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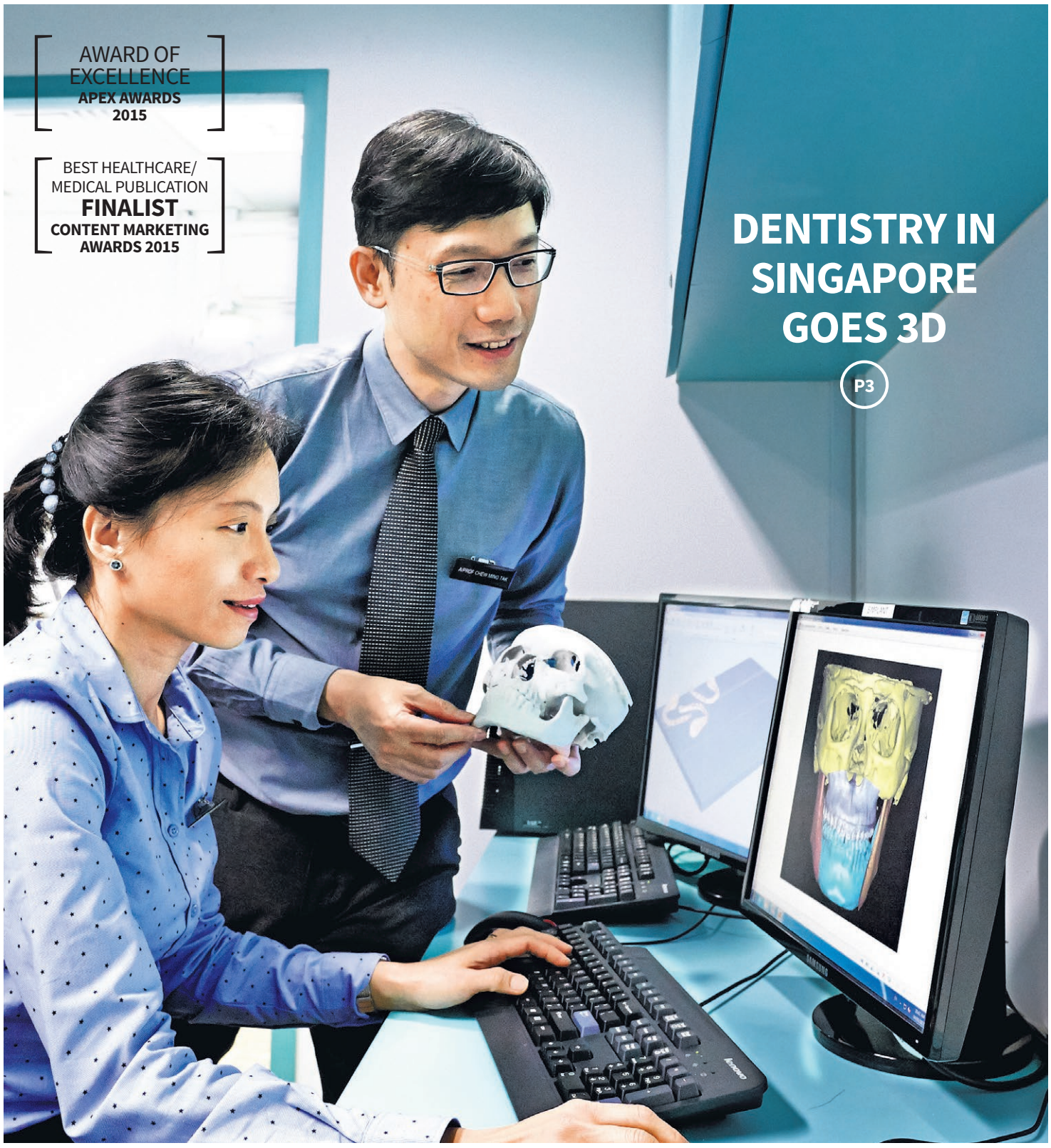

DENTISTRY IN SINGAPORE GOES 3D

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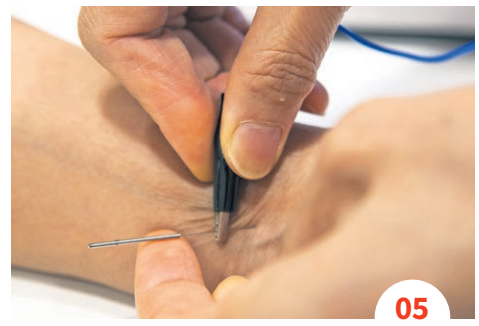

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PHOTOS: JUSTIN LOH

Dr Chew with Ms Sally Tan, Senior Biomedical Engineer (centre), and Ms Yvonne Tan, Biomedical Engineer, discussing a digitally rebuilt jaw that can be used for reconstructive surgery. (Below) Ms Tan with the 3D printer which builds the jaw layer by layer over a few hours.

3D dentistry is here

Using 3D technology in dentistry is a relatively new approach here, but it's expected to be commonplace in the near future. By Suki Lor

IT STARTED IN 2013 with the setting up of the 3D Simulation Unit at the National Dental Centre Singapore (NDCS).

Using 3D images and 3D technology, surgeons then began to pre-plan surgery for long, short or crooked jaws, where patients have difficulty chewing and speaking properly.

Today, they are "printing" advanced 3D models of patients' jaws and skulls as well as cutting guides for actual complex corrective jaw surgeries. The unit which is equipped with the know-how to run the complete 3D process for corrective jaw surgery is at the forefront of this area in South-east Asia.

"Corrective jaw surgery was our first mission. Ever since we achieved capability in that, we have been moving on to more complex procedures," said Clinical Associate Professor Chew Ming Tak, Senior Consultant, Department of Orthodontics, NDCS, and the founder of the unit.

He said the unit is now advancing into 3D planning and printing for those who need jaw resection and reconstruction, after the removal of benign or cancerous tumours in the jaws. "We can design and print cutting guides for surgeons to cut the jaw as planned and reconstruct with prostheses to improve the appearance."

Precision and shorter surgical time

The skulls or jaws are "printed" by 3D printers that build each object layer by layer over several hours. The end result is an exact model of a patient's jaw or skull that surgeons can physically cut and reconstruct to achieve the desired final result.

Dr Chew said 3D technology saves time, improves diagnosis, and lets surgeons plan surgeries more accurately, leading to better results for patients. The images also help in patient-surgeon communication, so patients can get a better understanding of what to expect during treatment.

The technology benefits some of the most complex surgeries, such as the case where surgeons had to harvest bone from a patient's leg to replace bone lost in his jaw during cancer surgery. The bone segments had to be cut at angles to create the shape of the jaw.

But Dr Chew said this is a relatively rare case, and that the most common corrective jaw surgery in Singapore (eight out of 10 operations) is for a long jaw. This is a life-changing surgery, which not only improves a patient's ability to chew and speak, but also his facial appearance.

The unit is also helping to make removable prostheses for patients who may have lost an eye, an ear or half a nose. NDCS has two biomedical engineers engaged in this technically-challenging work.

> **MANY PEOPLE ARE WALKING AROUND WITH LONG JAWS OR SHORT JAWS, NOT SEEKING TREATMENT MAINLY BECAUSE THEY AREN'T AWARE THAT THEIR CONDITION CAN BE SURGICALLY CORRECTED. BUT MORE PATIENTS ARE NOW SEEKING TREATMENT.**
>
> CLINICAL ASSOCIATE PROFESSOR CHEW MING TAK, SENIOR CONSULTANT, DEPARTMENT OF ORTHODONTICS, NDCS

"We are trying to help our biomedical engineers and dental technicians in the laboratory with the use of 3D technology to make their work processes more efficient, accurate, and less laborious," said Dr Chew. The 3D technology can make the moulds but the technicians will

> Continued on page 4

> *Continued from page 3*

3D dentistry is here

still have to make the prostheses by hand out of silicone, a material which current 3D printers are unable to use.

3D for other dental work

"All aspects of dentistry are going digital," Dr Chew said. He predicts that in the near future, it will become common in Singapore to use 3D techniques for even the more straightforward dental procedures such as crowns, dentures and fillings, and that this will lead to better results for patients.

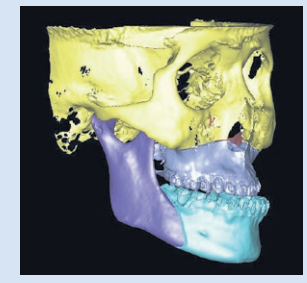
The unit at present is being tapped for its expertise by other local medical institutions. NDCS does about 140 to 150 jaw surgeries a year, with most patients in their early 20s. "More than half of these cases use 3D technology as more surgeons become more willing to adopt digital methods."

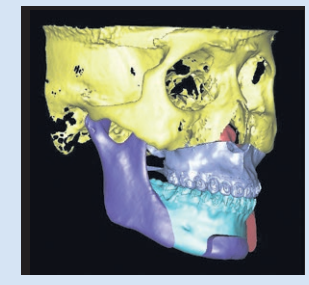
But these numbers are just the tip of the iceberg, said Dr Chew. "Many people are walking around with long jaws or short jaws, but are not seeking treatment mainly because they aren't aware that their condition can be surgically corrected. But more patients are now seeking treatment."

How 3D pre-planned surgery is done

1. Preparation: To be ready for jaw surgery, a patient usually has to be fitted with braces first, by an orthodontist, to straighten his teeth. This may take up to a year and a half.

2. 3D Imaging before surgery: Once the teeth are straightened, 3D images of the face, skull and teeth will be taken. Engineers use computers to fuse the images to create a virtual head, which surgeons can use to perform virtual surgery. Although radiation is low, this planning is usually used only for complex jaw surgeries.



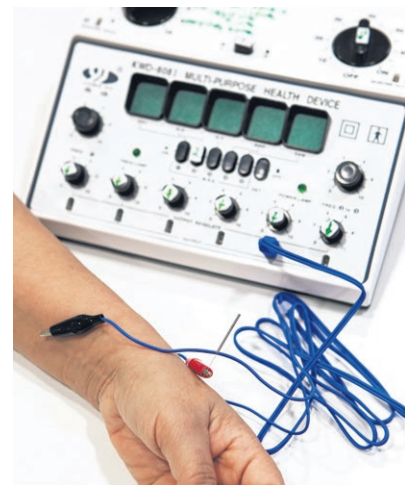


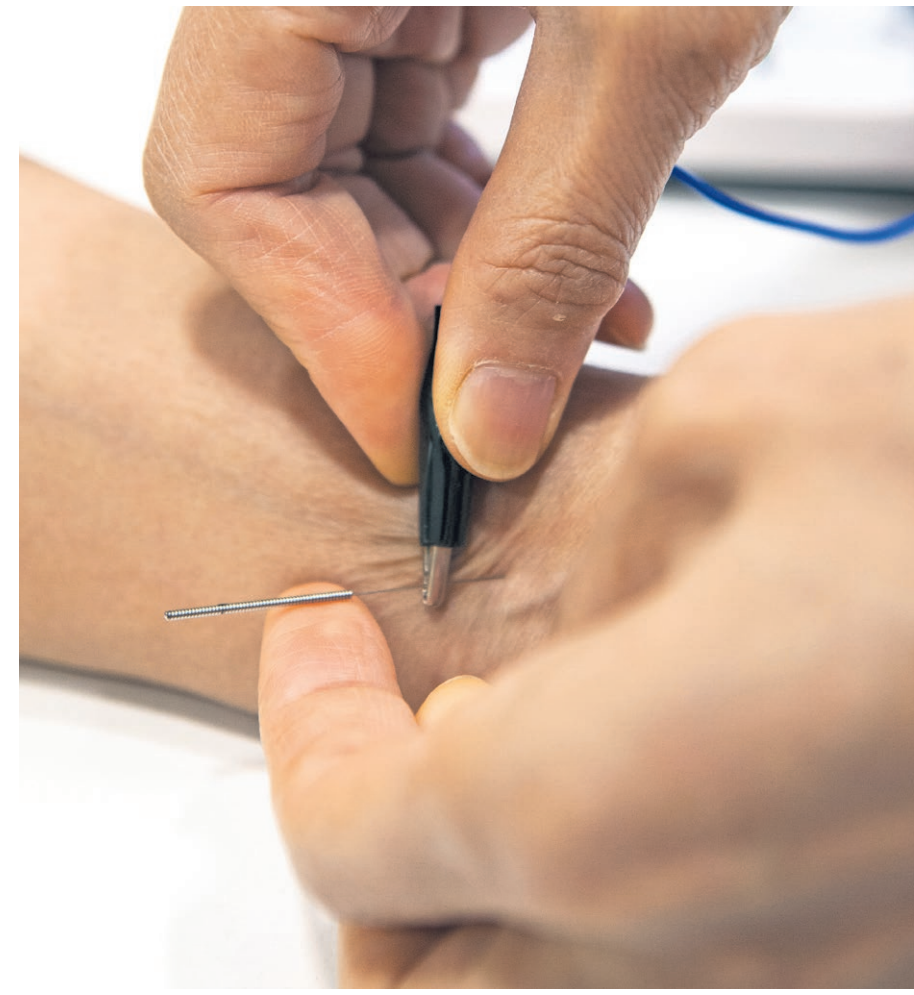
Photographs and scans of the patient's head and teeth are used to develop virtual models.

