1 years.

More recently, the LEADER trial showed that liraglutide reduced cardiovascular events by 13% (13.0% vs. 14.9% with placebo) and cardiovascular death by 22% (4.7% vs. 6.0% with placebo) after 3.8 years. The cardiovascular safety and favourable weight profile of these antidiabetic agents provide an attractive option for individuals with obesity and T2DM, especially for those at high cardiovascular risk.
LOCAL GUIDELINES

In Singapore, the MOH guidelines have recommended that MBS may be considered in patients with:

- BMI >40 kg/m², or
- Above 35 kg/m² with an obesity-related comorbidity such as T2DM.¹

As Asians have more adiposity for a given BMI, the BMI action points for Asians may be reduced by 2.5 kg/m².

More recently, a joint statement by major international diabetes organisations proposed that MBS should be an established treatment option in the algorithm to manage T2DM, ⁷ and is recommended for:

- All individuals with T2DM and BMI ≥ 40 kg/m²
- Individuals with BMI 35-40 kg/m² with inadequate glycaemic control despite lifestyle and optimal medical therapy

In addition, surgery may be considered in those with BMI between 30-35 kg/m² and uncontrolled hyperglycaemia despite optimal medical therapy.⁷ However, the number of studies in this population is still limited and there is lack of long-term data demonstrating net benefit.

Most importantly, patients must be able, willing and motivated to adhere to the post-operative lifestyle changes, nutritional supplementation, and follow-up that are necessary to ensure safety and success.

Pre-operative Preparation for T2DM Patients

After weighing the risks and benefits of surgery, Mr T decided to opt for a Roux-en-Y gastric bypass. Prior to MBS, weight loss with medical nutrition therapy can reduce liver volume and visceral adiposity, making surgery technically easier and leading to improved short-term outcomes.¹²

This can reasonably be achieved using very low calorie diets (VLCD) consisting of meal replacements which provide ≤ 800 kcal/day. VLCD is started at least 2 weeks prior to surgery. The acute caloric restriction with VLCD leads to improved insulin sensitivity and significant improvement in glycaemic control.

During VLCD, patients with T2DM should self-monitor their capillary blood glucose regularly, especially if they are on insulin or insulin secretagogues. Reductions in insulin doses are often necessary whilst on VLCD, in order to prevent hypoglycaemia. Mr T’s glycaemic control improved with pre-operative VLCD, and surgery was uneventful, with no early surgical complications.

Post-operative Nutritional and Metabolic Follow-up

In patients with T2DM, adjustments to the antidiabetes agents are frequently necessary in the early post-operative period to prevent hypoglycaemia. Insulin secretagogues (sulphonylureas and metiglinides) should be discontinued, and insulin doses reduced as appropriate.

Metformin should be continued post-operatively, and withdrawal considered if stable non-diabetic glycaemia (HbA1c in the normal range for at least 6 months) is demonstrated.

Diabetes complications screening should continue even with diabetes remission, at least for the first 5 years.⁷

Six months after surgery, Mr T lost 25 kg (19% of his body weight). The SGLT-2 inhibitor and gliclazide was discontinued, and HbA1c was 6.1% on metformin monotherapy. His antihypertensive medications were reduced, and blood pressure was 124/76 mmHg on perindopril.

Appropriate multivitamin, multimineral, calcium and vitamin D supplementation were commenced and nutritional screening did not reveal any micronutrient deficiencies. Mr T was counselled on the importance of adherence to long-term post-operative follow-up to ensure a safe and successful outcome.

PRACTICE POINTS

- In a patient with obesity and T2DM, lifestyle modification via dietary changes and increased physical activity, aiming for weight loss of 5-10% can result in significant improvement in glycaemic control.
- When selecting anti-hyperglycaemic agents, choose agents that have a favourable weight profile (either weight loss or weight-neutral).
- In the properly selected patient, bariatric surgery can result in significant glycaemic improvement, even to the point of diabetes remission.
- Bariatric surgery has been recommended as a treatment option for T2DM in Asian patients with BMI >32.5 kg/m².
- Careful pre-operative assessment and post-operative follow-up with a focus on adjusting diabetes medications ensure a safe and successful outcome after surgery.
Obesity

Dr Lee Phong Ching is a Consultant Endocrinologist at the Singapore General Hospital (SGH). His area of clinical interest is in obesity and its clinical, psychological and social impact on health. He recently spent a year-long clinical fellowship at the BakerIDI Institute in Melbourne with a focus on clinical obesity research and management. He is actively involved with the multidisciplinary obesity management program at the Lifestyle Improvement and Fitness Enhancement centre at Singapore General Hospital.

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REFERENCES
The Link Between Obesity and Non-Alcoholic Fatty Liver Disease

Dr George Goh, Consultant, Department of Gastroenterology & Hepatology, Singapore General Hospital

Non-Alcoholic Fatty Liver Disease (NAFLD) is closely associated with metabolic risk factors such as obesity, hypertension, diabetes and dyslipidemia and has been considered the hepatic manifestation of metabolic syndrome. The likelihood of NAFLD and specifically non-alcoholic steatohepatitis (NASH) increases as the severity and number of metabolic syndrome components increases. Obesity remains an important risk factor associated with NAFLD.

INTRODUCTION
NAFLD is defined as the excessive accumulation of fat (>5%) within the liver that is not attributable to alcohol or other drugs. It is increasingly becoming the most common chronic liver disease worldwide and may be encountered by a myriad of medical personnel, ranging from family doctors, endocrinologists, cardiologists to gastroenterologists. It is a heterogeneous disease, manifesting in a spectrum of phenotypes ranging from simple steatosis, which is traditionally considered relatively benign, to the more aggressive non-alcoholic steatohepatitis (NASH), seen in 10 to 25% of the cases.

Up to one-third of the patients with NASH may progress onwards to liver cirrhosis and other liver related complications such as hepatocellular carcinoma (HCC). On meta-analysis, it was found that the average time needed for NAFLD patients with simple steatosis with no fibrosis to progress by one stage was 14.3 years while the time taken to progress by one fibrosis stage is shortened to 7.1 years if NASH was present.

Studies have consistently demonstrated its increasing clinical burden, both as a function of increasing disease prevalence in parallel to the obesity and metabolic syndrome epidemic and also corroborated by continued emergence of natural history data. In the United States, NASH-related cirrhosis is the fastest growing indication for liver transplantation. Other studies have also reported increasing trends of NASH-related HCC over time.

For one, in our local context, there is evidence to suggest that the decline of chronic hepatitis B as a risk factor for HCC may be offset by the emergence of NAFLD as a rising cause of HCC. In addition, relative to the general population, patients with NAFLD have been reported to have increased mortality, with the top three causes of death attributed to cardiovascular, malignancy and liver related causes.

From the public health perspective, the direct medical cost of caring for a patient with NAFLD has been estimated to be about $1,613 or €1,163 per patient annually in the United States and Europe respectively, representing a substantial economic burden.

PREVALENCE OF NAFLD
Pooled global prevalence of NAFLD has been estimated at 24.4%, with geographic variability seen among different regions. In Asia, the reported prevalence has been reported slightly higher than overall global prevalence, at 27.4%. However, in westernised Asian populations, including in Singapore, prevalence appears to be higher, with rates as high as 40% being reported.

PATIENT PROFILE
NAFLD is closely associated with metabolic risk factors such as obesity, hypertension, diabetes and dyslipidemia and has been considered the hepatic manifestation of metabolic syndrome.

The likelihood of NAFLD and specifically NASH increases as the severity and number of metabolic syndrome components increases.

Obesity
Obesity remains an important risk factor associated with NAFLD. In bariatric surgery cohorts representing the extreme end of the obesity spectrum, studies have reported NAFLD and NASH in 66-91% and 34-37% of the patients respectively. This was consistent with a recent meta-analysis demonstrating a dose-dependent relationship between BMI and NAFLD risk and concluding that obese individuals had a 3.5 fold increased risk of developing NAFLD.

It should be emphasised that the distribution of fat may be more important than generalised obesity as reflected by BMI. Central obesity correlates more with visceral adiposity and is more closely related to insulin resistance, an integral part of NAFLD/NASH pathogenesis. There have been several reports where NAFLD can occur in “lean” (as defined by low BMI) but centrally obese individuals.

This is relevant to our Asian context, as South Asians, particularly from the Indian subcontinent, have a high prevalence of central obesity, which intuitively translated into increased risk of NAFLD.

Type 2 Diabetes Mellitus
Besides obesity, type 2 diabetes mellitus is also an important factor to evaluate. NAFLD is more prevalent and severe in diabetics compared to non-diabetics,
with DM an established independent risk factor for NASH and advanced liver fibrosis/cirrhosis. In addition, NAFLD patients with DM have a two-fold increased mortality compared to non-diabetic NAFLD patients. This takes on additional urgency in Asia where the most rapid increase in DM is being experienced.

Asian patients experience corresponding higher rates of DM and metabolic syndrome complications at lower levels of obesity compared to their western counterparts.

Other obesity or metabolic related diseases such as gout, thyroid dysfunction, polycystic ovary syndrome and obstructive sleep apnoea have been associated with increased risk of NAFLD.

Other Factors
Besides metabolic risk factors, advancing age, certain genetic predispositions such as specific variant of PNPLA3 (which encodes patatin-like phospholipase domain containing protein 3), unhealthy dietary patterns and sedentary lifestyles have also been reported to contribute to development of NAFLD.

SYMPTOMS
Patients with NAFLD are commonly asymptomatic. Some patients may report vague non-specific symptoms such as lethargy, nausea or dull ache over right upper quadrant. However, patients with NAFLD who subsequently progress to cirrhosis/HCC may then develop symptoms, such as pain, jaundice, fluid retention/ascites and variceal bleeding.

