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# PULSE

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Issue  
**No.24**  
July - December 2014

## President's Award for **NURSES**

The second consecutive year



### 12 CLINICAL

Keeping patients alive  
(and awake) when the  
lungs shut down

### 18 EDUCATION

Cardiology Secrets for  
the MBBS exams

### 23 RESEARCH

A New Approach to  
Adverse Drug Reaction  
Monitoring

### 28 EVENT

First hospital-supermarket  
collaboration to encourage  
healthy eating and shopping

# Cover Features

**04 President's Award for Nurses**  
Having received the President's Award for Nurses, the highest accolade for nursing, Ms. Karen Koh shares her words of wisdom.

**12 Keeping Patients Alive (And Awake) When The Lungs Shut Down**  
Discover a true story of how A/Prof. Graeme MacLaren saved the life of a pregnant H1N1 patient with the help of ECMO.

**18 Cardiology Secrets for the MBBS exams**  
Find out what the final year medical students have to say about the annual cardiology course that helps them prepare for their MBBS exam.

**23 A New Approach to Adverse Drug Reaction Monitoring**  
NUHCS works closely with top Singapore genetic and research institutes to increase drug safety in Singapore.

**28 First hospital-supermarket collaboration to encourage healthy eating and shopping**  
A collaborative effort brought easy and seamless healthy food shopping with a Dietitian's Choice section at FairPrice supermarket at One@KentRidge.

# In This Issue

## Accolades

**08 Making A Difference With The Human Touch**  
Mr. Clifford Xu made NUHCS proud for being an exemplary healthcare worker and role model.

**10 Automated solution for ECG, EasyG**  
The NUHCS team won the annual Hospital Management Asia Award 2014 for their Electronic ECG project, Easy G, which replaces the manual process of ordering and reporting the electrical activity of a patient's heart.

**33 Transcatheter Cardiovascular Therapeutics Angioplasty (TCTAP) Summit 2014**  
The TCTAP 2014 saw NUHCS receiving international recognition with Dr. William Kong winning best presenter.

## Clinical

**11 Monitoring Your Health from Home**  
A new care delivery model that brings healthcare to a whole new level by allowing doctors to monitor the blood pressure of patients from their home.

**14 Advent Of A New Era in Coronary Revascularisation**  
Learn more about the unique hybrid coronary bypass, which combines the durability of surgery with the minimally invasive nature of stenting.

**16 6 Million-Dollar Man Wins Gold Medal**  
With the help of a permanent pacemaker, a patient is able to realise his dream as a race-walker, naming himself the "six-million dollar man".

## Education

**19 Delving Into The Core Of Aortic Root Cannulation**  
An aortic root cannulation workshop was organised to train residents through hands-on procedures.

## Research

**20 Pushing Frontiers In Cardiovascular Research**  
Prof. Arthur Mark Richards and team clinched the STaR Investigator Award for their IMMACULATE study, which researches on the impact after the first heart attack.

**22 CONTRAST - a multicentre study (Combined N-acetylcysteine and bicarbonate in PCI To reduce adverse side effect of contrast)**

CONTRAST is the largest clinical trial conducted by NUHCS, with the participation of 6 local and overseas centres, 548 patients, and took 7 years to complete.

**33 Asian Interventional Cardiovascular Therapeutics (AICT) 2014**

Participants learnt from the best which hailed from Australia, America, Europe and the Gulf States during the 3 days congress.

## Event

**24 Don't deny The Heart Truth, Face It.**

The second Mandarin symposium by NUHCS had an overwhelming response, in which participants were highly engaged by our four cardiovascular specialists.

**26 Celebrating NUHCS World Heart Month 2014**

NUHCS celebrated the World Heart Month with a myriad of activities that provided patients and the public with tips, ideas and knowledge on caring for the heart.

**30 Wet, watery and fun! NUHCS Family Day 2014**

A tradition for NUHCS, Family Day 2014 lived up to the occasion of fun and staff bonding at the Wild Wild Wet.

**32 'A New Day In Heart Failure?' At ESC Congress 2014**

NUHCS made a notable presence at the European Society of Cardiology (ESC) Congress 2014 which also highlighted the potentially game-changing PARADIGM-HF results.

**34 Special Highlights**

Featuring the events, highlights and activities that had taken place in Jul-Dec 2014.

**40 New Colleagues and Promotions**

**41 Patient Compliments**

**42 Abstracts & Publications**

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## NUHCS in 2014

The Year 2014 has since passed us by. As the baby boomer generation ages, there is a general increase in cardiac diseases. NUHCS has seen an increase in the outpatient and inpatient volumes of patients and in the number of tertiary procedures by more than 10%.

As NUHCS continued to consolidate its 6 core clinical services in the past year, it has expanded the use of telemedicine. Patients are monitored remotely for their blood pressure (BP) control (page 17), body weights, pacemaker function and electrocardiograms (ECG).