3. 3D Printing before surgery: To carry planning through to execution in the operating theatre, there needs to be a surgical guide. This is a plastic device that fits over the teeth surfaces or over the area where the surgery will be performed, to guide the surgeon during the jaw surgery. The printer produces this layer by layer over hours but it is swifter and more accurate than making it by hand in the laboratory.

A prickly solution to lessen pain

Acupuncture trial in IVF procedure shows promise of some relief – and a possible bonus – for women undergoing egg retrieval. By Sol E Solomon





PHOTOS: ALVINN LIM

When using electro-acupuncture to help relieve pain during IVF retrieval, 12 acupuncture needles are inserted at specific points – four at the lower abdomen, another four at the lower back and two on each hand – and connected to a device that generates continuous electric pulses.

TO EASE THE PAIN and discomfort felt during an IVF (in vitro fertilisation) egg retrieval procedure at Singapore General Hospital (SGH), sedation is normally given.

But sedative drugs, while generally safe, aren't for everyone. They can cause allergic reactions, and even complications. Some women also suffer nausea, giddiness, extreme sleepiness and other effects from the sedative drugs after the procedure.

Seeking a viable alternative for women, especially those who might have problems with sedative drugs, an SGH team undertook a study to look at whether acupuncture might do the work as well. Acupuncture, a key part of traditional Chinese medicine (TCM), doesn't involve drugs – just needles which are inserted at various parts of the body to stimulate the acupoints and supposedly alleviate pain.

"The idea with this study was to prove that acupuncture does work (as a form of painkiller), and to hopefully make it a service that can be offered to women seeking IVF (at CARE or the Centre for Assisted Reproduction)," said Associate Professor Yu Su Ling, Senior Consultant, Obstetrics and Gynaecology, and Director, CARE, SGH.

"I'm always worried about the effects of sedation on some patients," she said, noting that the amount of sedative drugs may have to be increased markedly for overweight or obese women.

The study aimed to recruit 60 participants, half of whom were randomly chosen to be sedated and the other half given electro-acupuncture, to relieve pain. Like for every procedure, the women were tested for suitability for both sedation and acupuncture.

Early indications – 16 under conscious sedation and 12 who received electro-acupuncture – suggested that "the pain relief effects from sedation and acupuncture were almost the same", said Prof Yu. Nurses observed the patients during the procedure for signs of discomfort and asked them after to determine if they felt pain and its intensity.

While the effects were similar, "the acupuncture group asked for less top-up – additional help to relieve pain during the procedure", said Prof Yu. Just 8 per cent of the women who received electro-acupuncture asked for more pain relief during the procedure compared to 44 per cent from the conscious sedation group, she added.

One surprising – and notable – finding was that more women in the acupuncture group became pregnant (83 per cent) compared to the sedation group (40 per cent). But the study's small sample size does not allow for acupuncture to be conclusively pinned down as the cause for the happy outcome.

According to Ms Cui Shu Li, Senior Principal Acupuncturist, SGH, the acupoints targeted for stimulation not only provide pain relief, but also "nourish kidney function," which in TCM means enhancing fertility.

Because sedation caused after-effects, patients in that group needed at least an hour to recover under the nurses' careful monitoring. The other group didn't need monitoring because they had not been given any drugs and so, had no side effects. "We found that the acupuncture patients didn't need post-operative recovery at all. They could leave the hospital immediately after. But patients under sedation might still be sleeping when their husbands returned for them later," said Ms Yu Chun Yan, SGH Nurse Clinician, CARE.

(From left) Ms Yu Chun Yan, Prof Yu Su Ling and Ms Cui Shu Li.

"This post-procedure recovery really saves costs and time for the nurses. Beds can be freed up for other patients, and nurses can also attend to other patients," she added.

While acupuncture is regularly used in surgical procedures in China, the technique is increasingly being used in many places in the West, notably Denmark, as a way of relieving pain during surgical procedures, said Prof Yu. It is even being used in place of anaesthesia for hysterectomy, or the removal of the womb, in some countries, sometimes performed by anaesthetists trained in the technique. Acupuncture is finding favour among patients who prefer to use fewer or no drugs if possible, even to help with nausea and vomiting during pregnancy.

The study and its preliminary results were submitted to the SingHealth Duke-NUS Scientific Congress 2016 under the Clinical Research (Senior) category.

How eggs are retrieved in IVF

An in vitro fertilisation (IVF) egg or oocyte retrieval is a minor procedure that takes 10 to 15 minutes to do.

The woman would have been given daily injections for about a fortnight before to stimulate her eggs to mature. Before the procedure, she is sedated or put under anaesthesia to help ease the discomfort or pain that she may feel. In Singapore, sedation (which is a mild form of anaesthesia) can be given by a doctor, but anaesthesia is only performed by a trained anaesthetist.

Then, an ultrasound probe with a fine needle is inserted into the vagina, going through the vagina wall and into the ovary, to suck out follicle fluid. The fluid is then examined under a microscope by an embryologist, who collects an average of 10 eggs for an IVF treatment cycle.

There is usually very little bleeding, which in any case is easily stopped by pressure.

Patients given sedation have to rest for at least an hour, and confirm that they have recovered fully before they are discharged.

Depending on the quality of the eggs, a fertilised embryo will be transferred back into the woman two to five days later. No sedation is involved at this juncture as there is very little pain or discomfort.

Women between the ages of 25 and 45 can undergo IVF.

Ready if it ever happens again

Specialists probing the case histories of Singapore's 2015 raw fish infection outbreak now better understand it, and are prepared for any future recurrence. By Suki Lor

PHOTO: THE NEW PAPER/SPH LIBRARY

WHEN THE RAW FISH infection outbreak happened here, nobody knew the cause.

But the culprit bacteria was quickly identified as a Group B Streptococcus (GBS) bacteria. It was, in particular, the GBS Sequence Type (ST) 283 strain – a strain associated with fish.

Since then, researchers have been probing for answers, and they now have an improved understanding of the disease. This is expected to lead to better diagnosis and treatment if the bacteria strikes again in the future.

The team conducting the probe included Associate Professor Kevin Tan, Senior Consultant, Department of Neurology, National Neuroscience Institute (NNI) who was supported by Professor Tchoyoson Lim, Senior Consultant, Department of Neuroradiology, NNI. Other experts came from other hospitals including the Singapore General Hospital and Changi General Hospital.

The team studied brain MRI scans and showed how the Group B Streptococcus bacteria affected the brains and central nervous systems of outbreak victims. They also examined 14 adult patients with Group B Streptococcus meningitis and found abnormalities in the brain and its fluid spaces. These included small lesions and unusual features in certain regions of the brain.

These abnormalities can be visibly highlighted with diffusion-weighted imaging (DWI), an advanced magnetic resonance imaging (MRI) technique. The patterns highlighted can alert doctors and radiologists to an outbreak, and help in the detection and diagnosis of an outbreak.

Normally, brain infections caused by Group B Streptococcus bacteria are confirmed after testing patients' cerebrospinal fluid, obtained via a lumbar puncture (a needle inserted in the lower back). But Prof Lim said doctors would prefer to have some level of imaging before the lumbar puncture results.

Having a team in place

Dr Tan said that in any infectious disease outbreak, tracking down the cause fast and understanding how the infection affects people is vital.

The team managed to pick up the GBS meningitis cases because they were part of a larger team already in place, studying brain infections, when the outbreak happened.

This larger team was from the Singapore Neurologic Infections Program (SNIP) – a nationwide scheme to study infectious diseases of the nervous system and identify and assist in outbreak detection here.

The team included neurologists, infectious disease physicians, radiologists and microbiologists from various hospitals and laboratories who could communicate and share data efficiently.

"Our advantage was having a set-up in place to very quickly study this group of patients (with Group B Streptococcus meningitis) and look at the patterns, which may now help us identify such infections better in the future," said Dr Tan.

He recalled how in the early weeks of the outbreak, there were a larger number of patients with brain infections, compared to the months before.

Dr Tan said many patients had meningitis – an inflammation of the membrane covering the brain. Symptoms of meningitis include fever, headache, neck stiffness, and altered mental states.

Doctors were mystified because the bacteria had previously been known to infect mainly newborns and the elderly, but most victims in the outbreak were healthy adults.

"But with this larger team, we could identify the patients affected faster. We found unusual patterns in the way this bacteria affected the brain, so we suspected that this was a different brain infection compared to others we usually see.

"Outbreaks happen from time to time, but with this surveillance system in place, we are more prepared to identify new brain infections, or new ways known infectious agents cause central nervous system infections," said Dr Tan.

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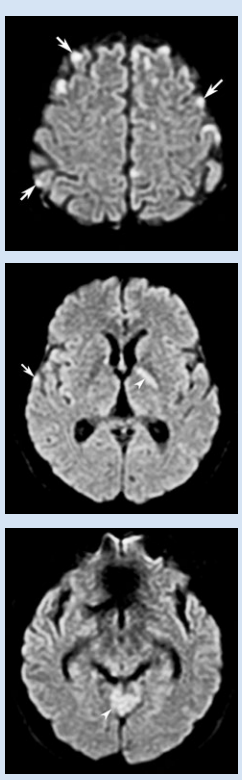
>
> ASSOCIATE PROFESSOR KEVIN TAN, SENIOR CONSULTANT, DEPARTMENT OF NEUROLOGY, NNI

(From left) Dr Kevin Tan and Prof Tchoyoson Lim studied brain MRI scans of victims for abnormalities caused by the GBS bacteria.

Brain infections – fast facts



MRI SCANS: JOURNAL OF MAGNETIC RESONANCE IMAGING

- Bacteria and viruses are the most common causes of brain infections. They can also affect other parts of the central nervous system, including the spinal cord.
- Parasites and fungi can also invade the brain.
- A brain infection from any cause is very serious and can lead to permanent brain damage or even death.
- Meningitis is the inflammation of the membrane surrounding the brain and spinal cord, and it can be caused by infections.
- Encephalitis, or brain inflammation, is the condition where the brain tissue itself is infected.

The arrows point to abnormalities in the brain scans of a patient with Group B Streptococcus meningitis.

Ready to breathe, swallow and speak without help

Team helps wean patients off tracheostomies, hastening their recovery and improving their quality of life. By Natalie Young

PHOTOS: ALVINN LIM

The multi-disciplinary tracheostomy team (seen here in a ward simulation) makes routine ward rounds to identify if patients are ready to be weaned off their tracheostomies and move to the next step, which is relearning talking, breathing and swallowing.

Respiratory specialist (second from left in photo) Dr Sewa Duu Wen works with the team to develop a coordinated plan and gives medical advice on managing each patient's tracheostomy.

Respiratory Therapist Ivan Lee (third from left) focuses on managing patients' airways and assessing patients for different types of tracheostomy tubes.

Speech Therapist Lee Yan Shan (second from right) works with patients and their families to communicate – through eye movements, yes/no questions or by helping patients articulate their speech – and teaches patients how to swallow again.

Respiratory Nurse Yatassha Abdul Fattah (extreme right) supports other nursing professionals in caring for tracheostomies to minimise the risks of infection.

Physiotherapist Farhanah Nizamudin (extreme left) assesses patients' lung function for sound, strength and quality of cough, as well as their overall mobility.

CRITICALLY ILL with pneumonia or after a severe stroke, patients might be fitted with tracheostomies to help them deal with breathing and swallowing difficulties as they recover. But relying on tracheostomy tubes for longer than necessary can slow or complicate their rehabilitation. For example, cleaning can be difficult, the tube can become blocked, and patients can develop infections.

To get patients off the device, a new multi-disciplinary team at Singapore General Hospital (SGH) is working closely with one another to quickly identify patients who are ready to be weaned off their tracheostomies, and help them begin relearning talking, breathing and swallowing – actions that most of us take for granted.

Doing this gets patients back to some semblance of normality, making their care easier to manage at home or even in the hospital. Without the trachestomy tube obstructing their movements, patients begin to communicate, swallow and eat more normally, said Dr Sewa Duu Wen, Consultant, Department of Respiratory and Critical Care Medicine, SGH.