**Weight loss** of at least 3-5% of body weight can improve steatosis and up to 10% can improve necroinflammation.

**Hypocaloric diet** to promote weight-loss should be encouraged. Mediterranean-type diet such as high consumption of fibres and antioxidants-rich fruits and vegetables, low carbohydrate and saturated fat intake, and avoidance of fructose-enriched soft drinks can be beneficial. Coffee may be considered as an adjunct in NAFLD as it is associated with improved outcomes.

**Sedentary lifestyle** must be avoided. It is recommended that NAFLD patients should commit to at least 150 minutes of moderate to vigorous aerobic physical activities a week.

**Aggressive control of metabolic risk factors** such as dyslipidemia, hypertension and diabetes in NAFLD patients is prudent: ischemic heart disease is a major cause of mortality in these patients. Optimising diabetes control with insulin sensitizers such as metformin or glitazones, controlling hypertension with ACE-I/ARB and treating dyslipidemia with statins and ezetimibe have been shown to benefit NAFLD as well. Cessation of smoking is advocated because it is associated with more severe NASH.

**WHAT ARE THE LIKELY TREATMENT OPTIONS BY SPECIALISTS?**
Management at the Fatty Liver/Metabolic Liver Clinic based at Singapore General Hospital follows a team-based approach, incorporating expertise ranging from gastroenterologists, endocrinologists, dietitians and weight management professionals. This clinic provides a platform for in-depth assessment of NAFLD severity and identification of any concomitant occult chronic liver disease. Initiation of liver directed therapies would be in line with most current available evidence-based practices.

Weight loss of 7-10% has consistently been shown to control or even resolve NASH, but is difficult to achieve without support. With close collaboration with LIFE centre, our weight loss management centre in SGH, our patients will have access to the full spectrum of weight loss management, from dietary regimes, exercise programs to bariatric surgical interventions. This may be useful to NAFLD patients that have difficulty losing weight by themselves without a supportive structured program.

Treatments such as vitamin E and pioglitazone have demonstrated effectiveness, but remain controversial in the context of potential side effects with long-term use. We offer close monitoring and adjustments of these medications to be used for the right considerations.

**WHAT ARE THE LIKELY TREATMENT OPTIONS BY GPs?**
GPs play a pivotal role as frontline medical practitioners managing a myriad of chronic diseases, which would also include uncomplicated NAFLD. All NAFLD patients should undergo interventions aimed at promoting healthier lifestyles and strict control of metabolic risk factors. Lifestyle modification including weight loss, dietary changes and physical exercise is first-line treatment.

Non-invasive methods such as NAFLD fibrosis score or transient elastography (Fibroscan), if available, can be utilised to identify these high-risk patients. The NAFLD fibrosis score calculator that can be found on website: www.nafldscore.com is a reliable risk stratification tool. This score uses age, hyperglycemia, body mass index, platelet count, albumin, and AST/ALT ratio to predict advanced liver fibrosis in NAFLD. A score of < -1.455 could exclude advanced fibrosis with high accuracy with negative predictive value of 93%. NAFLD patients with high NAFLD fibrosis score may benefit from specialist care.

Any NAFLD patient with clinical or radiological evidence of cirrhosis should also be referred to a specialist unit for further assessment. In addition, further evaluation by specialists may be considered for patients with persistently elevated liver enzymes despite attempts at lifestyle modification or if there was uncertainty in the diagnosis of the liver disease.

WHEN SHOULD GPs REFER TO SPECIALISTS?
Selected groups of NAFLD such as those with advanced liver fibrosis or cirrhosis should be referred to specialist care. These higher risk patients may require further investigation and more intensive therapy.

Non-invasive methods such as NAFLD fibrosis score or transient elastography (Fibroscan), if available, can be utilised to identify these high-risk patients. The NAFLD fibrosis score calculator that can be found on website: www.nafldscore.com is a reliable risk stratification tool. This score uses age, hyperglycemia, body mass index, platelet count, albumin, and AST/ALT ratio to predict advanced liver fibrosis in NAFLD. A score of < -1.455 could exclude advanced fibrosis with high accuracy with negative predictive value of 93%. NAFLD patients with high NAFLD fibrosis score may benefit from specialist care.

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Treatments such as vitamin E and pioglitazone have demonstrated effectiveness, but remain controversial in the context of potential side effects with long-term use. We offer close monitoring and adjustments of these medications to be used for the right considerations.
In addition, our unit is currently actively participating in several worldwide multicentre phase 3 trials using novel agents in patients with NASH, thus providing patients the opportunity to experience innovative, potentially effective therapies to ameliorate their disease. This may be particularly pertinent for those who have failed other treatment options. In the setting where patients are found to have NASH-related cirrhosis, HCC/variceal surveillance and optimisation of cirrhosis can be implemented.

**WHEN WILL THE PATIENT BE REFERRED BACK TO THE GP?**

GPs play an important role in shared care for successful management of NAFLD patients, particularly the optimisation and follow-up for the various metabolic diseases commonly intertwined with it.

Patients without NASH or assessed to have low probability of having advanced fibrosis can be referred back to GPs for continued follow-up, where they can be monitored with regards to maintenance of their lifestyle interventions and control of their related metabolic diseases. In addition, it may be prudent for GPs to use non-invasive risk markers or scores such as NFS on an annual basis to screen for potential disease progression, which may then necessitate referral back to the gastroenterologist.

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**REFERENCES**


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**Dr. George Goh**

Dr. George Goh is a Consultant Gastroenterologist and Hepatologist with the Department of Gastroenterology & Hepatology at the Singapore General Hospital. He underwent advanced subspecialty training in Hepatology at the Cleveland Clinic (USA), with a research focus on non-alcoholic fatty liver disease (NAFLD). He returned to establish a dedicated Metabolic Liver Clinic with multi-disciplinary involvement that helps to identify, prognosticate and manage patients with severe NAFLD.

He remains actively involved in research and is the local Principal Investigator of several ongoing international NAFLD trials. He is an appointed Adjunct Assistant Professor at Duke-NUS Medical School and Clinical Lecturer at Yong Loo Lin School of Medicine, National University of Singapore. He is the current Chairman of the National Foundation of Digestive Disease (NFDD).

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Obesity and Obstructive Sleep Apnoea

Obstructive sleep apnoea (OSA) is a condition characterised by repetitive upper airway obstruction during sleep, leading to oxygen desaturations and arousals from sleep. Classical symptoms include snoring, apnoeic and gasping episodes, unrefreshed sleep and excessive daytime sleepiness, and inability to concentrate at work. Sufferers may also report nasal obstruction, dry mouth and throat, morning headaches, inability to concentrate at work and poor memory.

Patients may present to General Practitioners with other symptoms like chronic sore throat and dry throat, especially in the morning because the snoring and mouth breathing result in repetitive stress injury. Nocturia and erectile dysfunction are also associated with OSA. Hypertension in the young and refractive hypertension should raise alarm bells on the possibility of OSA.

OSA is associated with hypertension, ischaemic heart disease, heart attack, premature all-cause mortality, sudden death, cardiac arrhythmias, stroke, type 2 diabetes, poor neurocognitive function and poor quality of life and work productivity.

These medical consequences have postulated to be the result of sleep fragmentations with sympathetic system activation during sleep and oxidative stress injury from repetitive oxygen desaturation and reoxygenation, resulting in a state of inflammation. The degree of oxygen desaturation has been shown to be associated with quality of life measures and cardiac arrhythmias.

The International Diabetes Federation recommends that patients with type 2 diabetes be screened for OSA and vice versa. With the Ministry of Health ‘declaring war’ on diabetes, this is an area that cannot be ignored for us to win this war.

The pathophysiology of OSA is multifactorial and linked to obesity. Known predispositions include:

- Male gender
- Older age group
- Patients with allergic rhinitis and nasal obstruction
- Family history of snoring and sleep apnoea
- Small jaw and retrusive maxilla

Fat deposit around the parapharyngeal airway, in the tongue and soft palate likely interact in the development of OSA in obese individuals. OSA itself can predispose individuals to obesity because of sleep deprivation, daytime somnolence, disrupted metabolism, and craving for high caloric food because of the leptin resistance.

PREVALENCE OF OSA IN SINGAPORE

Obstructive sleep apnoea is a highly prevalent disease in Singapore. It is estimated that 3 in 10 middle-aged Singaporean males have obstructive sleep apnoea.

The prevalence of obesity (defined as a body mass index of 30kg/m²) in Singapore is increasing. In 2004, it was 6.9% for the Singapore population between the ages of 18 to 69 and in 2014, it had risen to 8.6%. As such, the prevalence and incidence of OSA is likely to see further increase.

DIAGNOSIS

The diagnosis and treatment of OSA requires the clinician’s awareness of its potential to cause a spectrum of neurocognitive symptoms in patients who may be unaware that their sleep is disturbed. For patients who present with classic symptoms of OSA, a sleep study can be performed to determine its severity.

A multidisciplinary team including respiratory physicians, Ear, Nose Throat (ENT) specialists, dental specialists and sleep technicians manages patients in a holistic way. Regardless of the severity, patients’ quality of life is affected by this condition.

At the Singapore General Hospital (SGH) Sleep Disorders Centre, patients can undergo an in-laboratory polysomnogram. This will record the patients’ brainwaves to stage muscle tone, eye movement to stage sleep, airflow through nose or mouth and chest and abdominal movement to score respiratory events, electrocardiogram (ECG) to look to arrhythmias and limb leads to look for leg movements.
In Figure 1, it shows a typical polysomnogram for a patient with obstructive sleep apnoea. There is apnoea and oxygen desaturations.