**Transition care for our flagship chronic heart failure programme was also introduced this year**, where patients are monitored and managed at home. Sleep apnoea monitoring service was started last year after studies led by A/Prof. Ronald Lee revealed that 60% of NUHCS patients with acute myocardial infarction also suffer from obstructive sleep apnoea (OSA) disease (page 32). We also continued to strive to improve our clinical processes.

The Department of Psychological Medicine and NUHCS collaborated and saw the Heart Centre Psychiatry service grow in outpatient attendance. Led by A/Prof. Lai Yew Min, it provides our cardiac patients with timely and **one-stop psychiatric care**. The database setup provides heart patients' psychiatric information. Another upcoming collaborative programme is the Cardiometabolic service.

Our surgical colleagues excelled with new expertise in complex procedures and complete coronary revascularisation (page 14); leading the Vascular service and the Thoracic Surgery division with its **uniportal video-assisted thoracoscopy surgery (uVATS) programme**; and recognition for A/Prof. Graeme MacLaren, our Director of Cardiothoracic Intensive Care Unit (CTICU) (page 12).

Our nurses won the best award for oral presentation at the 9th Biennial Joanna Briggs International Colloquium (page 36); 1st runner-up at the Collaborative Nursing Quality Improvement Award 2014; **the coveted President's Award** won by **APN Ms. Karen Koh**, the second consecutive time that NUHCS has won (page 4); and **the Healthcare Humanity Award** won by **Specialty Nurse Mr. Clifford Xu** (page 8).

Earning patient satisfaction, our subsidised patients congratulated us on our "... **world class yet compassionate health system**" and "felt truly privileged that in Singapore, the man in the street can have access to such experienced and excellent doctors and nurses, and thank you for retaining these top-tier professionals in our public hospitals" (page 41).

NUHCS achieved research awards at various international cardiology meetings, including best presenters (page 33), and competitive research grants of up to S\$30 million. **Prof. Arthur Mark Richards won the NMRC STaR award of S\$9.5 million** (page 20). Cardiovascular Research Institute (CVRI), in partnership with Genome

Institute of Singapore, won a Strategic Position Funding grant of S\$3 million (page 23). **In total, NUHCS/CVRI presently hosts grants of up to S\$50 million.**

NUHCS successfully organised the annual Cardiology Review Weekend Course (page 18) and several international meetings, including the inaugural Cardiovascular Clinical Trialists (CVCT) Asia Forum 2014 (page 34). NUHCS also organised our sold-out Chinese Public symposium (page 24), Pulse Check seminar (page 37) and World Heart Month celebration (page 26). We also started a **joint fellowship programme between the two clinical departments** and a new CICCEM (Cardiothoracic Intensive Care Crisis and Emergency Management) training initiative led by Dr. Ramanathan.

The year ended on a high when we gathered for our traditional NUHCS Family Day held at the Wild Wild Wet at Downtown East (page 30). Attended by over 400 staff and their family members, we had a splendid time bonding, having fun and inculcating the NUHCS spirit from the many group activities organised.

The journey to success is a long and arduous one. NUHCS could not have achieved that much without our staff, hospital leadership, stakeholders and partners. We will continue to strive to provide accessible, quality and affordable care for all our patients. As I stated in my official opening speech of the NUHCS in 2011, we will **"remember the past, excel at the present and shape the future"**.

Thank you and have a great year ahead! •



**Associate Professor  
Tan Huay Cheem**  
Director

 **National University  
Heart Centre, Singapore**

For the full message by A/Prof. Tan, please visit  
[www.nuhcs.com.sg/about-us/our-milestones/nuhcs-in-2014.html](http://www.nuhcs.com.sg/about-us/our-milestones/nuhcs-in-2014.html)

COVER STORY



# President's Award For **NURSES**

The second consecutive year

Having the honour of receiving the President's Award, Ms. Karen Koh shares her passion for and meaningful experience in nursing, in hope of inspiring other nurses to bring out their best.

# Inspiration to urses

The award is the highest accolade of the nursing profession, given to the country's most outstanding nurses.

Each year, healthcare institutions will nominate nurses for the prestigious award to recognise their significant contributions in nursing. A panel, comprising the Chairman of the Health Government Parliamentary Committee, the Chief Nursing Officer (Ministry of Health), and Board Members of public institutions, will interview and select distinguished nurses from the nominees to receive the award. Only four awards were given out by President Tony Tan Keng Yam at the Nurses' Day Reception at the Istana on 30 July 2014.

The National University Heart Centre, Singapore (NUHCS) is proud to announce its second recipient for the second consecutive year, **Ms. Karen Koh Wei Ling.**

*Advanced Practice Nurses (from left to right):  
Lee Choy Yee, Myint Myint Myat, Ting Kit Cheng  
Lo Chew Yong, Karen Koh, Juvana Gan and  
Doreen Chew.*

*Nurse Clinicians (from left to right): Li Yao,  
Pan Ning, Nyeo Hui Qing and Ong Guat Sim.*



Specialty Nurses (from left to right): Florence Ang, Senbagam D/O Sivaramakrishnan, Clifford Xu, Janice Kee (Nurse Educator), Adeline Teo and Christina Chong.