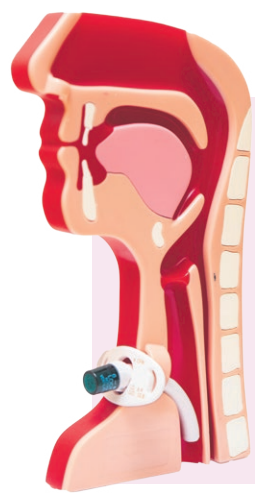
"To a patient's family, having his tracheostomy removed is a significant step in his recovery. Patients usually have other aspects of care that need to be handled – so we have to temper their optimism – but psychologically it does wonders for the family," he added.

From a pilot study conducted in 2013, the service has gained traction, doubling the number of new patients referred by other clinical disciplines from 25 in 2015 to 52 last year.

Besides a respiratory doctor, the team includes respiratory, speech and physical therapists, as well as a respiratory nurse. When a new patient is referred to this roving team, the respiratory therapist assesses what has been done since the tracheostomy was created. "The first thing we generally do is determine if it is safe to deflate the balloon that has been blocking off the upper airway," said Mr Ivan Lee, Respiratory Therapist, SGH.

The team may then use a smaller tube that can be modified with different valves, to manage airflow and allow patients to work on relearning swallowing and communicating. If the patient is already able to handle breathing on his own, they may challenge him with a spigot, a small plug that seals the tracheostomy without undoing it. This forces the patient to breathe through his nose and mouth and swallow efficiently.

For some patients, this spells the end of their tracheostomy.



What is a tracheostomy?

The tracheostomy tube is inserted into the windpipe through a small incision at the base of the throat, and secured with a neck strap. A balloon fixed to the tube is inflated to prevent secretions from flowing into the lungs. A ventilator can be attached to pump air directly into the lower airway and lungs, or patients can breathe independently.

For those who still struggle with swallowing saliva, continue to have some breathing difficulties, or have any underlying medical condition that makes weaning them off completely inadvisable, a one-way valve can be added. Also called a speaking valve, it only allows air to flow in, enabling those who have retained the ability to speak to express themselves again.

Regardless of their level of ability to communicate, a speech therapist becomes closely involved at this point. Working to a range of abilities, he helps patients express themselves through anything from eye movements and yes/no questions to speaking.

"For those who can talk, after the speaking valve is put on, we can teach them articulation drills to make it easier for them to be understood," said Ms Lee Yan Shan, Speech Therapist, SGH, who also helps patients with swallowing.

For many patients and their families, the closing of a tracheostomy is a major milestone. It may not be possible for everyone, but the tracheostomy team is able to wean almost nine in 10 patients off the tracheostomy before they are discharged, and help to make the time in which these patients require a tracheostomy as short and as comfortable as possible.

The community cares

A newly launched programme takes care of the medical, social and emotional needs of seniors in the community.

By Thava Rani

FOR MORE THAN A DECADE, 67-year-old Mr Wong Ah Ann has been living alone in his one-room flat in Chin Swee Road.

Due to his poorly controlled diabetes, he developed complications including near blindness, kidney failure and hardening of the arteries. Despite being visually handicapped, he has managed to move around on his own, going to the shops and for his medical check-ups.

"But I had a fall late last year and was admitted to Singapore General Hospital (SGH). Since my discharge, I've been in a wheelchair," said Mr Wong.

To ensure he was coping well at home, an SGH care team visited him regularly to monitor his condition, trained his new domestic helper and helped with his Medifund application. Concurrently, another team from Temasek Foundation Cares – Care Close to Home helped him with his personal care needs and arranged for befriender support.

This kind of post-discharge care integration is what the newly launched Community of Care programme is about.

Developed by SingHealth Regional Health System and supported by the Kreta Ayer-Kim Seng constituency, more than 260 seniors in Chin Swee Road and Banda Street have benefited from it so far. The team works closely with the Agency for Integrated Care, Kreta Ayer Seniors Activity Centre and general practitioners in Chinatown, to enhance their health and social care.

Professor Fong Kok Yong, Deputy Group CEO (Regional Health and Medical), SingHealth, said, "Patients have emotional and social needs beyond the medical issues we're hoping to address. The programme helps us spot complications early and intervene before conditions worsen for this group of elderly residents who are at risk of hospital readmission."

At-risk patients – those with complex medical conditions after discharge or social issues such as loneliness and financial difficulties – are first identified by a multi-disciplinary team in SGH. A personalised care plan is then put together for each patient before he is discharged.

"It goes beyond medical needs. Our team has cleaned the house, brought the elderly shopping, and organised Christmas parties – basically anything to cheer them up," said Ms Helen Alburque' V, Community Nurse, Temasek Foundation Cares – Care Close to Home.

In Mr Wong's case, they noticed that he frequently scalded his legs when pouring himself hot water. So, they took him to the Singapore Association of the Visually Handicapped to identify gadgets that could help him in his daily activities.

Dr Lily Neo, MP for Jalan Besar GRC (Kreta Ayer-Kim Seng) said, "With medical expertise from SingHealth, we are better equipped to help our elderly residents lead independent lives, and age in place confidently, among a supportive network of friends and familiar faces."

Associate Professor Lee Kheng Hock, Director, Office of Integrated Care, SGH, said, "Chinatown has a sizeable proportion of vulnerable elderly with little or no caregiving support. We plan to reach out to more residents by the end of this year."

PHOTO: WINSTON CHUANG

Mr Wong Ah Ann, who is in the Community of Care programme, chatting with (from left) Prof Ivy Ng, SingHealth Group CEO; Ms Amy Khor, Senior Minister of State for Health; and Ms Lily Neo, Member of Parliament, Jalan Besar GRC, who visited him at home.

Visiting a patient at home to ensure he is coping well are (from left) Dr Chia Min Yan, Resident Physician, Department of Family Medicine & Continuing Care, SGH and Ms Goh Wei Lin, Senior Staff Nurse (Patient Navigator), Office of Integrated Care, SGH.

> **THE PROGRAMME HELPS US SPOT COMPLICATIONS EARLY AND INTERVENE BEFORE CONDITIONS WORSEN FOR THIS GROUP OF ELDERLY RESIDENTS.**
>
> PROFESSOR FONG KOK YONG, DEPUTY GROUP CEO (REGIONAL HEALTH AND MEDICAL), SINGHEALTH, SINGAPORE GENERAL HOSPITAL.

Nerve stimulation to take away the urge

Nerve stimulation can help hard-to-treat urinary incontinence. By Natalie Young

PHOTOS: GETTY IMAGES; 123RF

An overactive bladder can start to affect daily life in extreme cases. With the wide range of treatments available, one should seek help once the symptoms get bothersome, said Dr Tricia Kuo.

IF YOU HAVE TO KEEP RUNNING to the loo, but then pass very little urine, you could be one of the more than 400 million people worldwide who suffer from an overactive bladder.

Caused by faulty signals, this bothersome problem is often treated using conservative methods – like lifestyle changes and pelvic floor exercises – before medication is given.

If the problem persists, treatments such as botox, electrical stimulation, or surgery are considered, said Dr Tricia Kuo, Consultant, Department of Urology, Singapore General Hospital (SGH).

But for those who prefer less invasive methods, a relatively new procedure that doesn't involve surgery and whose effects are fairly enduring is now available in Singapore. Known as percutaneous tibial nerve stimulation, the treatment is similar to acupuncture and is done in the clinic, said Dr Kuo.

"A fine (0.18mm in diameter) needle electrode is inserted 10mm to 20mm deep into the skin near the ankle to stimulate a specific nerve that transmits signals to the bladder. With a small electrical current, the muscles controlling the bladder can be regulated," said Dr Kuo.

The procedure, offered at SGH since April 2015, takes about 30 minutes each time. A complete course involves 12 visits over three months and provides relief for up to two years.

"After the initial 12 weeks of treatment, the frequency of treatment is tapered down," she said, adding that patients can have treatment intermittently after that.

Apart from the sensation from the needle prick, the side effects of percutaneous tibial nerve stimulation are mild, brief and relatively rare. The procedure is mainly used to treat urinary incontinence – overactive bladder or urgency incontinence – but in select cases can be used to treat faecal incontinence.

Overactive bladder occurs when nerve signals to the bladder are overstimulated, causing the muscles to squeeze and contract in an uncontrolled fashion, creating an urge to urinate. This overstimulation of the nerves can be caused by an underlying neurological condition, such as a stroke, Parkinson's disease, or multiple sclerosis.

However, there is another group of people who develop overactive bladder for whom the exact cause is never discovered.

With the wide range of treatment options available, people who experience overactive bladder should seek help once they develop symptoms that become bothersome or which start to affect daily life, said Dr Kuo.

"Prevention is not always possible since even normal childbirth can lead to incontinence in later years. But this should never be accepted as a normal part of ageing," said Dr Mark Wong, Senior Consultant, Department of Colorectal Surgery, SGH, and Director, SGH Pelvic Floor Disorders Service.

Types of urinary incontinence

Urinary incontinence may be a temporary inconvenience when triggered by a urinary tract infection, medication, or constipation. But there are also types of urinary incontinence that persist:

Stress urinary incontinence
This is caused by weakened support from the pelvic floor muscles. Being post-menopausal, lifting heavy weights, having had multiple pregnancies, and other forms of abdominal strain can worsen the condition.

Urgency urinary incontinence (wet overactive bladder)
This is related to overactive bladder, where patients feel the urge to urinate when the bladder is not full. This translates into more than eight trips to the bathroom during the day and waking up more than once at night to pass urine.

Mixed urinary incontinence
A combination of stress and urgency incontinence.

Continuous or total incontinence
a constant leaking of urine, caused by an abnormal connection between the bladder and vagina, prolonged childbirth, removal of the womb, or prior radiotherapy.

Overflow incontinence
Excess urine leaks from a full bladder, caused by a blockage at the bladder door or a problem with the strength of the bladder muscles. Diabetics may be at higher risk of developing this type of incontinence.

Other treatments for an overactive bladder

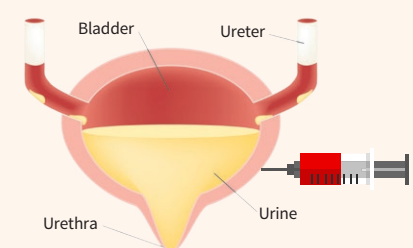
▶ **Bladder management –** bladder training, timed voiding, and urge suppression

▶ **Biofeedback, pelvic floor exercises, and behavioural techniques**

▶ **Non-reversible surgery –** to numb the nerves around the bladder

▶ **Nerve stimulation techniques**
In addition to percutaneous tibial neuromodulation stimulation, another technique known as sacral neuromodulation system involves a fine electrode inserted near the nerves of the lower spine and a pacemaker implanted into the back to stimulate and control the nerves that supply the bladder, bowels, urinary and anal, and pelvic floor muscles. This procedure can be used for both urinary and bowel incontinence.

▶ **Botox injections –** administered via cystoscope (a thin tube with a camera) into the bladder, to relax overstimulated nerves



▶ **Medication –** to decrease abnormal bladder muscle contractions and reduce pressure

▶ **Catheters, pads and underwear**

Get your queue ticket at home !

A new method of tackling long queues and waiting times at specialist clinics is being rolled out at SingHealth's specialist clinics. By Suki Lor

A FEATURE RECENTLY added to the SingHealth Health Buddy mobile app may see an end to long waiting times at clinics.

Using the app, patients can now register and get a queue number while still at home, using their mobile phones. They can also gauge their waiting time to see the doctor, via live updates of the queue status (how many patients are ahead of them), and go somewhere else instead of waiting in the clinic.

The innovation, which took SingHealth and iHIS a year to develop, lets patients better plan their arrival time to avoid a long wait. They need not rush to a clinic to face what could be a long queue.

The pilot project has been successfully tested at the Singapore General Hospital's Musculoskeletal Centre and Diabetes and Metabolism Centre, and at Cardiology Clinic 5A at the National Heart Centre Singapore since October last year.

SingHealth has started planning to roll this out progressively at other SingHealth Specialists Outpatient Clinics (SOCs) over the next two years, said Ms Lee Chen Ee, Director, Office for Service Transformation, SingHealth. It saw about 2.3 million attendances last year.

Like the airline industry's online check-ins before flights, SingHealth wants patients with appointments to be able to register before coming to its clinics, she said.

"Mobile registration is intended to help our patients have a better experience and spend less time waiting at the clinics. It could reduce waiting time in the clinic for each patient by 30 minutes.

"Patients waste time waiting in sometimes crowded clinics and are anxious and uncertain about how long they have to wait. In busy clinics, it can be up to one hour, or even longer if a doctor is called away to an emergency," said Ms Lee, who is also Chief Operating Officer, National Dental Centre Singapore.

Interest in the service

The innovation was made in response to patients' needs. About 75 per cent of the patients surveyed, who were smart phone users, indicated that they were keen to use the service.

"Since the pilot project, more than 1,000 patients have used it. That's about a 5 per cent take-up rate, and in some clinics, it's as high as 18 per cent. We're happy with the results so far, and will expand the service to more clinics," said Mr Chan Fun Jui, Manager, Marketing Communications, SingHealth, who manages the Health Buddy app.