For those who have a high pretest probability of OSA, taking into consideration patients’ presenting symptoms and BMI, we can do an ambulatory sleep study (Figure 2). This ambulatory sleep study is cheaper, has a shorter waiting time, and allows patients to do the test in their own home environment without disturbing their natural sleep pattern.

At SingHealth, a centre of excellence, the SingHealth Duke-NUS Sleep Centre, was set up to specifically look at the care of patients with sleep disorders, including OSA, in SingHealth’s different practice sites.

TREATMENT

1. Sleep hygiene and lifestyle modification
The treatment of OSA requires a holistic team approach. Patients will be advised on sleep hygiene and maintaining a healthy lifestyle with modifications like having a regular exercise regime, and cutting down smoking or alcohol consumption. Oral pharyngeal and tongue exercises have also been shown to be useful.

2. Positive airway pressure
Although not curative, the nasal positive airway pressure device is the initial treatment of choice for most patients because of its non-invasiveness and efficacy. It acts like a pneumatic splint to maintain airway patency during sleep.
SGH Sleep Disorders Centre provides a one-stop patient-centric service for trying the different masks and positive airway pressure, and trouble-shooting for patients.

Positive airway pressure use has been shown to eliminate snoring, obstructive events and improve sleep quality, improving patients’ quality of life. Patients feel refreshed the next day and have decreased daytime sleepiness. Using positive airway pressure can reduce the risk of hypertension, ischaemic heart disease, heart failure, type 2 diabetes, stroke, and vehicle accidents.

For positive airway pressure, patients have to be fitted with either the nasal mask, nasal pillow or full face mask. Positive airway pressure technology has come a long way and most patients currently can be on autotitrating airway pressure. For obese patients, if the pressure requirement is too high or if they have obesity hypoventilation syndrome, they may need bilevel positive airway pressure.

However, positive airway pressure device is limited by patient acceptance and long-term compliance. Overall the long-term compliance is about 30-40%. It is therefore important for us to have other modalities of treatment that are able to help these patients.

OSA in obesity may be cured with sufficient lifestyle-mediated or surgical weight loss, depending on patients’ airway size, skeletal makeup and how much the weight contributes to OSA.

At SGH, the Sleep Centre works closely with the SGH LIFE Centre to help effect weight loss and maintenance of the weight loss through its team of experienced endocrinologists, nutritionists, psychologists, and metabolic/bariatric surgeons. The patients will be thoroughly assessed and an individualised program will be tailored to suit them.

3. Dental Appliances and Upper Airway Surgery

Surgical modifications of the airway can be performed to reduce nasal obstruction and obstruction of the upper airway by tissues such as tonsils, long redundant soft palate, bulky lymphoid tissue tongue through various surgical techniques, including the use of robot to reach the tongue base area.

Multiple level surgeries can be performed safely and help improve outcomes compared to single level surgery. Similarly, skeletal surgeries can be done to enlarge the airway and increase tension on the tissue.

MULTI-INSTITUTION COLLABORATION

The Sleep Apnoea Surgery Service in the Department of ENT, SGH, brings together dental specialists and ENT surgeons to offer a comprehensive treatment for patients.

In addition to the different treatment options, patients with severe obstructive sleep apnoea or with cardiac arrhythmias on sleep study will be referred to the National Heart Centre Singapore (NHCS) for coronary artery assessment. This is based on studies done by SGH Sleep Disorders Centre and NHCS showing an association between the severity of OSA and coronary artery calcium deposit in the coronary artery, reflecting coronary artery disease.

Similarly, a research collaboration between Singapore National Eye Centre (SNEC) and SGH Sleep Disorders Centre found an association between the severity of OSA and normal tension glaucoma and patients with severe OSA will be referred to SNEC for assessment.

HOW GPs CAN HELP

Obstructive sleep apnoea is a common and serious condition in Singapore. Its pathogenesis is multifactorial and linked to obesity.

General Practitioners have an important role to play in case identification for patients with classical and non-classical symptoms. A holistic treatment using a multidisciplinary team approach is important to improve patient outcomes and give patient the best treatment. Preventive cardiology assessment needs to be done for patients with severe OSA.
REFERENCES


Dr Toh Song Tar is a Senior Consultant in the Department of Otolaryngology and Director, Sleep Disorders Centre, Singapore General Hospital (SGH). He is Chief, Sleep Apnoea Surgery Service and Deputy Head (Research) in the department. He is also Head of the SingHealth Duke-NUS Sleep Centre. He is an appointed Adjunct Assistant Professor and Senior Clinical Lecturer of the National University of Singapore, Yong Loo Lin School of Medicine, as well as Adjunct Assistant Professor at the Duke-NUS Medical School.

He is trained as a console-surgeon in performing transoral robotic surgery (TORS) using the da Vinci robot for obstructive sleep apnoea (OSA). He and his team have vast experience in this field, having done the most cases of TORS for OSA, in Singapore and Southeast Asia to-date.

GPs can call for appointments through the GP Appointment Hotline at 6321 4402 (SGH), 6788 3003 (CGH), 6472 2000 (SKH), 6294 4050 (KKH) or scan the QR code for more information.
Varicose Veins – A Hidden Problem in Obesity

Dr Ch’ng Jack Kian, Consultant, Department of Vascular Surgery, Singapore General Hospital

Obesity is a rising epidemic. With the 2013 National Health Surveillance Survey reporting that 8.6% of all Singaporean adults are obese, it is safe to say that we are dealing with a social problem of epic proportions. While it is common knowledge that heart disease, diabetes and joint issues are consequences of obesity, a lesser well-known fact is that varicose veins and chronic venous insufficiency are strongly correlated to raised intra-abdominal pressure caused by obesity.

Varicose veins are a condition where veins become dilated and tortuous. It is a common medical condition affecting 25% of the adult population, in particular women in their 20s to 40s.

They occur most commonly in the superficial veins of the legs. Veins have a series of one-way valves that keeps blood flowing in one direction. When these valves become incompetent, the blood flows backwards, resulting in varicose veins.

SYMPTOMS
A person with a normal body size who has varicose veins will commonly complain of:
• Ugly bulging veins,
• Swelling, heaviness, aching, and cramps in the affected leg, especially after long periods of standing

In obese patients, the varicose veins and swelling are not so visible, due to excessive fat. The heaviness and cramps in obese patients are often attributed to weight and joint problems. Hence, obese patients tend to present late.

COMPLICATIONS
Left untreated, it can result in complications such as:
• Lower limb eczema (itch)
• Hyperpigmentation (discolouration)
• Ulceration
• Bleeding
• Phlebitis (inflammation of the affected vein)
DIAGNOSIS
Varicose veins can be easily accessed and diagnosed through the use of a duplex ultrasound scan. These veins in a standard size leg are usually 1 or 2 cm under the skin. In very large legs, the scanning is much more difficult to do as the veins are much deeper, being covered by layers of fat, hence making the scan less accurate.

If the varicose veins are small and not too uncomfortable, elastic compression stockings may be prescribed. These stockings compress the veins, improving blood flow from the leg to the heart and thereby preventing the pooling of blood and the above described symptoms. These stockings should be worn during daily activities.

However, in the obese patients, sizing will be an issue, with some patients deemed to be too large to fit a suitable stocking. Compression stockings are notoriously prone to slipping down the legs in this group of patients.

TREATMENT
The surgical treatment described below becomes necessary when the stockings fail to improve symptoms and they become bothersome.

Ligation and Stripping
The traditional method of open surgery is ligation and stripping of veins. This may not be a palatable option as an incision at the groin crease needs to be made and the risk of infection of incision in an obese patient is high.

In addition to the surgical risk, this procedure requires general anaesthesia. In obese patients, the general anaesthesia risks are much higher compared to a patient with normal body size.

Minimally Invasive Techniques
Minimally invasive techniques such as Endovenous laser therapy and Radiofrequency ablation are also more difficult in obese patients. The veins are further away from the surface, making the access more difficult. The patient will either require a greater amount of local anaesthesia or even general anaesthesia.

CONCLUSION
Varicose veins in obese patients are a problem hidden in plain sight. A high index of suspicion is needed as the symptoms are often attributed to other obesity-related problems. Standard management cannot be easily applied and thus, individualised treatment is crucial for better management of this problem.
Obesity and Infertility/PCOS

Dr Hemashree Rajesh, Senior Consultant, Department of Obstetrics & Gynaecology, Singapore General Hospital

Obesity has a strong association with subfertility and is a major risk factor in pregnancy. In pregnancy, obesity may cause early foetal loss, congenital malformations and poor perinatal outcomes.

Women can be classified on the basis of BMI as overweight when: BMI 25-29.9 kg/m² and obese BMI >30. A female waist circumference of < 80 cm is considered low-risk, while 80-88 cm is moderate-risk and >88 cm are categorised as high-risk, and very high-risk.

Overweight Singapore women contribute to 28.6% of the population while obese women form 7.9%. Among the ethnic groups in Singapore, 20.7% of Malays, 14.0% of Indians and 5.9% of Chinese were considered obese with the highest prevalence of obesity in the 30 to 39-year-old age group (11.5%).

THE PATHOPHYSIOLOGY OF OBESITY AND INFERTILITY

In women with a high caloric intake, insulin, GLP-1 and leptin act on the hypothalamus and lead to a satiety response by inhibiting neuropeptide Y (NPY) and stimulating proopiomelanocortin (POMC) neurons. This also promotes gonadotropin-releasing hormone (GnRH) secretion.