By **Ms. Karen Koh**

Advanced Practice Nurse (APN), NUHCS



As one of the pioneer APNs certified in Singapore, Karen has helped and continues to shape the APN practice framework in NUH and nationally. She uses her clinical expertise to advance nursing and also facilitates many nursing research projects and setting up of a clinical service to improve patient care. Karen is a well-regarded and exemplary leader with 13 APNs/interns and five specialty nurses under her charge.



Ms. Koh is honoured to receive the award from President of Singapore, Dr. Tony Tan.

It was a huge honour for me to be conferred this prestigious award by President Tony Tan Keng Yam at the Nurses' Day Reception on 30 July 2014 at the Istana. It was definitely a meaningful acknowledgment and affirmation of my efforts and contribution towards nursing and healthcare. The award is a tribute to my outstanding mentors, colleagues, and friends who rendered their unwavering support and developed my love for nursing.

### REFLECTING ON THE NURSING JOURNEY

At the same time, I hope that my testimony can inspire our young budding nurses. I gained a lot of insights through my journey in cardiovascular nursing. I first started working in the Coronary Care Unit (CCU) in 2001. One of the greatest challenges is

working in a time-sensitive area with a huge learning curve. The nurses were very strict and meticulous in their work. This forced me to be on my toes all the time, ensuring that I deliver the best nursing care in a new environment with multiple technologies.

Reaching success in my career requires a lot of dedication and sacrifice. Having said that, I protect my personal and family time fiercely. I am fortunate to have a great support system and this gives me the strength and determination to contribute back to both nursing and society.

### A MOTIVATING MESSAGE TO OTHER NURSES

There are two groups of nurses – the ones with the calling (which I am very envious of) and those who came into nursing without the calling, just like me. I hope that the latter

group of nurses will be inspired to continue to contribute their best to nursing and their patients. Being committed and taking pride in their work will bring about multiple joy, rewards and opportunities, reveal their hidden talents, and make a difference to many lives. As Mother Theresa once said, "Not all of us can do great things, but we can do small things with great love."

Having spent majority of my career in cardiovascular nursing, **my vision for our nurses is for every nurse to be effectively functioning at the very top of their licence coupled with the "heart" ware to touch lives.**





# Making a Difference with the *Human Touch*



The Healthcare Humanity Award was first launched in 2004 as an annual event that recognises valiant healthcare workers following the SARS outbreak. The award honours inspirational healthcare workers and role models who demonstrate the noble values of the healthcare profession, namely courage, extraordinary dedication, selflessness, steadfastness in ethics, compassion and humanity. Mr. Clifford Xu is NUHCS' answer to the Healthcare Humanity Awards.

## **A REWARDING AND FULFILLING CAREER**

I am very thankful, humbled and grateful for being a recipient of the Healthcare Humanity Award 2014. After more than 13 years in sales and marketing, I desired a more meaningful and worthwhile career that contributes to society. This recognition celebrates a key milestone in my life as a mid-career nurse.

Looking back, **switching to nursing has indeed given me many opportunities to share my expertise and dedicate time to enhancing and impacting lives in a real and meaningful way.**

The award would not be possible without the constant support and encouragement of my wonderful family and colleagues. This recognition gives a great sense of purpose and fulfilment as I have had the privilege to be able to constantly make a difference to someone else's life. •

By **Mr. Clifford Xu**

Speciality Nurse,  
Cardiovascular Nursing,  
NUHCS



Currently a pioneer in specialty nursing on the management and care of open heart surgery patients, Mr. Xu achieved a Book Prize Award for Knowledge Translation in Nursing and the Courage Fund Bursary. He has presented a poster at an international nursing conference and is an active volunteer for Prison Fellowship Singapore.

Leading experimental dancers  
**Nirmala Seshadri**  
**Neewin Hershall**

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**12 Feb 2015, Thurs, 7pm**

An exclusive evening dedicated to appreciation. GPs are invited to join us for an evening of networking and making connections; drinks & hors d'oeuvr, complemented by a short CME session with CME Point accreditation. For more information, please visit <http://bit.do/nuhcs-dance-event> or RSVP to [nuhcs@nuhs.edu.sg](mailto:nuhcs@nuhs.edu.sg).

**13 Feb 2015, Fri, 7pm**

Open to public

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**NUHCS COURTYARD**

I carry  
your heart +  
with me

*A dance of healing and rejuvenation -  
a celebration of love, art and nature,  
expressed through Bharatanatyam Butoh with  
inspiration from the NUHCS Sculpture  
Garden created by Singapore's celebrated  
multidisciplinary artist Tan Swie Hian.*