PHOTO: 123RF

Patients with appointments will be able to register and get a queue number by using their mobile devices while still at home, to reduce their waiting time in the clinics.

The service is expected to be extended to KK Women's and Children's Hospital and the National Cancer Centre Singapore by the end of 2017. Changi General Hospital, which will return to the SingHealth group later this year, has also indicated interest.

Mr Chan said that mobile registration also means patients in crowded clinics need not fear losing their seats if they leave them. "Some refuse to leave their seats while waiting, for fear of losing them when they return."

And as app-savvy patients migrate to mobile registration, clinic staff will have more time to attend to the elderly. Apparently, the most frequent query that staff get from waiting patients is, "When is my turn coming?"

"Over the long term, mobile registration can result in less crowded waiting areas, reduce the staff needed to man registration counters, and reduce the need to build large waiting areas at our clinics," said Ms Lee.

How it works

1 Download the SingHealth Health Buddy app.

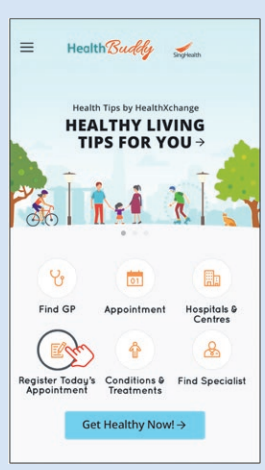
2 If you have a morning appointment you will receive an SMS at 8am inviting you to register with the Health Buddy app. The SMS gives you direct access to the app. If your appointment is in the afternoon, your invitation to register will be at noon.

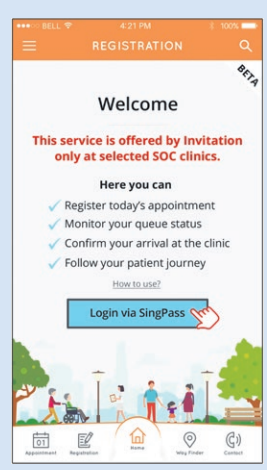
3 Log in with your SingPass to mobile-register yourself, or your children below age 15, at least 30 minutes before the appointment time.

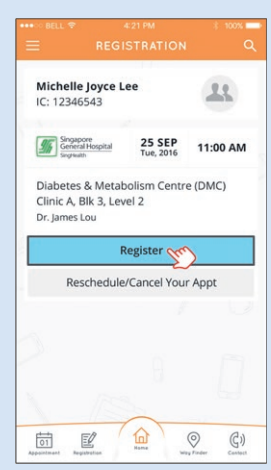
4 During mobile registration, you will be asked questions such as whether you have visited certain countries or have a high fever. These are based on Ministry of Health public health advisories. Depending on your answers, you might not be able to mobile register your appointment.

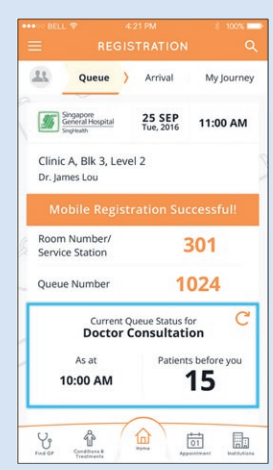
5 If your registration is successful, you will get a queue number and be able to see how many patients are in the queue ahead of you. By clicking the refresh icon, you can monitor the live queue status. An SMS alert will be sent to you when the queue is down to five persons.

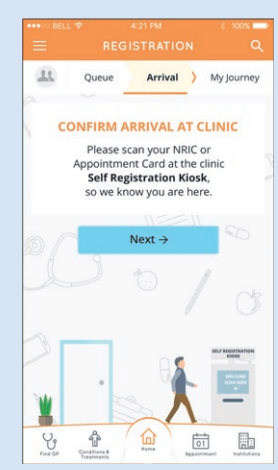
6 The app will also inform you to scan your identity card or appointment card at the self-registration kiosk in the clinic to confirm your arrival. If you are already in the clinic without pre-registering on the app, you can still log in and use the service to check your queue status.

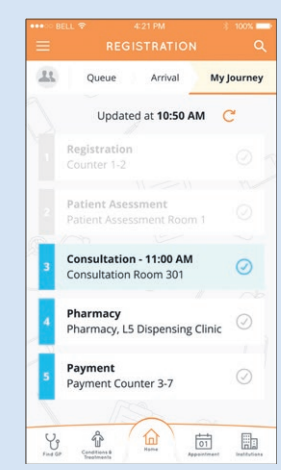












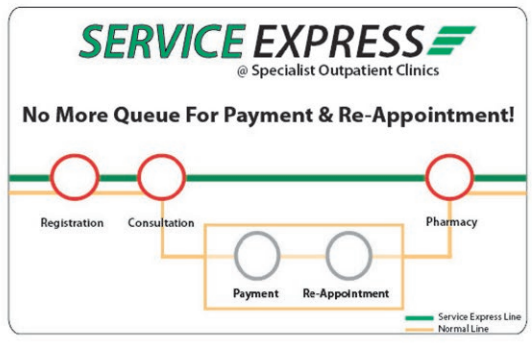
Faster way to settle bills

After seeing the doctor at one of your SOCs (Specialist Outpatient Clinic), I had to wait a long time to settle my bill and get a follow-up appointment. I have to ask for leave for a few hours each time I am at SGH for a consultation.

SGH SAYS If you do not want to wait to settle your bill after seeing the doctor, you can sign up for Service Express. Under this service, your bills will be charged to your credit card or GIRO, and the receipt and other documents, including your next appointment, mailed to you within seven working days. This free service is only for bills incurred for consultation, laboratory and other services rendered in the clinics.

You can register for Service Express at any of the clinics or visit https://www.sgh.com.sg/patient-services/specialist-outpatient-services/pages/serviceexpress.aspx to download the application form. The form is for pre-authorising your bill payments by credit card or GIRO. Service Express can be activated immediately for credit cards. As with all GIRO payments, activation of the service is subject to confirmation from the patient's bank. Service Express can also be used to pay for other patients' bills, but separate application forms need to be submitted for each patient.

You can also call 6321-4386 for more information.



Managing my child's appointments

Currently I can manage my appointments using SingHealth's Health Buddy app. I would like to reschedule my child's medical appointments using the app as well. Can I add my child as a dependent under my profile so that I can manage her appointments? It would make things so much simpler and quicker.

SH SAYS You can use the Health Buddy app to manage your child's appointments, by including her as a dependent under your account. Dependents are defined as your "own children below 15 years of age".

To do this, bring along your child's birth certificate to the SingHealth institution or polyclinic at her next appointment and approach the registration staff for help.

Once your child has been added as a dependent, you can conveniently manage or re-schedule her appointments using the Health Buddy app.

WRITE IN

about your health experience and win a prize for best letter

Letters must include your full name, address and phone number. *Singapore Health* reserves the right to edit letters and not all letters will be published. Write to **editor@sgh.com.sg** or **The Editor**, ***Singapore Health***, **Singapore General Hospital, Communications Department, Outram Road, Singapore 169608**, or talk to us on **Facebook**.

The winner will receive 1 bottle of Astavita Healthy Living Antioxidants (60 softgels) and 1 bottle of Astarism Skin Serum (30ml), worth a total of $114.00, sponsored by AstaReal Pte Ltd. www.astavita.sg

Seeking balance in art and medicine

Medicine is both a skill and an art, and like art, a balance between the risks and benefits of a treatment is important in deciding what is best for patients.

By Professor Foo Keong Tatt

I learnt to sketch as a Boy Scout. When we went hiking and camping, we were taught to be observant and to keep a log book with maps and sketches.

Years later, when I attended medical conferences overseas, I would sketch the various places I visited. If there was time, I did them on the spot; otherwise, I took photos or videos and drew the pictures when I was home.

I learnt the basics of fine art – composition, the one-third rule, focal points – from my secondary school art teacher. But it was my Chinese art teacher, the late Mr Fang Chiu Pi, who taught me the importance of having empty spaces in a picture to achieve a sense of peace and balance.

Yes, balance is key – be it in nature, life, water-colour painting, or clinical practice. In a sense, the practice of medicine is more of an art than science; each patient is different even if symptoms are similar. Of course, the doctor's work is more difficult as he cannot afford to make mistakes. When an artist makes a mistake, he can just tear up his work and start over again!

Patients often don't come with a ready diagnosis. They see us with symptoms or a combination of symptoms that we need to make sense of in order to make a diagnosis. We also need to know the prognosis to predict the natural course of the disease.

To achieve good balance in treatment, like any artist, the doctor needs to know the fundamentals of clinical practice and when to intervene – i.e., treat – after making a diagnosis.

Over-investigating or over-treating often can do more harm than good to a patient. A simple cyst in the kidney that is not life-threatening, not affecting the kidney and has no symptoms may be best left alone. Operating on the cyst may cause more harm than good. A less aggressive prostate cancer, especially in elderly men, is better kept under observation than treated, with the many side effects of treatment.

But deciding not to treat a patient is often more important and difficult to do than deciding to treat a patient. For instance, a patient with an elevated PSA (prostate specific antigen, a tumour marker) may need to have a biopsy if cancer is suspected. But the complications rate of transrectal ultrasound biopsy is high – 6.5 per cent of patients develop bleeding, fever and retention of urine, while one in 1,000 die from sepsis.

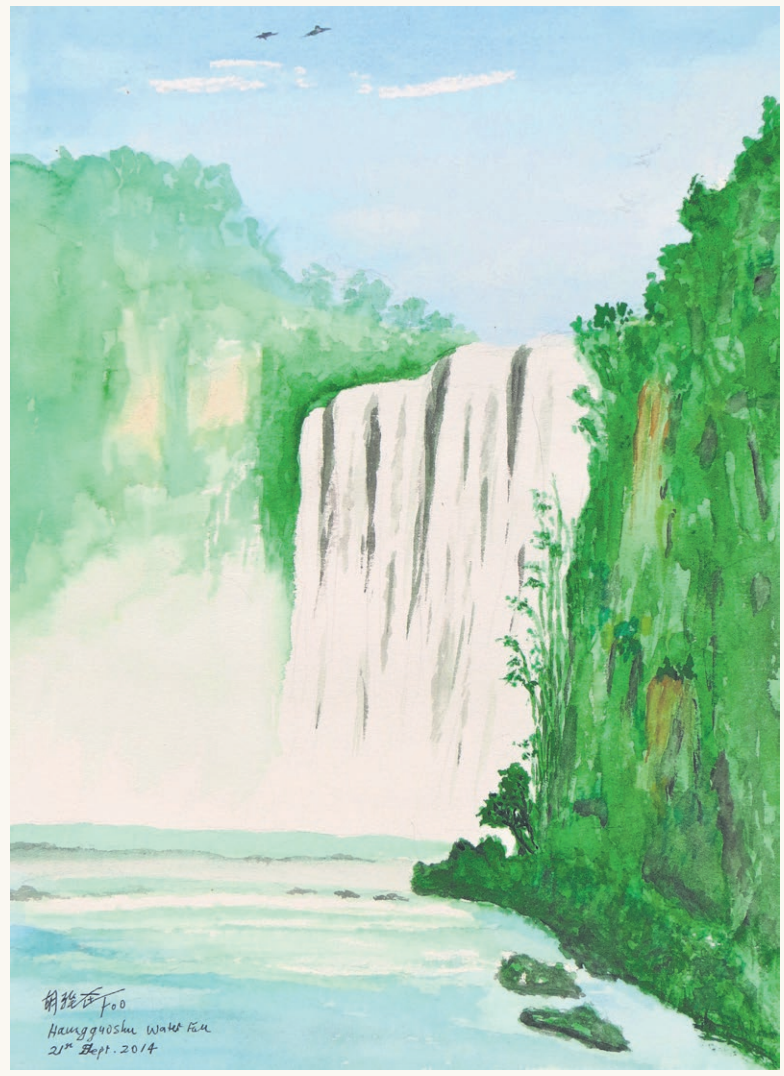


ILLUSTRATION: PAINTING OF HUANGGUOSHU WATERFALL IN GUIZHOU, CHINA, BY PROFESSOR FOO KEONG TATT

Professor Foo Keong Tatt learnt the importance of having blank spaces in his paintings or not overcrowding his canvas as a way of achieving a sense of peace and balance.

Such odds are really not acceptable for a diagnostic procedure. So while it may be easier for the urologist to perform a biopsy, in some cases, it might be far better to just observe the patient and not risk the complications that can arise with a biopsy.

Deciding when to treat a patient requires both a keen sense of clinical judgment and the ability to balance the risks and benefits, always with the patient's best interests in mind. Clinical judgement or experience comes from years of practice, and of making decisions – both right and wrong.