Leptin, in addition, selectively facilitates luteinising hormone (LH) release through kisspeptin release. Peripherally, leptin potentiates insulin-induced theca cell proliferation and androgen production from the ovaries. Chronic GnRH production with a propensity towards more LH can contribute to a polycystic ovary syndrome (PCOS) phenotype.

Alternatively, obesity may be due to leptin resistance or mutant leptin leading to an absence of the satiety response. Obesity per se can increase peripheral aromatisation of androgens, increase insulin resistance and decrease sex hormone-binding globulin (SHBG), contributing to chronic anovulation.

In patients with malnutrition and low calorie intake, Ghrelin from the gut and adiponectin from the fat inhibit GnRH secretion and stimulate feeding. This mechanism conserves energy during famine and promotes procreation only when food is available.

Obesity can cause a systemic inflammation due to interaction between the immune cells in adipose tissue and adipocytes, resulting in the release of free fatty acids (FFA) and cytokines. These FFA can increase reactive oxygen species (ROS) and cause dysfunction of the oocyte's mitochondria and endoplasmic reticulum. These oocytes may not form viable embryos or implant.

Obesity may also affect implantation by an endometrial effect and is associated with increased endometrial polyps. Increased BMI can double the miscarriage rate as compared to women with a normal BMI (38% versus 20%; odds ratio [OR] 2.4, 95% CI 1.6–3.8). Miscarriages in young overweight women may not be associated with aneuploidy suggesting alternative mechanisms.

SYMPTOMS

Obese women with PCOS usually present with oligomenorrhoea and clinical hyperandrogenaemia. Clinical hyperandrogenaemia manifests differently in the various races as hirsutism, acne or rarely androgenic alopecia in the crown of the head.

ASSISTED REPRODUCTION TREATMENT (ART) IN OBESE WOMEN

Overweight or obese women had significantly lower clinical pregnancy rates, live-birth rates and higher miscarriage rates following ART compared with normal BMI women.

Pre-term deliveries are higher in both singletons (1.5 fold) and in twins (2-3 fold) of obese women (BMI >35 kg/m²) after IVF compared with normal weight women. Younger women with a higher BMI have a more pronounced negative influence on fertility than older women.
Short-term low calorie diet and exercise for a period of 6-8 weeks prior to IVF has no statistically-significant difference in live birth rates in spite of a weight reduction and lower BMI. However, improvement in the Preconception Dietary Risk Score (PDRS), which is a measure of nutritional habits and dietary quality (higher scores indicate higher dietary quality), by one point, was associated with a 65% increase in the ongoing pregnancy rate after IVF.

**Medical Management**

Orlistat may be offered as an adjunct to women who have achieved partial success in losing weight and persevered with lifestyle changes for 6 months. There is no evidence of any increase in the relative risk of major malformation when orlistat was used in early pregnancy. However anti-obesity drugs should be stopped once pregnancy is achieved.

Insulin-sensitising agents, such as metformin, decrease circulating insulin and androgen levels and may be associated with a modest decrease in body weight and visceral fat.

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**POTENTIAL INTERVENTIONS IN OBESE WOMEN**

**Conservative/Expectant Management**

Diet and increased exercise would be the first line management of obesity. A daily caloric intake of 600 kcal less than the caloric requirement to maintain a stable body weight is recommended. Dietary restrictions lower than 800 kcal/day are not recommended beyond 12 weeks even if nutritionally complete. Although treatment with metformin can facilitate weight loss by appetite suppression, it should not be used for this purpose.

Exercise must be of moderate intensity at least 5 times a week for 60-90 minutes. Exercise activities should preferably be a daily routine like brisk walking or gardening to promote sustainability. The target weight loss should be no more than 0.5-1 kg/week.

Cognitive and behavioural interventions like goal-setting, slower eating and social support can sustain long-term adherence to both diet and exercise regimens.
Metformin is used in patients with PCOS especially if they have impaired glucose tolerance or features of metabolic syndrome. All women with PCOS would benefit from an oral glucose tolerance test at presentation and thereafter every two years. Evaluations should also include blood pressure, waist circumference and a lipid profile.

Metformin is more effective with a hypocaloric diet for reducing weight and visceral fat. The recommended dose is 1500-2000 mg/day and the main side-effects are gastrointestinal upset (i.e. nausea and vomiting) and rarely, lactic acidosis in patients with hepatic and renal impairment.

Clomiphene is commonly used for ovulation induction for subfertility. Clomiphene resistance is treated by ovulation induction with gonadotropins or laproscopic ovarian drilling. Metformin is not a first line drug for fertility in patients with PCOS.

**IS IT COST-EFFECTIVE TO OFFER ART TO OBESE SUBFERTILE WOMEN?**
The costs per live birth in overweight and obese women are at least 44% higher than those in their normal weight counterparts. However, in a single cycle of IVF treatment, there is no statistically significant difference in the obstetric costs of a woman with normal BMI woman or a BMI of 30-35.

**IS IT ETHICAL TO WITHHOLD FERTILITY TREATMENT AND ART OPTIONS FROM OBESE WOMEN?**
Spontaneously pregnant obese women are only offered careful monitoring. Assisted Reproduction in obese women increases the risks of deep vein thrombosis due to an hyperestrogenic environment and is associated with a suboptimal outcome.

Weight loss benefits both the mother and the child and it is not unethical for fertility specialists to insist on a certain target before commencing treatment. Numerous guidelines suggest a BMI < 30 for a younger woman and < 35 for an older woman prior to conception. From a societal perspective, this would reduce the increased demand on resources.

Respect for a patient’s autonomy dictates that it is reasonable to offer treatment to a woman willing to accept an unfavourable outcome. This must be considered for older women with declining fertility for whom outcomes are compromised due to body weight.

**CONCLUSION**
In summary, obesity has a significant adverse effect on fertility and ART outcome, especially in younger women less than 35 years. This effect may be mediated by both oocyte and endometrial effects.

There is not enough evidence on the effectiveness and cost of different interventions on the outcome of fertility treatment in obese women.

Being a modifiable risk factor, it is ethically justifiable to require obese women to lose weight before receiving ART.

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**Surgical Management**
Bariatric surgery is recommended for inpatients with a new diagnosis of type 2 diabetes and a BMI 30-35 kg/m², and a lower BMI in patients of Asian origin. Women with a preoperative BMI of >40 kg/m² can be expected to lose 20-40 kg over 2 years and to maintain their reduced weight for 10 years.

Pregnancy is not recommended for 12-18 months after bariatric surgery, when most of the weight loss occurs, to avoid nutritional deficiencies. There are no reports of randomised controlled trials (RCTs) assessing the impact of bariatric surgery in infertile populations or in patients undergoing ART; however, a recent observational study has shown an improvement in the number of oocytes retrieved in obese women after bariatric surgery.
Obesity and Breast Cancer

Dr Sim Yirong, Associate Consultant, Division of Surgical Oncology, National Cancer Centre Singapore; SingHealth Duke-NUS Breast Centre

Obesity is associated with increased morbidity and mortality. Not only does obesity increase the risk of cardiovascular disease and type 2 diabetes, it also increases the risk of most cancers – mainly the breast, colorectum, endometrium, gallbladder, kidney, oesophagus, pancreas, liver and thyroid.1

The prevalence of obesity worldwide has more than doubled from 1980 to 2014.1 In 2014, 13% of the world’s adult population (11% of men and 15% of women) were obese (BMI ≥ 30 kg/m²) and 39% of adults (38% of men and 40% of women) were overweight (BMI 25-29.9 kg/m²). Singapore is also not spared from this obesity endemic, with 8.6% of Singaporeans being obese in 2013.2

Breast cancer is the most common cancer in women worldwide, with nearly 1.7 million new cases of breast cancers diagnosed worldwide in 2012. This represents about 12% of all new cancer cases and 25% of all cancers in women.4 In Singapore, breast cancer is also the most common cancer amongst females5, accounting for 29.2% of all female cancers, and 17.6% of all female cancer deaths. The age-standardised incidence rate (ASIR) of newly-diagnosed breast cancer in females had increased significantly over the years – with a three-fold increase from 23.8 per 100,000 (1975-1979) to 64.7 per 100,000 (2010-2014).

**DOES OBESITY INCREASE THE RISK OF BREAST CANCER?**

It is well-accepted that obesity increases the risk of breast cancer, although the mechanisms behind it are less well understood.

In post-menopausal women, an increased BMI is associated with an increased risk of oestrogen-receptor positive breast cancer. In the post-menopausal female, the main production of oestrogen is from the adipose tissue, with a small proportion of oestrogens synthesised in breast tissue itself.

As such, the increased breast cancer risk in the post-menopausal female with a high BMI would likely arise from the higher serum oestrogen level associated with the higher body proportion of adipose tissue.

In pre-menopausal women, the link between BMI and breast cancer is more controversial. Most studies show that a higher BMI is associated with a lower risk of breast cancer 3, mainly the hormone-receptor positive breast cancer.6 Yet, other studies have shown that weight gain before age 50 is associated with a greater risk of breast cancer, in particular, the oestrogen-receptor negative breast cancer.7-9

In addition, obesity is correlated with an increased risk of and complications from breast cancer therapies.

Obesity also impacts on life expectancy, with pre-menopausal and post-menopausal obese women being 1.75 and 1.34 times, respectively, at increased risk of death from breast cancer.10

**WHY DOES OBESITY INCREASE THE RISK OF BREAST CANCER?**

The underlying molecular mechanisms promoting carcinogenesis in obesity are not well understood. Obesity per se does not appear to have a direct mutagenic mechanism, although the metabolic stress associated with obesity may alter mitochondrial metabolism, leading to an increase in reactive oxygen species production.

There are many explanations on why obesity increases the risk of breast cancer.