Photo credit: Yann Pitcheal

# Automated solution for ECG, *EasyG*

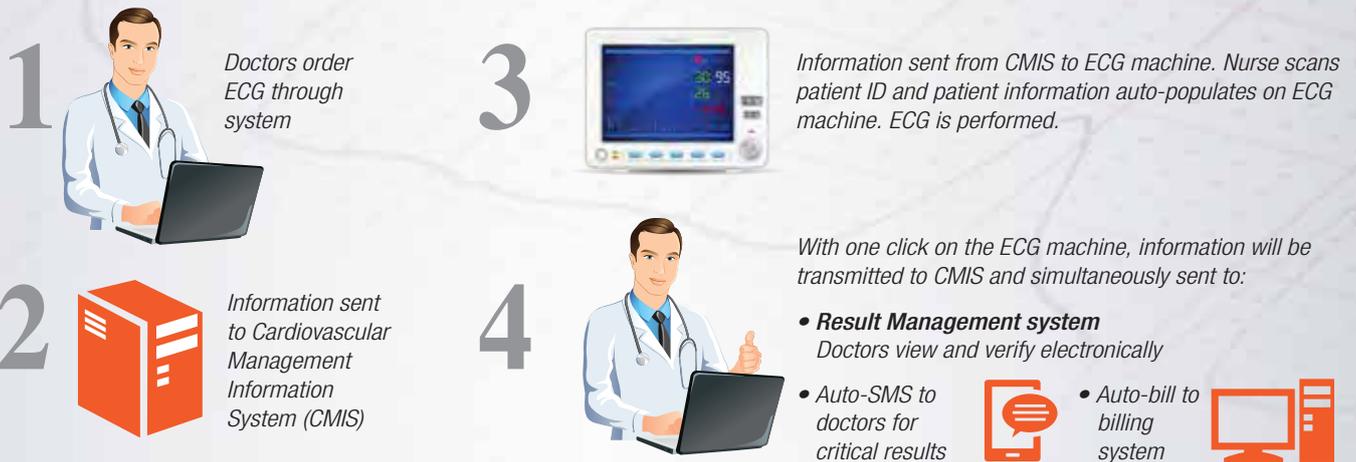
The electronic ECG, EasyG, which replaces the manual process of ordering and reporting the electrical activity of a patient's heart, resulting in improved productivity and timelier medical care, won the prestigious EXCELLENCE Award at the annual Hospital Management Asia Award 2014 competition. Asst. Prof. Devinder Singh who led the project, tells us about the award-winning initiative.

By **Asst. Prof. Devinder Singh**



Consultant, Department of Cardiology, NUHCS

Asst. Prof. Singh is trained in internal medicine and completed his Advanced Specialty Training (AST) in cardiology. He also did a fellowship in clinical cardiac electrophysiology and advanced clinical cardiac electrophysiology, with level 2 training in Cardiac Magnetic Resonance Imaging.



It all started during a meeting with Associate Professor Yeo Tiong Cheng, (Head, Department of Cardiology, NUHCS). I told him that it is quite frustrating to see patients being referred from Emergency Department for cardiac arrhythmia, when their crucial electrocardiogram (ECG) is either missing or not available at the time of consultation. A/Prof. Yeo immediately suggested that I should work on an electronic ECG project.

## WHY IS THERE A NEED FOR ELECTRONIC ECG

ECG is the basic and most widely performed cardiac investigation that records the electrical activity of the heart. The electrical activity is related to the impulses that travel through the heart that determines the heart rate and rhythm. Previously, nurses had to manually enter data on ECG machines, leaving human error to chance. There was also the process of getting the paper ECG

reports signed and verified by the doctors, which was time consuming. Easy access to electronic ECG is crucial for timelier medical care.

Under the able guidance of A/Prof. James Yip, the Chief Medical Information Officer in NUHS, we started working on this project since October 2013. The EasyG project, an integrated loop solution for ECG, was rolled out across the hospital at the end of March 2014.

**The electronic linkup of all hospital ECG carts to a centralised cardiovascular management information system provides real-time ECG results that can be reviewed by doctors from any hospital workstation.**

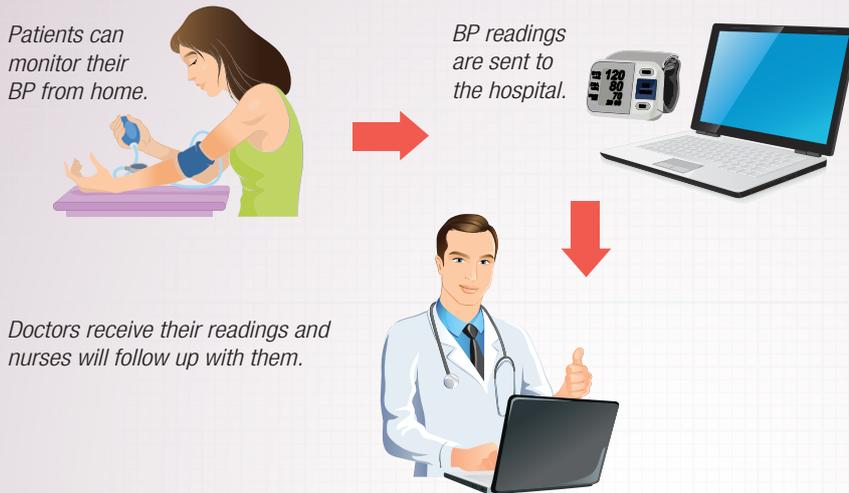
Patient data is scanned rather than entered manually into ECG carts. Integration with hospital result management system allowed automating escalation based on abnormal ECG.