The late Dr Earl Lu, a surgeon and an accomplished artist well known for painting roses, once told us that a good artist goes through three phases in his life – very similar to clinicians.

The first is "not the same" (不像 *bu xiang*), meaning that whatever he draws is not of the same standard as the master. The second phase is "the same" (像 *xiang*) – he is able to copy the work of the master and may even be able to reproduce exact copies.

The third phase is "not the same again" (又不像 *you bu xiang*). But this time, he has become his own master artist, producing original works which are not the same as any other, but in a class of their own.

Similarly, in clinical practice, a intern or junior resident who has not reached the standard of his seniors needs constant supervision. Meanwhile, senior residents or junior consultants are at the stage where they practise evidence-based medicine and follow the latest clinical guidelines.

TO ACHIEVE GOOD BALANCE IN TREATMENT, LIKE ANY ARTIST, THE DOCTOR NEEDS TO KNOW THE FUNDAMENTALS OF CLINICAL PRACTICE AND WHEN TO INTERVENE – I.E., TREAT – AFTER MAKING THE DIAGNOSIS.

With experience, they can – and should – advance to practising "individualised" medicine.

A consultant or senior consultant treats not just a disease but the individual with the disease. He takes into account a patient's age, state of mind, other medical conditions and social economic background – factors that make people individuals – to personalise his treatment and care.

In short, he is practising a more balanced approach to medicine to improve the care of his patients.

Professor Foo Keong Tatt is Emeritus Consultant, Department of Urology, Singapore General Hospital, as well as Clinical Professor at the NUS Yong Loo Lin School of Medicine, and Adjunct Professor at the Duke-NUS Medical School. He likes water colour as an art medium because "it is natural and simple. All you need are just the colour pigments and water which is available everywhere, and a brush to apply colour to the sketch book. It is a simple and inexpensive hobby".

Plated with love

Each day, Dietary Attendant Salimah Radiman assists tirelessly behind the scenes to deliver nutritious food to countless recovering patients. By Annie Tan

PHOTO: ALVINN LIM

After more than 10 years at SGH, Mdm Salimah has made many good friends, including Mdm M Vijaya Rani (left) and Mdm Christine Untalan (right). She considers SGH her second home and feels that her team inspires her to do her best.

THE CHEF may be the star in any kitchen. But in a large hospital like Singapore General Hospital (SGH) where thousands of different meals are needed for its patients each day, dietary attendants play an equally important role in the smooth functioning of the hospital's Food Services Department.

Each day, Dietary Attendant Salimah Radiman painstakingly helps the team of cooks and other kitchen staff prepare heaps of fruits and vegetables, and assemble innumerable plates of piping hot Muslim, Indian, Chinese and Western food – so many that she has lost count.

"We work as a team and I assist in providing safe and clean food that sustains the body. When patients eat healthy food, they recover faster," said Mdm Salimah.

> MY JOB EXPOSES ME TO DIETICIAN TALKS, AND THIS MAKES ME MORE CONSCIOUS OF HEALTH AND NUTRITION. AT HOME, I TRY TO COOK LOW-SALT AND LOW-FAT MEALS FOR MY FAMILY, AND AVOID USING MSG.
>
> SALIMAH RADIMAN, DIETARY ATTENDANT, SGH

"When I am cleaning the vegetables and fruits, I ensure they are fresh. When I assemble each meal tray, I make sure the plates and crockery are clean and in good condition – any cracks or chips can be breeding grounds for bacteria," she added.

The 51-year-old mother and grandmother has always been an avid home cook and baker. She was a dedicated homemaker before an SGH job advertisement caught her eye at the age of 38. As her two girls were in school and were very independent, she decided to pursue her interest in working with food.

Fast-forward 13 years: Mdm Salimah is a seasoned dietary attendant today who continues to find meaning in her job. Working one of two shifts – either 6.30am to 2.30pm, or 10.30am to 6.30pm – she prides herself on delivering high quality work on time.

Though most of Salimah's work is performed behind the scenes, she has her moments in the sun. She recounts the proudest moment in her career – when she met Prime Minister Lee Hsien Loong and his wife, Mdm Ho Ching, during their visit to the SGH Museum last year.

"Even my family and friends were excited for me! We usually see the prime minister on television, but how many people have had the chance to come this close to him? In person, he is soft-spoken and kind, and I felt very honoured to serve him tea," she said.

The affable Mdm Salimah is a natural at receptions, and when roped in to serve at a department function in 2012, she stood out for exceptional service and was nominated for recognition. Showing off her green name tag, she said: "SGH goes the extra mile to recognise us for good work. We start with a white name tag, and if we do a good job, we get graded coloured name tags as acknowledgement of our dedication."

After receiving her 10-year Long Service Award, she said: "SGH feels like my second home and I've made many friends. It's my team that inspires me to do my best every day."

Although her childhood dream was to be a singer, Mdm Salimah is happy with her career choice. "I've learnt so much more than I ever would have if I had remained a housewife. My job exposes me to dietician talks, and this makes me more conscious of health and nutrition. At home, I try to cook low-salt and low-fat meals for my family, and avoid using MSG," she said.

Mdm Salimah, who finds fulfilment in her job, hopes to continue working for as long as she is able to. When not preparing meals for the hospital, she enjoys simple pleasures such as seaside walks and lively family meals.

Dedicated to life

The desire to help patients overcome the adversity of illness has enabled Dr Anantham Devanand to persevere in a high-pressure career in respiratory medicine and critical care. By Annie Tan

PHOTO: JUSTIN LOH

Dr Anantham is often faced with the ethical challenge of maintaining the delicate balance between being realistic and idealistic while keeping patients' well-being at heart.

SHE WAS PUTTING on her headscarf while minding two infants. Then an unexpected sneeze caused the heavily pregnant woman to swallow the large five-centimetre pin she had been holding between her teeth. She was rushed to Singapore General Hospital (SGH), where Dr Anantham Devanand deftly manoeuvred the pin – pointy end upwards – out from her right lung.

Because of her condition, he turned to bronchoscopy instead of surgery. He inserted a thin bronchoscope into her lung, and with a small magnet, drew the pin out. The foetus was unharmed.

While such dramatic occurrences are uncommon, the lung specialist's everyday work with patients needing urgent care for problems like breathlessness is no less challenging. "Most patients panic when confronted with breathlessness. To be able to help them deal with this horrible experience was what attracted me to the field in the first place," said Dr Anantham.

As Senior Consultant, Department of Respiratory and Critical Care Medicine, he also faces ethical dilemmas regularly. Critically ill patients can be supported for a long time on machines that do the work of the kidneys, heart and other organs, but such treatment cannot continue indefinitely.

"Intensive care doctors do not like to limit life support in critically ill patients. We know that in catastrophic illness, families are hopeful and physicians want to try their best. No one wants to give up, but it is the poor patient who bears the entire burden in our attempt to secure the long shot," said Dr Anantham.

When he feels that the patient might no longer benefit from continued treatment, he reaffirms the decision by talking the case through with his team. "I set the bar high. I have to convince the most idealistic person in the medical team," he said. Getting everyone's opinion also helps doctors cope with such morally and emotionally difficult issues, said Dr Anantham, who also is Vice-Chair, National Medical Ethics Committee, and Deputy Director, Centre of Medical Ethics and Professionalism.

While he refers to his involvement in medical ethics and professionalism as a hobby, he was clearly most excited about the new SingHealth Duke-NUS Lung Centre, of which he is the Deputy Head.

SGH has long recognised that disease treatment is often not the single preserve of any one discipline, meaning that patients suffering from say, diabetes or cancer, need to be seen by different specialists. But the establishment of multi-disciplinary disease centres takes such care further, with doctors being updated on a patient's condition even after their part in his treatment ends. So if a disease recurs, doctors can quickly decide on a treatment plan.

> **IT'S NOT EPISODIC CARE. THE TEAM IS ALWAYS THERE FOR THE PATIENT, AND THE PATIENT FEELS CONSTANTLY LINKED TO THE LUNG CANCER TEAM.**
>
> DR ANANTHAM DEVANAND, SENIOR CONSULTANT, DEPARTMENT OF RESPIRATORY AND CRITICAL CARE MEDICINE, SGH; DEPUTY HEAD, SINGHEALTH DUKE-NUS LUNG CENTRE

"It's not episodic care. The team is always there for the patient, and the patient – whether his condition improves or worsens – feels constantly linked to the lung cancer team," said Dr Anantham.

Moreover, complex or rare lung diseases like cancer, lung fibrosis or scarring, and pulmonary hypertension need big medical teams and are particularly suited to be treated at the Lung Centre, said Dr Anantham.

To manage his responsibilities, Dr Anantham avoids spreading his time too thin by focusing on one task at a time. He also credits his wife, Rejini, for being his confidante and keeping him steadfast. "She has shown me that having a sense of purpose provides a sense of direction when difficulties arise, and supersedes the fickle nature of approval from others," said the father of two boys.

ADVERTORIAL

WHEN MEMORY LOSS CAN BE MORE THAN JUST FORGETFULNESS

Forgetfulness in Singapore

Studies conducted on cognitive impairment and dementia in Singapore showed the overall prevalence of any cognitive impairment was 15.2% among Chinese and 25.5% among Malays[1]. In the past, memory loss and confusion were considered a normal part of aging. The hormones and proteins that repair brain cells and stimulate growth in the brain decline with age and that is the reason why forgetfulness sets in. One factor strongly impacting the brain cell repair is oxidative stress. Now, scientists have proof that most people can remain alert and able as they age, although a lot of people experience memory lapses and longer recollection time.

When is memory loss to be taken seriously?

There is a thin gray line between the ordinary forgetfulness that comes with aging from more serious problems like Mild Cognition Impairment (MCI) and dementia including Alzheimer's disease. Hence, it helps to consider key symptoms of mild cognitive impairment and the early stages of dementia to figure out this transition.

What is MCI?

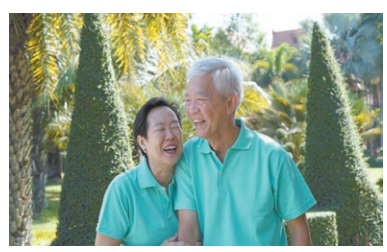
In Mild Cognitive Impairment (MCI), a person has problems with memory or another core brain function. Though these problems are noticeable they are not serious enough to interfere with daily life. People with MCI have an increased risk of progressing to dementia and developing Alzheimer's disease. Earlier detection means earlier interventions to provide support and possibly delay the worsening proven by scientific studies.

What is Dementia?

Dementia describes the regular forgetful symptoms that are caused by changes in brain function. The main difference between dementia and MCI is that dementia is more noticeable and impact more on everyday life, manifesting as lapses in memory and impairment to language ability (ability to write, speak or understand) or reasoning abilities (ability to plan, solve problems and focus).

What is Alzheimer's Disease [AD]?

When dementia progresses significantly to cause a characteristic, progressive decline of cognitive functions, memory, and changes in behavior and personality, then such a neurodegenerative disease with a marked late onset (late diagnosis as well) is called Alzheimer's disease [AD]. In Alzheimer's disease, nerve cell changes in certain parts of the brain result in the death of a large number of cells. For people in the early and middle stages of Alzheimer's disease, certain drugs are prescribed to possibly delay the worsening of some of the disease's symptoms.



Can external Antioxidants supplementation help against progression into dementia?

• Human bodies contain natural, inbuilt antioxidants that protect the organs of the body including the brain and its tissues from free radicals produced due to oxidative stress. However, if this is insufficient, supplementation with external antioxidants may help. It is important to know that the kind of antioxidant one is supplementing the body with, makes a significant difference.

An effective antioxidant should possess the following properties:

1. Strong antioxidant activity with both physical quenching and chemical scavenging potential
2. Proven anti-inflammatory activity;
3. No pro-oxidant activity;
4. Ability to pass the blood-brain-barrier, penetrate the brain cells and achieve adequate tissue levels;
5. Dual action on both cell membrane and the mitochondria;
6. Ideal location on the cell - outside and inside protection.

Superiority of Natural Astaxanthin as an antioxidant

• Astaxanthin is a member of the carotenoid family. It is a carotenoid pigment that gives certain seafood like wild salmon and prawns their natural colour and is stronger than other common antioxidants (like Vitamin C or E). When consumed, Astaxanthin enables the simultaneous neutralization of multiple free radicals.

Its anti-inflammatory and antioxidant effects, implicate astaxanthin as a promising therapeutic agent for neurodegenerative disease, including dementia[2].

• The basis for the use of astaxanthin approach in the treatment of neurodegenerative disorders is its ability to reduce oxidative stress and mitochondrial dysfunction and thereby, prevent the progression of forgetfulness into dementia.