Firstly, obesity and obesity-related lifestyle factors (e.g. physical inactivity and high-fat diets) are usually accompanied by elevated glucose metabolism traits (e.g. insulin, glucose, and homeostatic model assessment-insulin resistance (HOMA-IR) levels).11-13

Insulin receptors are mainly found in adipose tissues, muscle and liver cells, and are overexpressed in breast cancer cells. This overexpression of insulin receptors leads to an overstimulation of various signaling pathways, which in turn promote an anabolic state necessary for cell proliferation, differentiation, and anti-apoptosis.

This association is particular strong in post-menopausal women, in whom high insulin levels have been associated with a twofold increase in breast cancer risk.

Secondly, obesity may cause concentrations of circulating endogenous hormones (insulin, insulin-like growth factors, and sex steroids) to fluctuate, distorting the equilibrium between cell proliferation and apoptosis14, in favour of promoting carcinogenesis.

As discussed above, in the post-menopausal women, obesity is associated with higher serum oestrogen levels which can increase breast cancer risk. There are many other local and systemic factors which are simultaneously elevated in obesity, such as insulin, IGF-1,
Obesity increases the risk of proinflammatory cytokines, blood glucose, free fatty acids and leptin.

The ratios of proinflammatory to anti-inflammatory factors (e.g. adiponectin:leptin) are important to tumour cell proliferation, survival, and invasiveness. Some also propose that a chronically inflamed state (such as that seen in the adipose tissues of obese patients) may modify the tumour microenvironment and potentially drive cancer incidence and metastasis.

Thirdly, a hyperglycaemic state (commonly seen in obese patients) can induce high levels of intracellular glucose, facilitating breast cancer growth. There has been a limited number of population-based epidemiologic studies performed that examine the relationships between glycaemic phenotypes and cancer risk.

Through in vitro studies, obesity-glucose metabolism-related gene signature-breast cancer risk pathways have been identified. Jung et al.15 studied 16 glucose metabolism-related SNPs (single nucleotide polymorphisms), of which three were associated with breast cancer risk. Comparing non-obese and obese carriers, there was a difference in the associations of these SNPs with cancer.

This suggests that obesity as well as modifiable lifestyle-related factors can both influence glucose metabolism-related SNPs’ interactions and have an impact on cancer risk.

**IMPACT OF OBESITY ON THE MANAGEMENT OF BREAST CANCER**

Surgery is the mainstay of breast cancer treatment, and is either performed as the initial form of curative treatment, or performed after neoadjuvant therapy. Not only does obesity and its associated comorbidities increase the risk of general anaesthesia for their surgeries, obesity is also associated with a poorer surgical outcome.

Obesity is associated with nearly 12-fold increased odds of a post-operative complication after elective breast procedures.16 Obesity is also known to contribute to increased operating and recovery times, more blood loss, poorer healing, flap necrosis, seromas, haematomas and high infection rates.17

**The risk of lymphoedema** after breast cancer surgery is also higher in obese women.

**Obesity also has an impact on adjuvant therapy.** For adjuvant radiotherapy, the set-up for an obese patient is more difficult – their body surface is more mobile, and there is an increased vulnerability to instability and reduced reproducibility of skin contours and treatment positions. There tends to be a shift in the delivery of external-beam radiation in obese patients, resulting in the target location not receiving the full dose.18

Also, there are increased side effects as the skin folds and the larger volume of breast/axillary fat that sag will result in a greater amount of normal tissue inadvertently included in the treatment fields.

**As for chemotherapy, the doses required will be higher in obese patients,** as the therapeutic doses are based on body surface area. There is however no evidence to suggest difference in toxicities for patients with extremes of weight. There is also the potential of undertreating a severely obese patient if there is a cap to the maximum dose of chemotherapeutic agents that can be administered.

**Obesity is also associated with a 35% to 40% increased risk of breast cancer recurrence and death** and therefore poorer survival outcomes. This relationship is most clearly established for oestrogen-receptor positive breast cancer, but not so for the triple-negative and Her2-positive subtypes.18

**Obesity increases the risk of developing a second primary malignancy** – a 37% increase in the relative risk of contralateral breast cancer, a 97% increase in the relative risk of endometrial cancer and an 89% increase in the relative risk of colorectal cancer.20 However, these findings are likely because obesity itself is also a risk factor for developing other cancers, such as endometrial and colorectal cancers.

**CONCLUSION**

The prevalence of obesity and breast cancer are on the increase worldwide and there are some associations linking both these conditions.

Obesity increases the risk of oestrogen-receptor positive breast cancer in post-menopausal women. The mechanism in which obesity increases the risk of breast cancer is not fully understood, but it is believed to be through the increased oestrogen levels, as well as through the increased levels of endogenous hormones and inflammatory mediators.

Obesity also increases the morbidity of the surgical and adjuvant treatments of breast cancer, and is associated with a higher rate of recurrence and a second malignancy.

However, there are still a lot of questions that remain unanswered:

- Is the association between obesity and cancer purely dictated through our genetic polymorphisms, or can it be modified by other risk factors?
- Does a high BMI during one’s youth also increase cancer risk?
- If the excess weight were to be lost, would cancer risk subsequently reduce and/or would the prognosis or survival in cancer patients improve?
- Would the various distributions of adiposity within the body affect cancer risk differently?21

But what we do know is this – we know that obesity increases the risk of cancers, in addition to increasing morbidity and mortality through its multiple associated systemic conditions. As such, obesity affects the individual, and has healthcare and economic implications at a national and global level. It is therefore important to fight obesity, not just at the individual level, but also as a community, and at a national and global level.
REFERENCES


**Thank you to Dr Wong Fuh Yong and Dr Kiley Loh for their contributions to this article.

Dr. Sim Yirong is an Associate Consultant at the Division of Surgical Oncology at the National Cancer Centre Singapore and SingHealth Duke-NUS Breast Centre.

Dr. Sim graduated with a medical degree and PhD from the University of Cambridge in 2009, and obtained her fellowship with Royal College of Surgeons Edinburgh in 2016. Her focus and interests are in breast cancer research and in education.

GPs can call for appointments through the GP Appointment Hotline at 6436 8288 (NCCS), 6321 4402 (SGH), 6788 3003 (CGH), 6472 2000 (SKH), 6294 4050 (KKH) or scan the QR code for more information.
Comprehensive and Personalised Weight Loss Programme at SGH Obesity & Metabolic Unit

The Obesity and Metabolic Unit at Singapore General Hospital (SGH) offers a comprehensive and personalised weight loss program designed to help patients reach their weight loss goals.

Using evidence-based approaches to weight management, our multidisciplinary team comprising of endocrinologists, bariatric surgeons, physiotherapists, dietitians and psychologists will guide patients to live a healthy lifestyle.

Our weight management programme is the largest in patient volume in Singapore with a designated gym, kitchen and operating theatre facilities.

We are one of the few in the country that have had experience operating on high-risk patients with end-stage kidney, liver and heart disease or congenital disorders like Prader-Willi syndrome. Our surgical mortality and morbidity are comparable to most ‘Centres of Excellence’ in the United States.
### OUR TEAM

#### Endocrinologists
- **Dr Tham Kwang Wei**  
  Senior Consultant  
  Dept of Endocrinology  
  Director, LIFE Centre  
- **Dr Sonali Ganguly**  
  Consultant  
  Dept of Endocrinology  
  Director, Obesity & Metabolic Unit  
- **Dr Tan Hong Chang**  
  Consultant  
  Dept of Endocrinology  
- **Dr Lee Phong Ching**  
  Consultant  
  Dept of Endocrinology  
- **Dr Kovalik Jean-Paul**  
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  LIFE Gym-in-Charge  
- **Ng Deng Peng**  
  Senior Physiotherapist  
- **Chen Xiu Min**  
  Physiotherapist  
- **Aaron Yeo**  
  Physiotherapist  
- **Kirsten Eve Abdul**  
  Physiotherapist  
- **Irene Chu**  
  Physiotherapist  
- **Aloysius Chan**  
  Physiotherapist  
- **Melissa Pei**  
  Physiotherapist  
- **Olivia Tay**  
  Physiotherapist

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- **Jessica Ong**  
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  Dept of Dietetics  
- **Alyssa Chee**  
  Dietitian  
  Dept of Dietetics  
- **Peh Hui Yee**  
  Dietitian  
  Dept of Dietetics

#### Specialty Nurses/Coordinators
- **Jasmine Chua**  
  Clinical Coordinator
- **Angelina Foo**  
  Bariatric Specialty Nurse
- **Cindy Ng Li Whye**  
  Principal Physiotherapist  
  Clinical Coordinator
- **Vieon Wu**  
  Research Coordinator
- **Valeria Lai**  
  Research Coordinator

#### Psychologists
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  Senior Psychologist
- **Serene Wong**  
  Senior Psychologist

#### Physiotherapists
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  Senior Consultant  
  Dept of Upper GI & Bariatric Surgery  
  Director, Obesity & Metabolic Unit  
- **Dr Alvin Eng**  
  Senior Consultant  
  Dept of Upper GI & Bariatric Surgery  
- **Dr Lim Chin Hong**  
  Consultant  
  Dept of Upper GI & Bariatric Surgery
- **Dr Eugene Lim**  
  Consultant  
  Dept of Upper GI & Bariatric Surgery  
- **Dr Jeremy Tan**  
  Senior Consultant  
  Dept of Upper GI & Bariatric Surgery

#### Bariatric Surgeons
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  Senior Consultant  
  Dept of Upper GI & Bariatric Surgery  
  Director, Obesity & Metabolic Unit  
- **Dr Alvin Eng**  
  Senior Consultant  
  Dept of Upper GI & Bariatric Surgery

### WHO TO REFER

#### Medical Weight Management
Anyone with **BMI above 27 kg/m²** with obesity-related comorbidities (for example type 2 diabetes, hypertension, obstructive sleep apnoea, degenerative joint disease, etc.)