Currently, the project is functioning well without any major hiccups. We recognise that there is always room for improvement, hence we will continue to work on the feedback from the medical and nursing staff. The success of this project is the result of our teamwork. I would like to thank Dr. Daniel Tan, Ms. Karen Tan, Ms. Tay Rui Xian, Ms. Fauziah Azizi, Ms. Chua Li Hoon, Ms. Toh Seow Mei and the Integrated Health Information Systems (IHIS) team. Last but not least, this project would not have been possible without the guidance and mentorship of A/Prof. Yip. •



# Monitoring Your Health From Home

A/Prof. James Yip shares how the benefits of telehealth monitoring service changes the paradigm of healthcare.



By **A/Prof. James Yip**



Senior Consultant,  
Department of  
Cardiology, NUHCS

Programme Director,  
Congenital & Structural Heart  
Disease, NUHCS

A/Prof. Yip holds multiple concurrent appointments, including the position of Chief Medical Information Officer, NUHS. His specialties are pregnancy and heart disease, pulmonary hypertension, Marfan syndrome and medical informatics.

## SPEARHEADING INTEGRATED HEALTH MONITORING

The NUHCS, in conjunction with MyHealth Sentinel, has set up Singapore's first integrated telehealth monitoring service. This service extends the reach of healthcare monitoring from the hospital to the home for patients with hypertension, heart failure and poorly controlled diabetes on insulin.

These patients are sent home with an internet gateway and a bluetooth enabled blood pressure (BP) set, weighing scale or glucometer. The set up is simple for the elderly with no need for wifi or mobile phone configuration. Patients can simply plug in and use. Monitoring at home enables their readings to be sent to the hospital, where dedicated nurses are assigned to track their follow-up.

Since its inception in February 2014, it has monitored 800 patients to date.

## ENHANCED CARE WITH AN INNOVATIVE SERVICE

Patients with severe hypertension in the clinic can avoid a clinical admission by being monitored in the ambulatory setting. Our nurses work with the physicians to do drug titration remotely using protocolised orders. Our patients who have had a heart attack are often given drugs, which help improve their long term outcome. These

drugs, however, are not fully optimised during their inpatient stay. Through telehealth monitoring, we found that 20% of these patients require some form of dose adjustments of up to 1 month after their discharge from hospital.

**Telehealth monitoring has also prevented adverse effects of overdosing in 3.6% of patients.**

Patients with heart failure have also benefited from drug optimisation of their medications from telehealth weighing scales.

**This has resulted in expedited care for these patients before their scheduled appointment with their doctors.**

This service can be scaled to include video telehealth, activity tracking, ECG and temperature sensing in the future. These new modalities, when added, can change the paradigm of healthcare taking place only in a clinical setting.

**After all, home is the best place for care to take place. •**

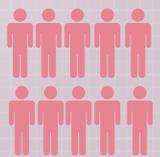
## Benefits of Telehealth Monitoring

**30%** of patients 

Pick up rate of true hypertension

First week : Fourth week  
**19%** : **8.7%**

Saw a drop of high glucose readings (>20 mmol/L) for diabetic patients

**85%** of patients 

BP reduced to <150/95 mmHg within **1 month**



In intensive care medicine, extracorporeal membrane oxygenation (ECMO) provides both cardiac and respiratory support oxygen to patients whose heart and lungs are so severely diseased or damaged that they can no longer serve their functions. A/Prof. Graeme MacLaren recounts a true story of an amazing recovery that showcases how this incredible machine has become a life-saving technique.

After the H1N1 pandemic of 2009, swine flu seemed to disappear for a while. Then, at the beginning of 2013, it reappeared with a vengeance. We had a flurry of referrals for

#### USING ECMO TO MANAGE A CRITICAL CASE

A 25-year-old woman recently presented with severe breathing difficulties at another hospital. She was 37 weeks pregnant. She was rushed to the operating room, where she had an emergency Cesarean section and delivered a healthy baby boy. Unfortunately, she became extremely difficult to keep alive during the operation. Despite getting 100% oxygen on a breathing machine, the oxygen levels in her blood were less than a tenth normal. A diagnosis of swine flu pneumonia was made and she was referred to the Cardiothoracic Intensive Care Unit (CTICU) at National University Hospital. She was placed on ECMO, after which she stabilised.

#### SAVING LIVES AND REPLACING OTHER LIFE SUPPORT

After a week of ECMO, she still had severe lung disease but was clear of the virus and no longer contagious. Her breathing tube was removed. Although her lungs remained completely non-functional, the ECMO circuit did all the work for them. Now free of the mechanical ventilator and not requiring heavy sedation, she was able to talk, eat and most importantly, spent time with her newborn son. A week later, her lungs recovered sufficiently and the ECMO could be removed. She was discharged from the hospital 5 days later.