• Recently, there has been emerging evidence that astaxanthin can promote regeneration of brain cells (neurogenesis)[3]. In a randomized study of 96 middle-aged and elderly subjects who complained of age-related forgetfulness, those who ingested a capsule containing astaxanthin-rich Haematococcus pluvialis extract per day showed higher cognitive health scores (measured by factors such as memory, reaction time and attention span) after 12 weeks supplementation.

• Since the efficacy of Astaxanthin in cognitive function is now evident in several human clinical studies, it is time for one and all to exploit the possible neuroprotective effects. The earlier one starts astaxanthin, the better it is as dementia does not inform when it transitions from cognitive inhibition.

Experience the Benefits of Astaxanthin

Astaxanthin's remarkable ability to combat oxidative stress makes it one of the most potent antioxidant to help maintain good brain health. Astavita Healthy Living is a daily antioxidant supplement containing AstaReal® astaxanthin, derived from natural microalgae. It is available in Singapore through AstaReal – a subsidiary of Fuji Chemical Industries Group, which is backed by Fuji's expertise in the pharmaceutical industry over seven decades. AstaReal is an industry leader and pioneer in the commercial production of natural astaxanthin derived from a Swedish freshwater microalgae, *Haematococcus pluvialis.*

(Content extracted from article by Dr B. K. Iyer, General Pracitioner & AstaReal Group Medical Advisor.)

With Astavita Healthy Living you can enjoy a better quality of life through maintaining brain health. Now available online and through selected distributors. For more details, contact enquiry@astavita.sg or visit the website www.astavita.sg.

1. Hilal S., et al., Curr Alzheimer Res. 2015 Oct 2. 2. Grimmig B. et al., GeroScience (2017) 39:19–32.
3. Katagiri M. et al., J. Clin. Biochem. Nutr., September 2012, vol. 51, no. 2, page 102–107

WEIGHTY CONSIDERATION

Obesity is associated with excessive weight and body fat, and is usually due to eating too much and not moving or exercising enough. It can lead to serious – and in some instances, potentially life-threatening – illnesses such as diabetes, heart diseases and stroke.

A BMI of **18.5 to 22.9** is ideal; an obese person's BMI is

30

and higher.

Between 1992 and 2013, the number of people in Singapore who were obese rose by

70%

Obesity among those aged 18 to 39 years had doubled to

8.4%

from 4.2% in those years.

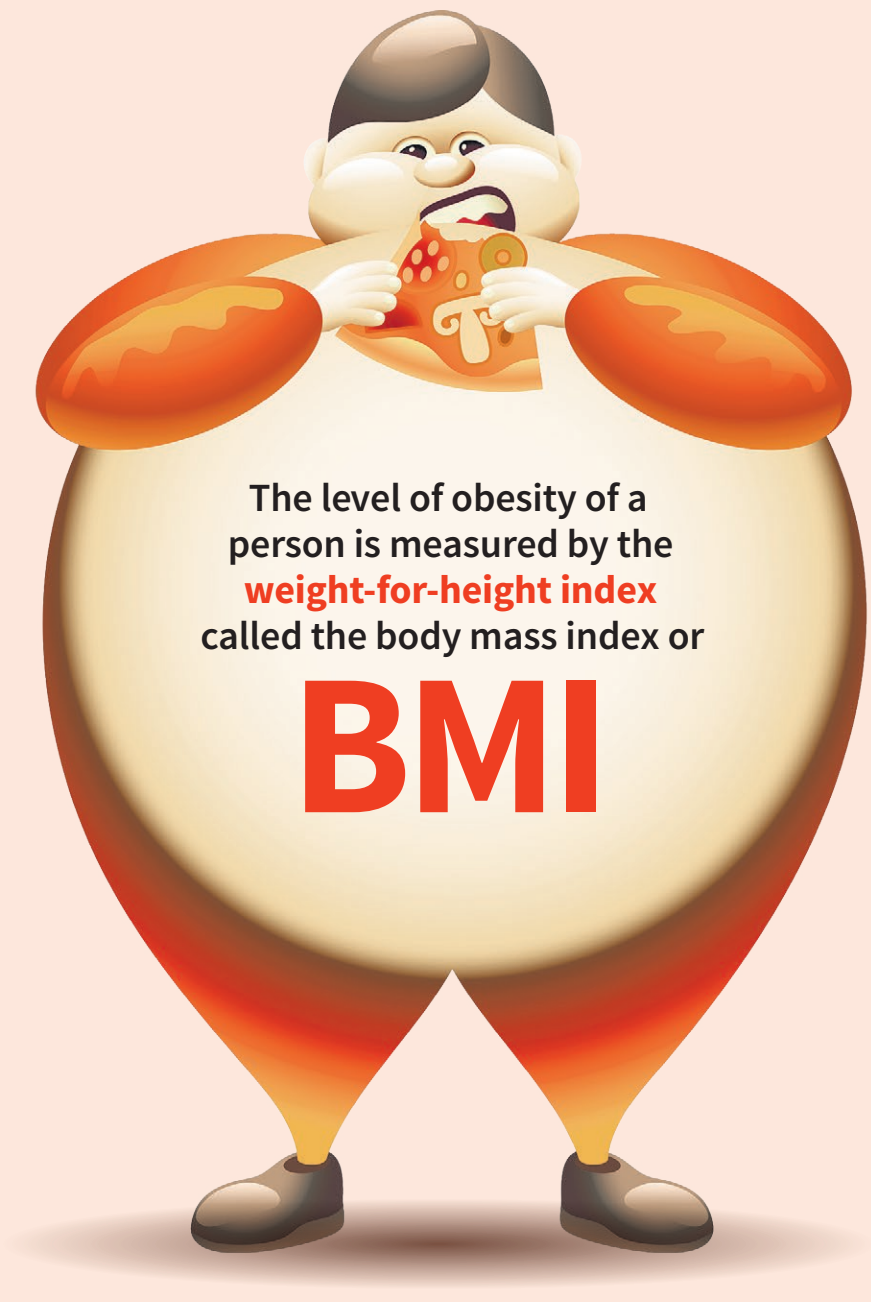
1 in 10

Singaporeans aged between **18 to 69** is obese.

Obesity is more common among men –

12.1%

– than women (9.5%).



The level of obesity of a person is measured by the weight-for-height index called the body mass index or

BMI

Close to 58% of Singaporeans with a BMI of

23

or greater are **pre-diabetic** or suffer from one or more **chronic conditions** such as diabetes.

Obesity among schoolchildren is on the rise:

12%

were obese in 2014 vs 11% in 2013.

The percentage of adults with diabetes in Singapore is estimated to have risen to 13%, from 11%

6 years

ago.

34%

of people **aged 24 to 35** are likely to have diabetes by the time they are **65**.

SOME KEY LIFESTYLE CHANGES* THAT CAN HELP IN MANAGING OBESITY:

- Healthy and controlled diet
- Structured exercise regimen
- Increased physical activity
- Stress management
- Positive outlook

5-10% loss in body weight has been shown to reduce **cardiovascular risks**, and improve **insulin sensitivity** and **glucose tolerance** in type 2 diabetes.

** Before embarking on any lifestyle changes, consult a doctor, dietitian or trained counsellor.*

TEXT BY SOL E SOLOMON

Sources: https://www.hpb.gov.sg, https://www.moh.gov.sg, http://www.straitstimes.com, https://sph.nus.edu.sg

Watching birds can beat stress

There's something about birds' tweets that call out to something deep in us. Research by academics at the University of Exeter, the British Trust for Ornithology and the University of Queensland recently found that watching birds makes people feel relaxed and connected to nature. It said that those in neighbourhoods with more birds, shrubs and trees are less likely to suffer from depression, anxiety and stress. The study, which involved more than 1,000 people, found these mental benefits were universal and applied whether in urban or more leafy suburban neighbourhoods.

Source: The Telegraph

PHOTOS: 123RF

Gluten may be safe

With gluten taking the rap for a multitude of health problems, gluten-free foods have become the diet choice of even those with no celiac disease or wheat allergy. However, new research presented by the American Heart Association reveals that a low-gluten diet may have contrary health effects, by raising the risk of type 2 diabetes. In a 30-year US study of almost 200,000 people, it was found that participants with a high gluten intake (up to 12g a day) had a 13 per cent lower risk of developing type 2 diabetes compared to those who ate the lowest amount (less than 4g a day).

Source: Health.com

EVENT CALENDAR

Coping with Allergies

DATE/TIME: July 1, Saturday; 9am-12.30pm
VENUE: Health Promotion Board, 3 Second Hospital Ave, Auditorium, Level 7
FEE: Free. Pre-registration needed.
REGISTRATION: Call 6576-7658 (Monday to Friday, 9.30am-5.30pm) or email details to public.forum@sgh.com.sg

Learn how to cope with adult allergies such as eczema, food allergies, drug allergies, allergic rhinitis and asthma, at this public forum by the Singapore General Hospital.

Hypertension – One number, many consequences

DATE/TIME: August 5, Saturday; 1pm-5pm
VENUE: National Heart Centre Singapore, Lecture Theatre, Level 7
FEE: $6
REGISTRATION: Closes on July 28 or once capacity is reached. Call 6704-2389/6704-2381 (Monday to Friday, 9am-5pm) or email nhccme@nhcs.com.sg. Download the form from www.nhcs.com.sg.

Learn more about hypertension and get expert advice from specialists on how to better manage high blood pressure.

Visit www.singhealth.com.sg/events or the websites of respective institutions for any changes, more information and other listings.

PHOTOS: 123RF

Compared to Caucasians, Asians develop borderline diabetes at an earlier age and a lower BMI, says Dr Goh Su Yen.

Turning back the clock on prediabetes

Losing weight and adopting healthy lifestyle habits can stop borderline diabetes from progressing to the full disease. By Natalie Young

DIABETES IN ITS INITIAL STAGES can be easily reversed. When blood sugar levels are elevated, but are not high enough to be classed as diabetes, losing weight and adopting a more active lifestyle can often stop borderline type 2 diabetes or prediabetes from advancing to the full disease.

Once type 2 diabetes is diagnosed, however, the disease can only be managed and not reversed. Type 2 diabetes is often tied to obesity and poor lifestyle habits.

"Lifestyle interventions such as increasing physical activity and modifying eating habits have been shown to reduce the progression from prediabetes to diabetes by about 35 to 50 per cent over a decade," said Dr Goh Su-Yen, Senior Consultant and Head, Department of Endocrinology, Singapore General Hospital (SGH).

"(Making these changes) is the most effective, and cheapest, way of reversing pre-diabetes," she said.

In borderline diabetes, the insulin-producing cells in the pancreas struggle to make enough insulin to reduce the levels of sugar in the blood.

People with excess weight around the waist are most susceptible to developing both prediabetes and diabetes. When fat levels build up in the abdomen – around organs like the liver and pancreas – these cells turn "blind" to rising blood sugar levels. Paying attention to weight and body fat distribution is important.

Asians are prone to storing fat as they do not process excess dietary fat well. They also tend to have higher levels of body fat than Caucasians of the same weight. "We have found that Asians develop prediabetes at an earlier age and a lower BMI (body mass index, the standard measure of healthy body weight) than Caucasians," said Dr Goh.

Trying to reverse prediabetes does not require drastic weight loss. Losing just 5-10 per cent of one's body weight and maintaining a BMI within the healthy range (less than 23 kg/m^2) can significantly reduce the risk of it progressing to diabetes.

One in three people with borderline diabetes are able to reverse the condition. Another third avoid developing diabetes by remaining prediabetic. With these lifestyle changes, only a third of prediabetics go on to develop diabetes.

The key is to start slow and set achievable targets. Half an hour of exercise a day, five days a week, and making healthier meal choices can be beneficial.

Having the support of family and friends can also make sticking to these changes easier. Care and support are also available, if needed, at primary health care and specialist centres. For those needing greater support, there are specialist centres offering comprehensive lifestyle modification programmes targeting the reversal of prediabetes, said Dr Goh.

Prediabetes comes on without warning

Feeling tired, thirsty or urinating more than usual? These are signs that your blood sugar levels may be higher than normal. But few people with borderline diabetes will have these warning signals.

There are, however, other indications. People who are overweight, middle-aged, lead a sedentary lifestyle, have high blood pressure, LDL cholesterol or triglyceride levels, and a family history of diabetes, are more likely to develop the condition.

Prediabetes is diagnosed if the blood sugar level registers between 7.8 mmol/L and 11.0 mmol/L by the gold standard oral glucose tolerance test. The test involves taking a blood sample after overnight fasting, and a second sample two hours after consuming a sweet glucose drink.

Diabetes is diagnosed if the reading is more than 11.1 mmol/L. Normal blood glucose level is under 7.8 mmol/L.

People diagnosed with prediabetes should get their blood glucose level measured every six to 12 months. Those who have normal blood sugar levels but who have a family history of type 2 diabetes should undergo diabetes screening after the age of 40.