OR

**BMI above 32 kg/m²** with or without obesity-related comorbidities

#### Surgical Weight Management
Patients with **BMI above 37.5 kg/m²**, with or without obesity-related comorbidities

OR

**BMI between 32.5 and 37.5 kg/m²** with at least one obesity-related co-morbidity

Bariatric surgery can be considered for patients with mild to moderate obesity (i.e. **BMI 27.5–32.5 kg/m²**) with poorly-controlled type 2 diabetes despite maximum medical treatment. Endorsement from an endocrinologist is needed.

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**GPs can call for appointments at:**

- **9799 9582**  
  (Angelina Foo - Bariatric Nurse)  
- **9047 9650**  
  (Jasmine Chua - Clinical Co-ordinator)

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**CONTACT**

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Appointment Tel: **6321 4377**  
Fax: **6223 4526**  
Email: sgh.lifecentre@sgh.com.sg
**SGH Obesity and Metabolic Unit**  
**Obesity Surgery Support Group**

The Obesity Surgery Support Group is a vital component for patients who are interested in, awaiting or have undergone bariatric surgery.

We welcome all patients, family members and those who are considering bariatric surgery. The objective of this support group is to provide a place where patients can receive ongoing education, share or provide support to one another, and have questions answered before and after surgery.

**SGH Obesity Surgery Support Group takes place on the following Wednesdays, from 7.00-8.00 pm:**

<table>
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<tr>
<th>Dates</th>
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</table>
| 5 July 2017    | Dr Chan Weng Hoong, Senior Consultant  
Ms Wong Hui Mei, Dietitian | Understanding Bariatric Surgery  
Plating Up for Bariatric Surgery |
| 2 August 2017  | Dr Lim Chin Hong, Consultant  
Ms Cindy Ng, Principal Physiotherapist | Understanding Bariatric Surgery  
Importance of Exercise in the Management of Weight |
| 6 September 2017 | Dr Jeremy Tan, Senior Consultant  
Mr Henry Lew, Senior Psychologist | Understanding Bariatric Surgery  
Coping Strategies for Cravings |
| 4 October 2017 | Dr Alvin Eng, Senior Consultant  
Ms Alyssa Chee, Dietitian | Understanding Bariatric Surgery  
Eating Out After Bariatric Surgery |
| 1 November 2017 | Dr Lim Chin Hong, Consultant  
Ms Cindy Ng, Principal Physiotherapist | Understanding Bariatric Surgery  
Importance of Exercise in the Management of Weight |
| 6 December 2017 | Dr Jeremy Tan, Senior Consultant  
Mr Henry Lew, Senior Psychologist | Understanding Bariatric Surgery  
Staying Motivated Before/After Surgery |

**CONTACT**  
Angelina Foo (Bariatric Coordinator)  
Tel: 6326 6697/6698  
Email: sgh.lifeobesity@sgh.com.sg

**LOCATION**  
LIFE Centre  
Singapore General Hospital  
Outram Road, Bowyer Block,  
Block A Level 1  
Singapore 169608
SINGAPORE GENERAL HOSPITAL

APPOINTMENTS

Dr Sachin Mathur  
Consultant  
Dept  
General Surgery

Dr Thay Yu Jia  
Associate Consultant  
Dept  
Anaesthesiology

Dr Tay Kwang Yong  
Timothy  
Associate Consultant,  
Dept  
Anatomical Pathology

Dr Chok Aik Yong  
Associate Consultant  
Dept  
Colorectal Surgery

Dr David Carmody  
Associate Consultant  
Dept  
Endocrinology

PROMOTIONS - CONSULTANTS

Dr Lim Jia Hao  
Consultant  
Dept  
Emergency Medicine

Dr Teo Jin Yao  
Consultant  
Dept  
Hepato-pancreato-biliary & Transplant Surgery  
Sub-specialty  
Hepatobiliary and Pancreatic Surgery, General Surgery

Dr Than Aung  
Consultant  
Dept  
Internal Medicine

PROMOTION - ASSOCIATE CONSULTANT

Dr Yap Hao Yun  
Associate Consultant  
Dept  
Vascular Surgery

SENGKANG HEALTH

APPOINTMENTS

Dr Anupama Roy Chowdhury  
Consultant  
Dept  
General Medicine (Geriatric Medicine)

Dr Peh Wee Ming  
Associate Consultant  
Dept  
General Medicine (Internal Medicine)

Dr Kiran Sharma  
Associate Consultant  
Dept  
General Medicine (Respiratory Medicine)
SENGKANG HEALTH

APPOINTMENTS

Dr Koh Shao Hui  
Associate Consultant  
Dept Emergency Medicine

Dr Kiong Liqin  
Kimberley  
Associate Consultant  
Dept Otolaryngology

Dr Phua Chu Qin  
Associate Consultant  
Dept Otolaryngology

Dr Cheong Wei Kiong  
Associate Consultant  
Dept Radiology

Dr Toh Bin Chet  
Associate Consultant  
Dept Surgery

Dr Ibrahim Muhammad Hanif  
Associate Consultant  
Dept Dept of General Medicine

KK WOMEN’S AND CHILDREN’S HOSPITAL

APPOINTMENTS

Dr Uma Alagappan  
Associate Consultant  
Dept Dermatology Service

Dr Abiramy Mahendran  
Associate Consultant  
Dept Emergency Medicine

PROMOTIONS - SENIOR CONSULTANTS

Dr Koh Jean Aan Mark  
Senior Consultant  
Dept Dermatology Service

Dr Tan Woon Hui Natalie  
Senior Consultant  
Dept Paediatrics (Infectious Disease Service)

Dr Indra Ganesan  
Senior Consultant  
Dept Paediatrics (Nephrology Service)

Dr Mok Yee Hui  
Senior Consultant  
Dept Paediatric Subspecialties (Children’s Intensive Care Unit)
**KK WOMEN’S AND CHILDREN’S HOSPITAL**

**PROMOTIONS - CONSULTANTS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Chay Pui Ling</td>
<td>Consultant</td>
<td>Dental Service</td>
</tr>
<tr>
<td>Dr Rohit</td>
<td>Consultant</td>
<td>Diagnostic &amp; Interventional Imaging</td>
</tr>
<tr>
<td>Dr Yeo Kee Thai</td>
<td>Consultant</td>
<td>Neonatology</td>
</tr>
<tr>
<td>Dr Seng Su-Fern</td>
<td>Consultant</td>
<td>Paediatric Subspecialties (Haematology/Oncology Service)</td>
</tr>
</tbody>
</table>

**NEW APPOINTMENTS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Chan Yoke Hwee</td>
<td>Chairman</td>
<td>Division of Medicine</td>
</tr>
<tr>
<td>Dr Vicknesan Jeyan</td>
<td>Head</td>
<td>Child &amp; Adolescent Mental Wellness Service</td>
</tr>
</tbody>
</table>

**NATIONAL NEUROSCIENCE INSTITUTE**

**PROMOTIONS**

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Yip Chun Wai</td>
<td>Senior Consultant</td>
<td>Neurology (SGH Campus)</td>
</tr>
<tr>
<td>Dr Lim Ee Wei</td>
<td>Consultant</td>
<td>Neurology (SGH Campus)</td>
</tr>
<tr>
<td>Dr John Ng</td>
<td>Consultant</td>
<td>Neurology (SGH Campus)</td>
</tr>
<tr>
<td>Dr Ng Kok Pin</td>
<td>Consultant</td>
<td>Neurology (TTSH Campus)</td>
</tr>
<tr>
<td>Dr Yeo Tianrong</td>
<td>Consultant</td>
<td>Neurology (TTSH Campus)</td>
</tr>
<tr>
<td>Dr Ling Ji Min</td>
<td>Associate Consultant</td>
<td>Neurosurgery</td>
</tr>
</tbody>
</table>
If you are a qualified doctor, a challenging career awaits you at SingHealth. We seek suitably qualified candidates to join us as:

**• STAFF REGISTRARS / SERVICE REGISTRARS**

**• RESIDENT PHYSICIANS / PHYSICIANS / FAMILY PHYSICIANS / PRIMARY EYECARE PHYSICIANS**

Interested applicants to email CV with full personal particulars, educational and professional qualifications (including housemanship details), career history, present and expected salary, names of at least two professional references, contact numbers and e-mail address together with a non-returnable photograph.

Please email your CV to the respective institutions’ email addresses/online career portals with the Reference Number MN1707.

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**KK Women’s and Children’s Hospital**

Departments seeking Resident Physicians and Staff Registrars:
- Diagnostic & Interventional Imaging
- Emergency Medicine
- Haematology / Oncology Service
- Neonatology
- Obstetrics & Gynaecology
- Ophthalmology
- Paediatric Surgery (Urology)
- Women’s Anaesthesia

Website: www.kkh.com.sg
Email: medical.hr@kkh.com.sg

**Sengkang Health**

Departments seeking Resident Physicians and Staff Registrars:
- Anaesthesiology
- Cardiology
- Emergency Medicine
- General Surgery
- General Medicine (with interest in Endocrinology, Geriatric Medicine, Rehabilitation Medicine, Renal Medicine and Respiratory Medicine)
- Neurology
- Orthopaedic Surgery

Website: https://www.ah.com.sg/jobseekers/Pages/JoinUs.aspx
Email: careers@skh.com.sg

**National Heart Centre Singapore**

Departments seeking Clinical Associates:
- Cardiology
- Cardiothoracic Surgery

Website: www.nhcs.com.sg
Email: hr_mgr@nhcs.com.sg

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**National Neuroscience Institute**

Department seeking Resident Physicians and Service Registrars:
- Neurosurgery

Website: www.nni.com.sg
Email: nni_hr@nni.com.sg

**Singapore National Eye Centre**

- Staff Registrar / Physician
- Staff Registrar / Resident Physician (Ophthalmic Anaesthesiology)
- Primary Eyecare Physician (Full-time / Locum)

Website: www.snec.com.sg
Email: recruitment@snec.com.sg

**SingHealth Polyclinics**

Seeking Resident Physicians and Family Physicians:
- Polyclinic (Family Medicine)

Website: http://polyclinic.singhealth.com.sg
Email: hr_admin@singhealth.com.sg

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The SingHealth Duke-NUS Academic Medical Centre draws on the collective strengths of SingHealth and Duke-NUS Medical School to drive the transformation of healthcare and provide affordable, accessible, quality healthcare.