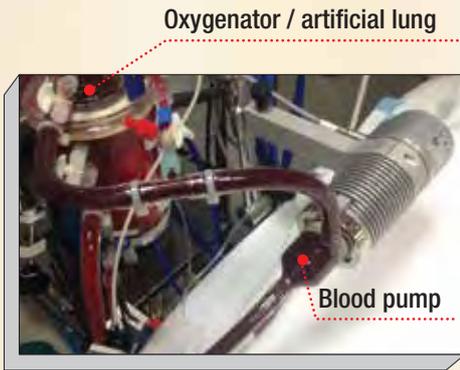
**In her case, ECMO was not only life-saving, it allowed us to take off other forms of life support.**

Instead of sedating her and keeping a breathing tube in her windpipe, she was able to communicate with her family who waited for her to get better. Critical care physicians worldwide are becoming more aware of the benefits of keeping even the sickest of patients awake and alert. •

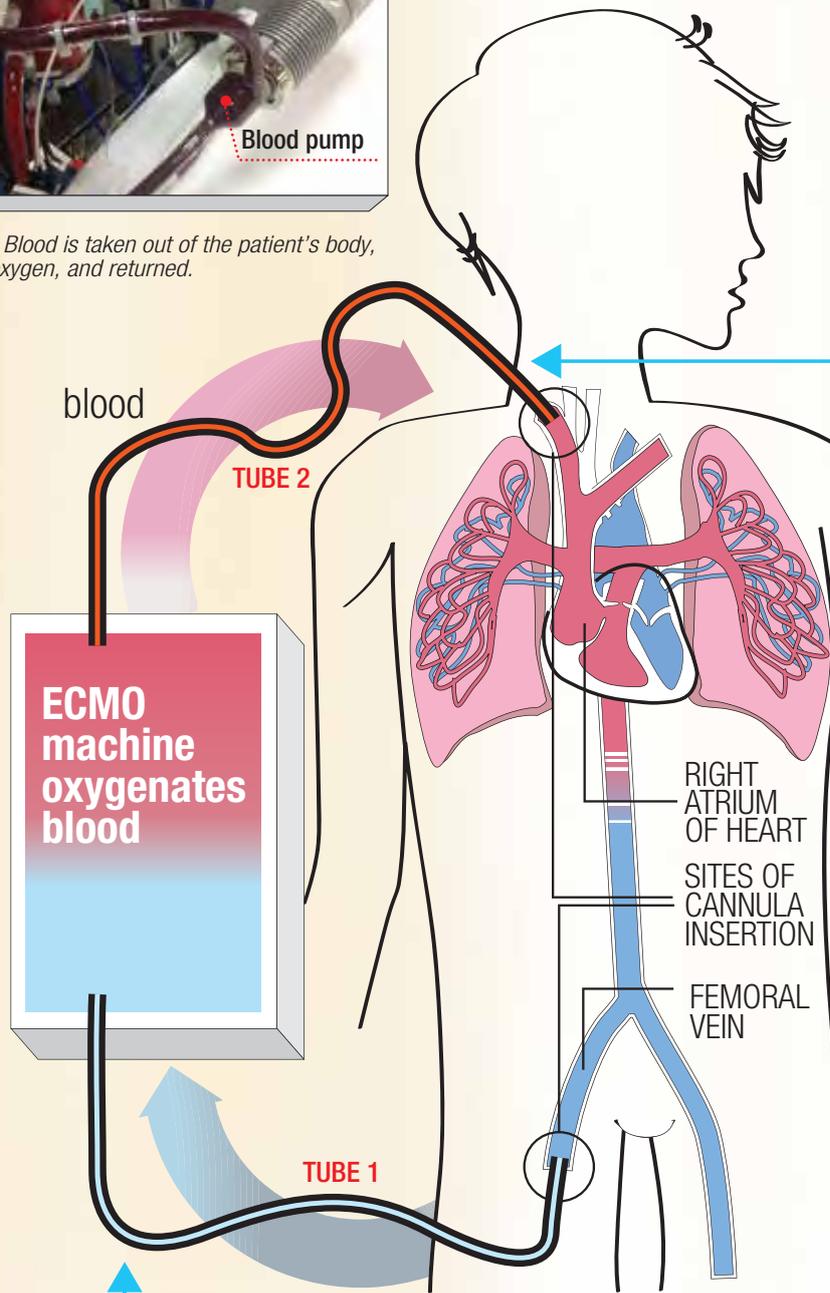
# Keeping Patients **Alive** (And Awake) When The Lungs **Shut Down**

patients with such severe disease that they could not be kept alive with conventional life support. In 2009, there was a global resurgence of interest in a more advanced form of life support called extracorporeal membrane oxygenation (ECMO). Blood is pumped out of the body, given oxygen, and then pumped back in. This technique is not new but has improved a lot and is now much safer.

# What Our Doctors Did?



ECMO: Blood is taken out of the patient's body, given oxygen, and returned.



Source: The New Paper® Singapore Press Holdings Limited. Reproduced with permission.