BY THE NUMBERS

1 in 5 people in Singapore have prediabetes or diabetes*

1 in 2 heart attack cases also have diabetes**

2 in 3 new kidney failure cases are due to diabetes**

2 in 5 stroke cases also have diabetes**

Complications from diabetes lead to **1,500** amputations a year***

*National Health Survey 2010 **National Registry of Diseases 2014 ***MOH

When organs need replacing

Find out about some types of organ transplants. By Desmond Ng

ORGAN TRANSPLANTATION, one of the most remarkable successes in the history of medicine, is often the only hope for those suffering from organ failure.

Today, many parts of the body can be transplanted.

Types of transplant possible

Heart

- A healthy heart from a donor who has suffered brain death is used to replace a patient's damaged or diseased heart.
- Singapore's first heart transplant was carried out in July 1990.
- Due to the complexity of this procedure, strict medical criteria is imposed in assessing whether a donor's heart is suitable for transplant, and whether a potential recipient is suitable to receive the transplant.
- Deceased donor heart transplants are performed three to six times a year in Singapore, partly due to a scarcity of donors.

Lung

- One lung or both lungs from a recently deceased donor are used to replace a patient's diseased lung or lungs.
- Singapore's first lung transplant was performed in November 2000.
- Because of strict medical criteria for suitability of lung donors, as of end-2009, only nine lung transplants have been performed locally.

Liver

- A patient's diseased liver is replaced with a healthy liver graft from a donor. Donor livers can be obtained from deceased donors, or a family member may choose to donate a portion of his liver to the patient.
- Singapore's first liver transplant was performed in September 1990.

Pancreas

- Singapore's first simultaneous pancreas and kidney transplant was performed in 2012. This type of transplant is commonly done on type 1 diabetics whose pancreas don't work properly.

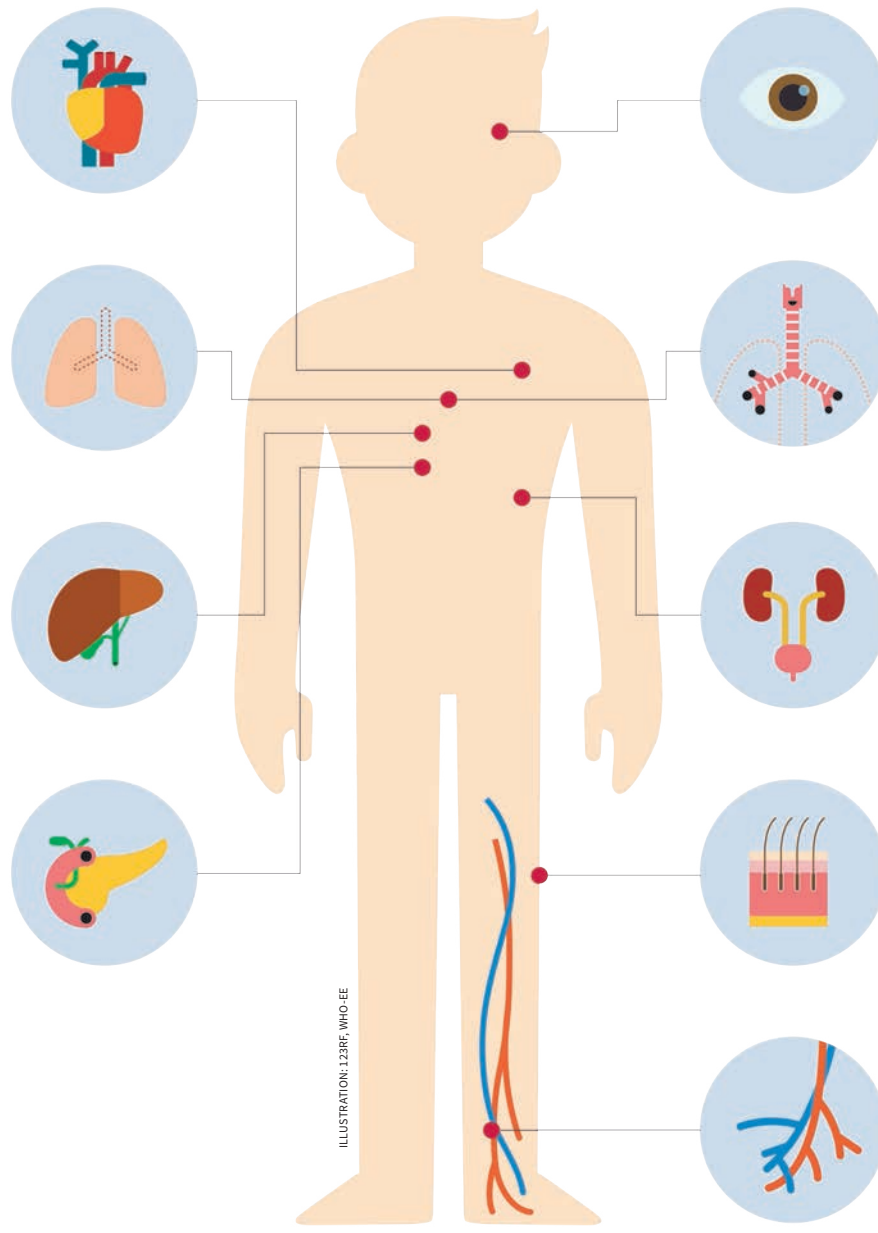


ILLUSTRATION: 123RF, WHO-EE

Cornea

- Corneal donation restores vision to those blinded by corneal disease. A damaged or cloudy cornea can be replaced surgically with a healthy, normal cornea, donated by another individual, during a corneal transplantation.
- The Singapore Eye Bank, which provides corneal tissue from local and foreign donors for transplant, reported a 26-year record of 236 cornea donations in 2016. That figure, the highest since its inauguration, broke the previous record of 222 donations in 2015.

Trachea

- The windpipe or trachea is a cartilaginous tube descending from the larynx to the bronchi and into the lungs. A trachea transplant can help patients who suffer from hardening and narrowing of their windpipe.

Kidney

- A kidney for transplant can be taken from a living or dead donor.
- Singapore's first deceased donor renal transplant was performed in 1970; the first from a living donor was carried out in 1976. Since then, more than 1,000 deceased donor and over 500 living donor transplants have been done.

Skin

- Donor skin has been found to be an effective treatment option for patients suffering from severe burn injuries, acting as a temporary dressing and allowing and promote healing until a patient is ready for grafting using his own skin.
- The Skin Bank, started in 1998 by SGH's Burns Centre, recovers, prepares and preserves donated skin for burns treatment. Skin must be recovered within 15 hours of a donor's death, but it can be stored at very cold temperatures for many years.

Vascular tissues

- Transplanting vascular tissues that circulate blood around the body can help relieve symptoms of breathlessness, tiredness and dizzy spells in patients with severe cardiovascular conditions.
- Vascular tisues can be donated up to 24 hours after death.

Legislation governing organ transplants

HOTA

- The Human Organ Transplant Act (HOTA) allows for the kidneys, heart, liver and corneas to be removed in the event of death from any cause for the purpose of transplantation.
- This act covers all Singapore citizens and permanent residents who are at least 21 years old and have no mental disorders. They can opt out of the scheme.

MTERA

- The Medical (Therapy, Education and Research) Act (MTERA) is an opt-in scheme, whereby people can pledge their organs or any body parts for the purposes of transplant, education or research after they pass away.
- Donors must be at least 18 years of age.
- Adult next-of-kin may pledge the organs of deceased patients of any age for donation.

What's dry eye syndrome?

It's a case of not having enough tears, but how do you deal with it? By Shermaine Wong

PHOTOS: 123RF

Dry eye syndrome can worsen over time and damage the surface of the eye, causing staining and keratitis. To prevent this, eyedrops and lubricants from a pharmacy may be used.

TEARS ARE NOT JUST emotional indicators comprising salty water.

They are a complex mixture of oil, water and mucus, created by three different "production factories" in the eye for its own benefit.

The mucus is made by microscopic goblet cells in the conjunctiva and the water layer by the lacrimal gland under the orbital rim bone, just below the eyebrow. The outermost layer, oil, is provided by the meibomian glands that line the edges of the eyelids.

This mixture coats the entire surface of the eye, cleaning, lubricating and nourishing it throughout the day and protecting it from infection.

Sufficient quality and quantity of tears are essential for good vision, as they maintain a healthy and clear refractive surface. When there are not enough tears, or when the tears don't have the correct mix of oil, water and mucus, the condition called dry eye syndrome occurs.

Who is susceptible?

Dry eye syndrome is part of the natural ageing process, so the elderly are more likely to develop it. Also prone to it are those going through hormonal changes.

People suffering from certain ocular and systemic diseases such as rheumatoid arthritis, diabetes and thyroid problems, and those on medication such as antihistamines, decongestants, blood pressure pills and antidepressants, are also more likely to have dry eyes.

Lifestyle too can play a part. Constant exposure to smoke, wind and dry environments may also lead to dry eye.

The condition is easily missed. Those who have it may not be aware of it because its symptoms can be thought to be due to fatigue or tiredness.

These symptoms include red or irritated eyes, eyelids which feel heavy or have a sensation of sand or a foreign object in the eye, occasional blurring of vision, and watery eyes which may be secondary to irritation of the eye.

The nerves on the surface of the eye (cornea) are extremely sensitive to many types of stimuli, including dryness, tiny changes in temperature, and particulate matter. Some of these nerves relay signals to the tear-producing glands as well, causing reflex tearing.

Dry eye is also one of the leading causes of contact lens intolerance or discomfort, as contact lenses can destabilise tears. This can lead to irritation, due to dry eye, hypoxia, or to lens protein deposits, and immune responses to these deposits.

Dealing with it

Dry eye syndrome is not something harmless to live with, or which will go away. Over time, chronic dry eye can damage the cornea, causing staining and keratitis – inflammation of the cornea. The eye then becomes increasingly vulnerable to infections, and vision may be damaged.

An ophthalmologist can spot dry eye syndrome. Tests and procedures done in an eye clinic can assess tear stability and the amount of tears produced. When an eye opens after each blink, the tear layer in front of the eye is stretched into a very thin sheet.

At some point, breaks or gaps occur in this layer, resulting in an irregular interface between the air and the eye surface, as well as dry spots on the eye. This irregular interface interferes with the transmission of light, causing visual disturbances and light sensitivity. The dry spots trigger the corneal nerves into firing, and this is perceived by patients as pain or a burning sensation, or the feeling of a foreign body in the eye.

In patients with dry eye, tear quality may be poor in terms of surface tension or elasticity, causing the tear layer to break up faster after each blink – a condition known as unstable tears. It is worsened by computer use or intense psychological efforts. During such activities, the blink rate decreases, exposing the eyes for longer periods between blinks.

If the eyeball surface has not been damaged, lubricants from a pharmacy can be used. Be sure to follow the usage instructions provided.

Lifestyle adjustments can prevent dry eye syndrome from worsening. Some of these are reducing the use of contact lenses, lowering the height of computer monitors, limiting one's exposure to air-conditioning, and spending less time gazing at screens.

Some foods are also beneficial, especially those that contain omega-3 lipid components.

If damage to the cornea has already occurred, medication in the form of steroids or surgery like punctal occlusion or a procedure to close the eyelids might be necessary.

An ophthalmologist can advise patients on whether they have ocular and systemic diseases, drugs that can aggravate dry eye, and what can be done in those circumstances.

Extracted from *Understand More About Dry Eye Syndrome,* a publication of the Singapore National Eye Centre.

A diet rich in omega-3s can help prevent or mitigate dry eye syndrome. Affected individuals should reduce their time spent gazing at screens, use of contact lenses, and exposure to air-conditioning, to prevent it from worsening.

Stomach cancer – the facts

Although it's one of the top 10 cancers here, many people don't know enough about it. By Suki Lor

STOMACH CANCER (or gastric cancer) is among the top 10 cancers in men and women in Singapore. Each year, about 200 are diagnosed with the disease here.

It hits men above 40 more frequently, and is more common among the Chinese compared to Malays and Indians.

In stomach cancer, cells lining the stomach grow out of control, forming tumours which can spread throughout the stomach, and to nearby lymph nodes and organs such as the liver, pancreas or colon. It can also spread to the lungs, bones and brain.

The exact cause is unknown, but some factors worsen its development. The single most important risk factor is chronic infection by the helicobacter pylori bacteria. Family history of stomach cancer or hereditary stomach polyps can also be a factor.

Smoking raises the risk by 2.5 times. Other risks include diets with large amounts of smoked foods, salted fish and meat, and pickled foods. Eating more fruits and vegetables and taking vitamins A and C appear to lower the risk.

How to detect it

It takes many years for the cancer to develop and before symptoms are felt. Stomach cancer is hard to detect because symptoms are often non-specific, and in the early stages absent or very mild. They could also be similar to those of peptic ulcer diseases or gastritis.