With 42 clinical specialties, a network of 2 Hospitals, 5 National Specialty Centres, 9 Polyclinics and Bright Vision Community Hospital, it delivers comprehensive, multi-disciplinary and integrated care.

In 2018, the Sengkang General Hospital and Sengkang Community Hospital will be completed to serve the community in the north-east of Singapore. To enhance community care, the new Outram Community Hospital on SGH Campus will be completed in 2020.
Courses

Bariatric Surgery Workshop

The field of metabolic surgery has evolved in the past decade, with the unexpected resolution of type 2 diabetes in the surgical treatment of morbid obesity by Walter Pories almost three decades ago, to the use of bariatric surgery to decrease diabetes-related morbidity and mortality recently. Moving forward, the question to ask now is where do we go from here?

At the SingHealth Bariatric Surgery Congress, we aim to address, firstly, how as a nation we can address the twin epidemics of obesity and diabetes; and secondly, the future of bariatric surgery.

Participants of the workshop will gain hands on cadaveric experience in laparoscopic sleeve gastrectomy & Roux-en-Y gastric bypass. In addition, learners will also have the opportunity to interact and share with regional and international experts in the field of bariatric surgery.

This program is designed to meet the continuing education needs of bariatric surgeons, MIS fellows, endocrinologists, diabetologists, gastroenterologists, primary care physicians, residents and policy makers.

Date
3 – 4 August 2017 (Thursday)

Venue
Academia
20 College Road
Singapore 169856
(Singapore General Hospital Campus)

Fees
Visit www.singhealthsac.com.sg
(Registration for Bariatric Surgery Workshops entails free entry to the Main Congress)

Contact
Email: secretariat@singhealthsac.com.sg/
diana.fu.c.w@singhealthacademy.edu.sg

Congress Director (Bariatric Surgery):
Dr Lim Chin Hong
Consultant Surgeon
Dept of Upper GI & Bariatric Surgery
Singapore General Hospital

Workshop Director:
Dr Alvin Eng
Senior Consultant
Dept of Upper GI & Bariatric Surgery
Singapore General Hospital

Featured Speakers:

Professor Sayeed Ikramuddin
Robert and Katherine Goodale Chair,
Minimally Invasive Surgery
University of Minnesota
United States of America

Dr Tippi Mak
Senior Deputy Director
Health Promotion Board,
Regional Health & Community Outreach
Singapore

Dr Stuart Amateau
Division of Interventional Endoscopy
University of Minnesota
United States of America

Dr Suthep Udomsawaengsup
Bumrungrad International Hospital
Thailand

Register by 31 July 2017.
For more details or to register, visit www.singhealthsac.com.sg or email to diana.fu.c.w@singhealthacademy.edu.sg
Based on the data from the National Registry of Diseases Office (NRDO) for cancers, there is a rising number of patients with blood cancers in Singapore. Many of these blood cancers are now curable or manageable with medications over long periods of time that they are almost similar to chronic diseases like diabetes and COPD. With the advancement in the knowledge and management of blood cancers, more and more people are living longer and are increasingly presenting to the primary care practitioners.

Organised by the SingHealth Duke-NUS Blood Cancer Centre, this forum is conceived as an interactive session aimed at updating our primary care colleagues on common presentations of haematological conditions and how best to manage these situations. This will be organised through small round table hands-on and interactive discussions for all to participate and share their experiences.

Featuring talks by specialists from the SingHealth Duke-NUS Blood Cancer Centre, this forum also aims to provide insight and understanding into blood cancers and how General Practitioners/Family Physicians can help with early identification, which conditions need prompt referral and others that can perhaps even be co-managed.

**GP Forum 2017**

**Towards a Synergistic Care**

**Date**
19 August 2017 (Saturday)

**Time**
2.00 pm – 5.00 pm
(Buffet lunch and tea break will be provided)

**Venue**
White Space
Level 2, Academia
20 College Road 169856
(Please be informed there is no parking at Academia)

**CME points**
CME points will be awarded

**Fees**
Free

**Contact**
SingHealth Duke-NUS
Blood Cancer Centre
Tel: 6702 5505
Email: brenda.ng.s.p@singhealth.com.sg

**Programme**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 pm</td>
<td>Lunch &amp; Registration</td>
</tr>
<tr>
<td>2.00 pm</td>
<td>When to suspect Myeloma in General Practice and what tests to send for</td>
</tr>
<tr>
<td>2.15 pm</td>
<td>Case-based Discussion</td>
</tr>
<tr>
<td></td>
<td>An interactive and hands-on round table group discussion for all to share their experiences.</td>
</tr>
<tr>
<td>2.50 pm</td>
<td>How to approach a patient with Lymphadenopathy</td>
</tr>
<tr>
<td>3.10 pm</td>
<td>Q &amp; A</td>
</tr>
<tr>
<td>3.20 pm</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>3.40 pm</td>
<td>Cancer Associated Thrombosis</td>
</tr>
<tr>
<td>3.55 pm</td>
<td>Panel Discussion (Workshop)</td>
</tr>
<tr>
<td></td>
<td>Interactive session with the speakers</td>
</tr>
<tr>
<td>4.15 pm</td>
<td>Seeing patients with Thrombocytopenia and Thrombocytosis in general clinic settings</td>
</tr>
<tr>
<td>4.30 pm</td>
<td>Q &amp; A</td>
</tr>
<tr>
<td>5.00 pm</td>
<td>End of Programme</td>
</tr>
</tbody>
</table>

**Registration is required.**
The 6th Asia Pacific Primary Care Research Conference in conjunction with Family Medicine Symposium is organised by College of Family Physicians Singapore (CFPS) and SingHealth Duke-NUS Family Medicine Academic Clinical Programme (FM ACP). This is the first time that CFPS, FM ACP and other institutions from the public and private sectors have come together to organise this event.

The theme of the Conference – Advancing Best Care through Education and Research emphasises the importance of education and research in supporting and advancing the development of Family Medicine, and importantly, to bringing about better patient care across the continuum of care.

Key Highlights
- Quality Improvement Essentials
- Harnessing Patient Experiences to Improve Healthcare: A Workshop on Experience-Based Co-Design
- Using Psychometrics To Improve Assessment In Medical Education
- Research Championship

CME points
- 4 CME points will be awarded for each day of the conference
- 12 CME points will be awarded for participation of the full 3-day conference.

REGISTER BEFORE 31 JULY 2017 to enjoy Early Bird Rates!
For registration details and the full programme please go to: www.appcrc.sg
The 3rd NNI Neuro-Oncology Symposium aims to showcase the Precision Medicine initiatives established at National Neuroscience Institute (NNI), which reflect the institute’s multi-faceted approach to translational neuro-oncology with the recently awarded Translational and Clinical Research Programme.

**Date**
25 – 26 September 2017 (Monday – Tuesday)

**Time**
8.30 am – 5.30 pm

**Venue**
Duke-NUS Medical School, Amphitheatre

**Fees**
$50.00

**Contact**
National Neuroscience Institute
Tel: 6357 7152/7541
Fax: 6256 4755
Email: nni_secretariat@nni.com.sg

Registration is required. For more details or to register, visit www.nni.com.sg/education/events/Pages/3rd-Neuro-Oncology-Symposium.aspx

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The KKH Paediatric Dermatology Service will be organising its 3rd Paediatric Dermatology Workshop on 26 and 27 August 2017. This will be held in conjunction with KKH’s 1st Vascular Anomalies Workshop, jointly organised with the KKH Vascular Anomalies Team.

On the back of 2 very successful workshops, this year, the Paediatric Dermatology Workshop will focus on clinical approaches to various common skin rashes and skin lesions in children, with emphasis on differential diagnoses, evaluation and management of these various conditions.

Common paediatric skin presentations that will be discussed include itchy rashes, annular rashes, blistering rashes and urticarial rashes. Other problems discussed include neonatal skin conditions, common birthmarks, pigmentary problems, and hair and nail problems in children.

The Vascular Anomalies Workshop, held on the morning of 26th August 2017, aims to educate doctors on the latest classification, nomenclature, radiological and pathological findings, and management of the various vascular tumours and malformations.

**Date**
26 & 27 August 2017 (Saturday & Sunday)

**Paediatric Dermatology Workshop**
Day 1 (26 August): 12.30 pm – 5.30 pm
Day 2 (27 August): 8.00 am – 12.30 pm

**Venue**
KKH Auditorium (Training Centre)
Level 1, Women’s Tower

**Fees**
Paediatric Dermatology Workshop $15.00 per pax
Vascular Anomalies Workshop $10.00 per pax

Register by 22 August 2017 (Tuesday). For more details, please call 6394 8746 (Monday-Friday, 8.30 am to 5.30 pm) or log on to www.kkh.com.sg/events.
The Advanced Neuroradiology Course has grown in scope since its inception in 1999. We have introduced a hands-on workshop for residents and trainees. Last year’s Pre-course Neurointerventional Workshop was overwhelming and successful.