- 2 The oxygenated blood returns to her heart via another tube inserted through a neck vein
- 3 Patient stabilised after she was placed on ECMO

1 A tube inserted in the femoral vein (located in the upper thigh) draws out her blood

By **A/Prof. Graeme MacLaren**

Senior Consultant,  
Department of Cardiac,  
Thoracic and Vascular  
Surgery, NUHCS

Director, Cardiothoracic Intensive  
Care, NUHCS

Trained in critical care, A/Prof. Graeme MacLaren is an adult and paediatric intensivist, focusing on extracorporeal life support and cardiac intensive care in adults and children. He is also the Vice-President (Asia-Pacific) of the Pediatric Cardiac Intensive Care Society.



# Advent Of A New Era

## *in Coronary Revascularisation*

*HCR is performed at the Hybrid Operating Theatre, a surgical theatre equipped with advanced medical imaging devices.*



Combining durability of surgery with minimally invasive nature of stenting, hybrid coronary bypass is a relatively new procedure and alternative to traditional bypass surgery. To patients, it offers shorter recovery time, potentially fewer complications and a quicker return to work and life. Dr. Chang Guohao sheds light on the unique approach that combines the best of both worlds.

Coronary artery bypass surgery (CABG) has evolved over the last 50 years since the development of the cardiopulmonary bypass machine invented by Dr. John H. Gibbon Jr. in the 1950s. The progress of percutaneous coronary intervention (PCI), research and development of stents with improved qualities and evolution of CABG have allowed us to offer patients a more customised and differentiated manner of coronary revascularisation.

#### DUAL BENEFITS

Hybrid coronary revascularisation (HCR) is a one-stop service provided by cardiologists and cardiac surgeons. It combines the benefits of PCI and CABG. PCI has the advantage of being minimally invasive – with less pain, faster return to normal basic functionality and much lower risks of complications such as stroke. CABG is done via an incision in the anterior chest wall using the left internal mammary artery as the conduit for the left anterior descending artery. HCR avoids the detrimental consequences of cardiopulmonary bypass, decreases the overall need for blood

transfusions and results in faster recovery and a reduced length of stay in the hospital. By combining these two procedures, the patient receives a complete revascularisation without the worry of complications while reaping the benefits of being able to return home early and back to being fully functional.

**The benefits of HCR in reducing blood transfusions, duration of hospital stay and the occurrence of complications directly translate to improved outcomes, symptomatic relief and overall cost savings for the patients.**

Despite the excellent results, the programme is still in its early stage and until the formulation of specific recommendations, only one-third of the patients will qualify for this.

**A meticulous patient selection and the close cooperation between cardiac surgeons and interventional cardiologists of the 'Heart Team' will bring about the success of this programme. •**



*Cardiac surgeon, A/Prof. Theodoros Kofidis and cardiologist, Dr. Edgar Tay are part of the 'Heart Team', that does the HCR procedure.*



**By Dr. Chang Guohao**

Registrar, Department of Cardiac, Thoracic and Vascular Surgery, NUHCS

Dr. Chang is a registrar undergoing his advanced specialty training in cardiothoracic surgery. He has completed his basic surgical training and is currently a member of the Royal College of Surgeons of Edinburgh.



# 6 Million-dollar Man Wins Gold Medal

**With the implantation of a permanent pacemaker to maintain the heart rate, Dr. Seow Swee-Chong helped an avid race-walker fulfil his passion.**

The Sino-atrial node (SAN) is the heart's natural "pacemaker" (refer to Fig. A), maintaining the heart rate within the normal range of 60-100 beats/min at rest and increasing the rate to meet the body's increased demands during exercise. With advanced age, degeneration of the SAN occurs and this can result in a slower heart rate and/or an inability to raise the heart rate in response to exertion.

## **HAMPERED BY A SLOW HEART RATE**

This proved to be particularly disabling for 76-year-old former police officer, Navaratnasingam, who has been a race-walker since the 1960s and had competed in regional events and won medals for his feats. Over the past 2 years, however, he felt that he could no longer manage the "spurt" towards the finish line and suffered from occasional giddy spells. Dismissing it initially as fatigue and not having trained enough, he finally consulted a doctor and was found to have a very slow heart rate of 30-40 beats/min, and up to 4.5 seconds without a heartbeat. He was diagnosed with sinus node dysfunction.