Symptoms include persistent indigestion and a burning sensation after meals (heartburn), a bloated feeling after meals, upper abdominal discomfort or pain, early feeling of fullness despite a small meal, loss of appetite, weight loss, nausea, vomiting, and blood in the stools or black tarry stools.

The doctor will take a full medical history and perform a physical examination. A test may be done to detect blood in the stool because stomach cancer sometimes causes bleeding that may not be visible.

A gastroscopy may be called for, in which a fibre-optic scope with a light at the end of it is passed through the mouth and into the stomach. This is to examine the organ and take tissue samples from suspicious areas for examination.

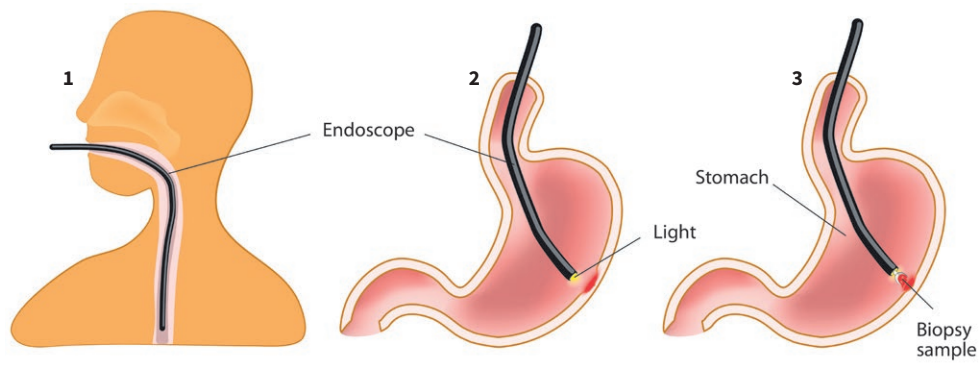
Another test may be ordered where the patient swallows a thick, chalky liquid called barium which shows up on x-rays, so that abnormalities in the oesophagus and stomach can be detected.

When stomach cancer is diagnosed, further tests, such as a computerised tomography (CT) scan or a positron emission tomography (PET) scan, may be needed to determine if the cancer has spread.

Treatment depends on the size, location, and extent of the tumour. It also depends on the stage of the disease when the cancer is found and the patient's general health.

The main treatment for early stage stomach cancer is surgery to remove part of the organ or all of it, as well as suspicious lymph nodes near it and in the surrounding tissue. Chemotherapy, which uses drugs to kill cancer cells, and radiation therapy may also be needed.

Clinical trials show that new treatments such as biological therapy (immunotherapy) may be effective in certain types of gastric cancer.



A gastroscopy or endoscopy, in which a fibre-optic scope with a light at the end of it is passed through the mouth and into the stomach to examine the organ and take tissue samples from suspicious areas for examination.

Side effects of chemotherapy may include nausea and vomiting, temporary hair loss, risk of infection due to a reduction in white blood cells, risk of bruising or bleeding due to a drop in platelets, lethargy and weakness, loss of appetite and mouth ulcers.

Side effects of radiation therapy, which uses high energy x-rays to kill cancer cells or stop them from growing further, vary from patient to patient. The most common side effect is "sunburn", in which the skin on the treated area may become dry, red, tender and itchy.

Patients who receive radiation to the abdomen may also experience diarrhoea, nausea, and/or vomiting. Dietary changes or medicine may be prescribed to counteract these symptoms.

Diet and nutrition

Many patients with stomach cancer lose a lot of weight. It is important for them to eat well as building up to a nearly normal weight can aid recovery.

Cancer and its treatments can cause a loss of appetite. Advice from a dietician to learn more about possible dietary changes will be helpful after stomach surgery.

Getting support

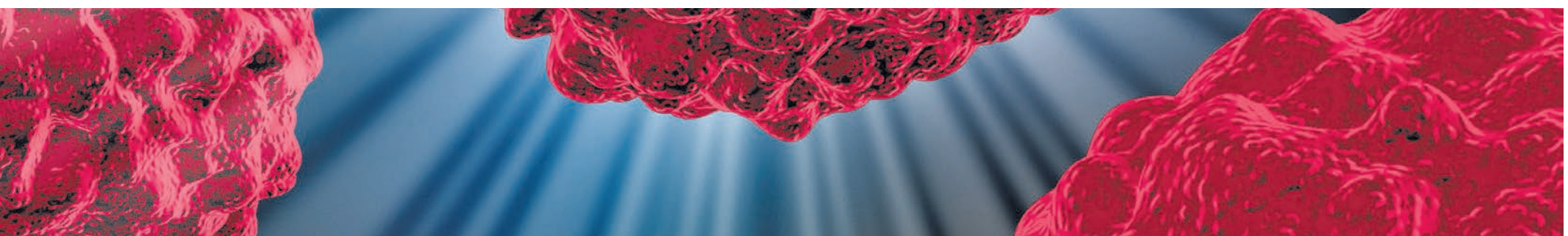
Supportive care to help people and their families to cope with cancer and its treatment should begin once cancer is suspected. Patients do not need to struggle with the illness alone.

Useful support services include the Medical Social Service Department of the hospital where treatment is done, and cancer support groups.

For more information about stomach cancer and the various support services available, you can call the NCCS Cancer Helpline, run by nurse counsellors, at 6225 5655 during office hours, or email cancerhelpline@nccs.com.sg

Source: Stomach Cancer, *a booklet published by the National Cancer Centre Singapore. It has information on the risk factors, symptoms, diagnosis and treatment of stomach cancer, and is in English and Chinese on the NCCS website www.nccs.com.sg*

ILLUSTRATIONS: 123RF



HEALTH XCHANGE

Do men get hormonal?

I am in my 50s and feel less energetic and more tired recently. Sometimes, I'm also unable to perform sexually, causing frustration for my wife and myself. One of my male friends suggested I might be having male menopause. I have never heard of this. What is it?

While male menopause or andropause is not as well known or studied as female menopause, it is known that some men have lower male hormone levels when they reach their 50s. A health screening of 1,000 men in Singapore between 2007 and 2009 showed that more than 26 per cent suffered some form of androgen (male hormone) deficiency or low testosterone level. The SGH Urology Centre is also seeing more men for andropause symptoms and treatment.

No well-established hereditary, social or behavioural factors have been found that put a person at higher risk of early andropause, which is triggered by low testosterone (the hormone responsible for male physical characteristics like body and facial hair, deep voice, strong sexual drive and competitive behaviour). The testes produce less testosterone as men age.

Testicular cancer and the subsequent surgical removal of the testes, and anti-testosterone therapy to treat prostate cancer can also trigger early andropause.

Feeling tired, having a low sex drive and erectile dysfunction are some signs of the condition. A loss of concentration, change in attitude and mood swings, loss of muscle mass and strength, insomnia and memory loss are other symptoms.

Testosterone replacement preparations are commonly prescribed by doctors for the condition – testosterone gels, pills and injections – but these have to be used with caution. Testosterone pills, for instance, cannot be used long-term as they can raise cholesterol levels and the risk of heart and liver problems.

Dr Kaysar Mamun, Senior Consultant, Department of Geriatric Medicine, Singapore General Hospital
Dr Lee Fang Jann, Consultant, Department of Urology, Singapore General Hospital

Natural after c-section

My first child was delivered by caesarean section but I'm contemplating going through natural delivery for my second. What are the risks?

The main concern for a woman undergoing a natural or vaginal birth after caesarean section, or VBAC, is the risk of the scar from the previous c-section rupturing – about 1 in 200 cases or 0.5 per cent for a woman with a previous c-section. The risk of womb rupture increases with the number of previous c-sections performed. That is why most local obstetricians would strongly advise against a VBAC if a woman has had more than one previous c-section.

The consequences of a womb rupture include a higher risk of the baby dying, or being damaged – up to two in 1,000 women or 0.2 per cent. This is no higher than for a woman undergoing labour for the first time, but higher compared to having a repeat planned caesarean delivery (one in 1,000).

In the main, women planning a VBAC have a good chance (up of 75 per cent) of achieving a successful vaginal delivery, and a greater chance of having an uncomplicated normal birth in subsequent pregnancies.

Unless there are medical reasons for a c-section, natural birth is recommended. Women who deliver naturally tend to recover faster, and have less pain and a shorter hospital stay. In comparison, a repeat caesarean is usually more difficult to do. Scar tissue formed from the first operation can cause internal organs to stick together, increasing the chance of injury to these organs. Women undergoing repeat caesareans also have a greater risk of developing deep vein thrombosis.

Dr Tan Eng Loy, Senior Consultant, Department of Obstetrics and Gynaecology, Singapore General Hospital

PHOTOS: 123RF

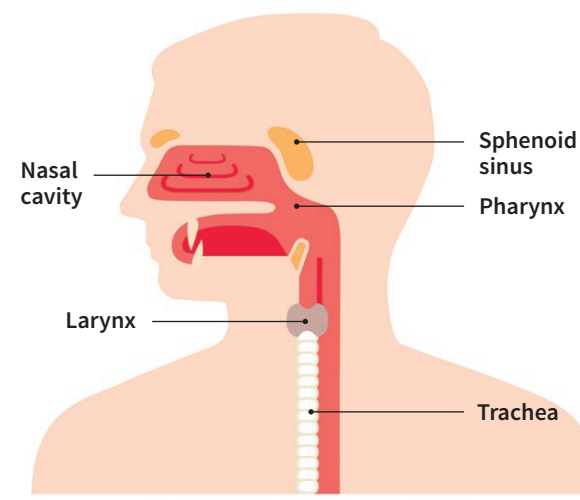
Nose cancer risk?

My dad had stage 1 nose cancer which was resolved with radiotherapy. Am I at risk of developing it? If so, are there any screening tests that can be done and what age would be an appropriate time for it?

Screening for nasopharyngeal cancer is generally not recommended as the pick-up rate is very, very low. But for high-risk individuals i.e. those with a strong family history, it is justifiable to get screened for this disease.

The screening involves doing a blood test for EBV DNA, and then going on to an endoscopic examination of the nasopharynx if the result is positive.

Dr Terence Tan, Senior Consultant, Division of Radiation Oncology, National Cancer Centre Singapore



CONTEST

TEST YOUR MEMORY

Answer these simple questions to stand a chance to win Bone Health Cream (10% Glucosamine Sulphate Plus Bio-Calcium and Chondroitin) worth $49.50 each (five in total to be won).

QUESTIONS

- **What are the three components our tears are composed of?**
- **When was Singapore's first heart transplant carried out?**

Send your answers with your name, age, gender, address and telephone number to:
Email editor@sgh.com.sg (or)
Post The Editor, Singapore Health, Singapore General Hospital, Communications Department, #13-01 Surbana One, Blk 168, Jalan Bukit Merah, Singapore 15016.

Deadline July 15, 2017

Winners will be notified via phone or email. Incomplete or multiple entries will not be considered.

* Sponsored by Urah International Pte Ltd. www.urah.com.sg

WINNERS OF CONTEST 45
1. Jason Biene Bohol 2. Sarjit Kaur
3. Sam Ng 4. Tan Puay Yee
5. Wee Swee Chye

ADVERTORIAL

Consumers to exercise caution when buying glucosamine

In Singapore, glucosamine is widely available as health / nutrition supplement and is not subject to even simple checks on purity.

Not all glucosamine brands are effective! In fact, many are not up to standard.

Glucosamine can be sold without registration or approval

In Singapore, glucosamine can be imported and sold without a licence. They are not subject to pre-market approval by the Health Sciences Authority (HSA). This means that glucosamine products need not be approved before sale. They are also not assessed for their effectiveness by HSA. The responsibility in ensuring the safety and quality rests with the importer, manufacturer, distributor and seller. (information extracted from HSA website)

There were cases announced by HSA, in which dishonest manufacturers produce health supplements with undeclared or unlabelled potent medicinal ingredients. Taking such products can be extremely harmful and can lead to serious health problems.

In the US and Canada, the content of various glucosamine and/or chondroitin products were analysed by the University of Maryland and the Alberta University respectively. It was found that the actual amount of active ingredients in most tested products vary from their label claims, ranging from 0% - 115% in the US and 41% - 108% in Canada.

Recommendation by international researchers

Claims can easily be made without proper validation through clinical studies.

This is why many researchers have recommended that “Prior to obtaining any supplement containing chondroitin sulfate or glucosamine, the consumer should become informed about the manufacturer and the product.”

The American Arthritis Foundation advised that “When a supplement has been studied with good results, find out which brand was used in the study, and buy that.”

Viartril®-S is the only glucosamine proven safe and efficacious in more than 300 clinical studies

The good clinical results of Viartril®-S cannot be generalised to other glucosamine brands. Viartril®-S is supported by excellent clinical safety and efficacy data.

Viartril®-S is of the highest quality and is in fact, registered as a prescription drug in many European countries.