The course aims to update, refresh and highlight advances in the practice of Neuroradiology and Head & Neck Radiology from a multidisciplinary approach. The specially-invited international and local faculty will share their expert knowledge and insights with the audience on the newest developments in their fields.

The course comprising lectures and discussion of diagnostic and interventional procedures will be relevant to all doctors and healthcare professionals in neuroradiology, head and neck radiology, neurology, neurosurgery, head and neck surgery, oncology, and the other neuroscience disciplines.

**Date**
5 – 6 October 2017
(Thursday – Friday)

**Time**
5 October: 8.00 am – 5.00 pm
6 October: 8.30 am – 5.00 pm

**Venue**
TTSH Theatrette
Level 1, Tan Tock Seng Hospital

**CME points**
8 CME/CPE points

**Fees**

<table>
<thead>
<tr>
<th>Category</th>
<th>1 June to 31 August 2017</th>
<th>After 1 September 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>S$330</td>
<td>S$360</td>
</tr>
<tr>
<td>Radiographers / Nurses / Others</td>
<td>S$250</td>
<td>S$280</td>
</tr>
<tr>
<td>Residents / Trainees</td>
<td>S$250</td>
<td>S$280</td>
</tr>
<tr>
<td>Radiology Resident Review Session: 3 - 5 pm on 4 October 2017</td>
<td>S$50</td>
<td>S$60</td>
</tr>
<tr>
<td>3rd Interventional Neuroradiology Workshop on 4 October 2017</td>
<td>S$180</td>
<td>S$200</td>
</tr>
</tbody>
</table>

**Contact**
17th Advanced Neuroradiology Course Secretariat
Department of Neuroradiology
National Neuroscience Institute
11 Jalan Tan Tock Seng,
Singapore 308433
Tel: 6357 7057/7033
Fax: 6358 1259
Email: sin_leong_tien@nni.com.sg

Registration is required.

This workshop provides state-of-the-art guidance on basic and advanced endovascular treatment strategies for cerebral aneurysms, acute stroke intervention, etc. Attendees will learn ‘what to do and how to do it’ through these workshop lectures, followed by hands-on sessions using flow models and simulators.

There will be product demonstrations and sharing of novel and emerging techniques, tips and tricks for special interventional situations by a panel of experts comprising neuro-interventionalists and nursing specialists.

**Date**
4 October 2017 (Wednesday)

**Time**
8.30 am – 5.00 pm

**Venue**
TTSH Theatrette and Conference Rooms 1 & 2
Level 1, Tan Tock Seng Hospital

**CME points**
4 CME/CPE points

For more details or to register, visit
GP Forum - 14th Practice Update in Paediatrics
Working Together for Holistic Paediatric Healthcare

<table>
<thead>
<tr>
<th>Time</th>
<th>Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 pm</td>
<td>Lunch Reception and Registration</td>
</tr>
<tr>
<td>2.00 pm</td>
<td>Updates on the Management of Myopia in Children</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Tay Su Ann</strong>, Visiting Consultant Ophthalmology Service, KKH</td>
</tr>
<tr>
<td>2.40 pm</td>
<td>Clinical Approach to Stress and Anxiety in Children and Adolescents</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Siobhan Kelly</strong>, Principal Psychologist Psychology Service, KKH</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Shirley Fong</strong>, Associate Consultant Mental Wellness Service, KKH</td>
</tr>
<tr>
<td>3.20 pm</td>
<td>Tea Break</td>
</tr>
<tr>
<td>3.40 pm</td>
<td>Paediatric Dentistry 101 for Doctors and Dentists: The Key Essentials</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Yee Ruixiang</strong>, Organising Committee and Chairperson</td>
</tr>
<tr>
<td></td>
<td>14th Practice Update in Paediatrics 2017 Dental Service, KKH</td>
</tr>
<tr>
<td>4.20 pm</td>
<td>In Search of a Sensible Approach to Cough and Cough Remedies</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Joel Chan</strong>, Associate Consultant General Paediatrics and Adolescent Medicine Service, KKH</td>
</tr>
<tr>
<td></td>
<td><strong>Dr Kelvin Xu</strong>, Principal Clinical Pharmacist Department of Pharmacy, KKH</td>
</tr>
<tr>
<td>5.00 pm</td>
<td>End of Forum</td>
</tr>
</tbody>
</table>

Date
21 October 2017 (Saturday)

Time
1.00 pm – 5.00 pm

Venue
KKH Auditorium (Training Centre) Level 1, Women’s Tower

CME points
Application in process

Fees
$11.00 per pax (Includes lunch, tea and parking)

Contact
Tel: 6394 8746

Register by 17 October 2017 (Tuesday).
For more details, please call 6394 8746 (Monday-Friday, 8.30 am to 5.30 pm) or log on to www.kkh.com.sg/events. Seats are confirmed upon full payment on a first-come-first-served basis. Registration fee is non-refundable.

For the first time in Asia, the S3 Conference 2017 will bring together international thought leaders and cutting-edge ideas from three renowned healthcare simulation centres to one venue in Singapore! Bringing the World of Medical Simulation Together, the S3 Conference will connect healthcare professionals across disciplines and medical professions in Singapore, the Asia-Pacific region, Europe and the US.

The S3 Conference is hosted by the SingHealth Duke-NUS Institute of Medical Simulation (SIMS) with the Society in Europe for Simulation Applied to Medicine (SESAM) and The Gathering Of Healthcare Simulation Technology Specialists (SimGHOSTS).

Who should attend
- Healthcare and simulation technology specialists
- Healthcare educators and trainers
- Nursing and allied health professionals
- Academics and researchers
- Local and overseas healthcare leaders
Approximately one in ten adults aged 18 to 69 were obese, according to the 2010 National Health Survey. Every year, many will fall prey to obesity-associated metabolic diseases like type II diabetes, hypertension, dyslipidemia, infertility and fatty liver. As this number will continue to grow as predicted by MOH, it becomes obvious that prevention and earlier diagnosis followed by effective treatment of these metabolic diseases is vital in efforts to reduce the burden to the national healthcare system.

Providing excellent care means knowing as much as possible about available treatment options. Please join us for the 2017 Obesity & Metabolic Unit GP Symposium. This half-day event, exclusively for healthcare practitioners will focus on the latest advancements in the care and treatment of metabolic syndrome associated with obesity.

Specialists from LIFE Centre, National Cancer Centre Singapore, Centre for Assisted Reproduction and Centre of Digestive and Liver Diseases will present on a variety of topics designed to improve the way you approach these metabolic diseases.

Attendees will also have the opportunity to participate in panel discussions throughout the symposium.

It is extremely important for us to find out from general practitioners/family physicians how we can improve our collaboration, facilitate and co-manage patients with metabolic syndrome in the community to reduce hospital admission.

### Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic &amp; Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.45 pm</td>
<td>Lunch</td>
</tr>
</tbody>
</table>
| 1.40 pm    | Opening Address  
**Dr Lim Chin Hong**, Consultant, Dept of Upper GI & Bariatric Surgery, SGH |
| 1.45 pm    | Novel Medical Therapy on Obesity and Type II Diabetes  
**Dr Sonali Ganguly**, Consultant, Dept of Endocrinology, SGH |
| 2.15 pm    | Diagnosis and Management of Fatty Liver  
**Dr George Goh**, Consultant, Dept of Gastroenterology & Hepatology, SGH |
| 2.34 pm    | Management of Obesity-Related Infertility  
**Dr Rajesh Hemashree**, Senior Consultant, Dept of Obstetrics & Gynaecology, SGH |
| 3.30 pm    | Obesity and Cancer Prevention  
**Dr Justina Lam**, Associate Consultant, Division of Medical Oncology, NCCS |
| 3.45 pm    | Metabolic-Bariatric Surgery: Results After 700 Procedures  
**Dr Alvin Eng**, Senior Consultant, Dept of Upper GI & Bariatric Surgery, SGH |

**CME accreditation is in progress**

For registration and enquiries, please email: UGIB.Enquiry@sgh.com.sg  
Or Contact Cindy Yeong at DID: 6321 5563 / Pauline Lim at DID: 6321 3564  
Mon to Fri, from 10:00 am to 4:00 pm
Join us for the SingHealth Duke-NUS Education Conference 2017 – a landmark academic event in Singapore that showcases the synergy and strength in healthcare education. The last Conference in 2015 successfully gathered more than 1,000 healthcare educators and learners from Singapore and around the world in fellowship and exchange of best practices to boost scholarly exchange.

With the theme “Best Practices in Health Professions Education – Challenges and Opportunities”, the SingHealth Duke-NUS Education Conference returns in September 2017 with the aim to raise teaching standards and forge interprofessional collaborations in healthcare education. The two-day Conference will span all major aspects of healthcare education, with an emphasis on interprofessional practice and collaborations, simulation training, faculty development and teaching methodologies.

Hear from the brightest minds in healthcare education, discover the latest trends in teaching from renowned thought leaders, and exchange best and next practices in teaching to transform the way we teach and learn for better patient care.

Date
29 – 30 Sept 2017
(Friday to Saturday)

Venue
Academia, Singapore
20 College Road
Singapore 169856

Highlights
• Interprofessional Practice and Collaboration
• Assessment of Learning
• Education Technology and Innovations
• Faculty Development
• Pedagogy
… and more!

REGISTER NOW
Don’t miss your chance to be part of this landmark health professions education event. Register online by 31 August 2017!