## **FIXING THE "WIRING" OF THE HEART**

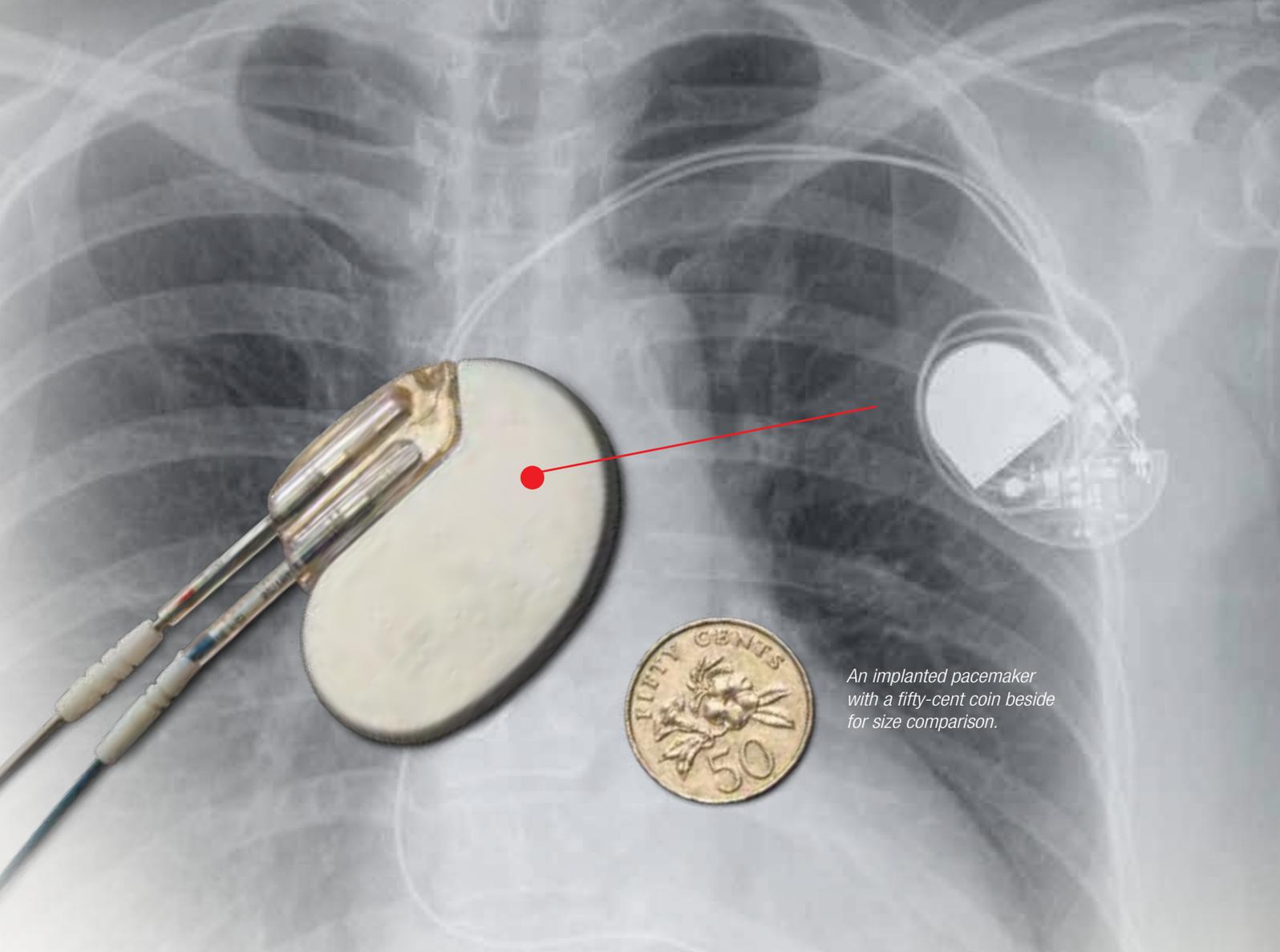
The solution was simple.

**Just like how a house with faulty wiring needs to be 're-wired' for the lights to work properly, the faulty 'electrical system' of the heart is fixed by 're-wiring' it with an implanted permanent pacemaker.**

These small electronic devices maintain the heart rate at a programmed level and are able to ramp up the heart rate appropriately in response to exercise. This is because they contain accelerometers that detect movement, much like how your smartphone is able to detect movement when you tilt your screen or shake the handset.

Five months after his pacemaker implant, Navaratnasingam returned to my clinic jubilantly with two medals to show me. He had won Gold in Singapore and Silver in Malaysia in the "Masters" category. "I am the six-million-dollar man" he quipped – referring to the popular TV series in the 1970s, based on a "bionic man" with mechanical implants. •





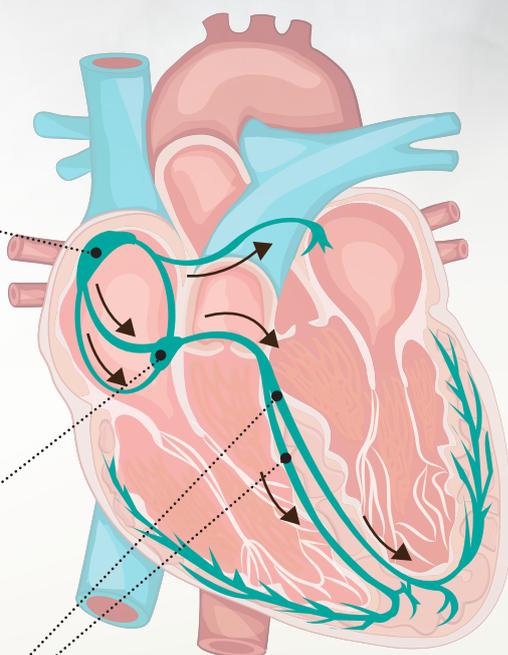
An implanted pacemaker with a fifty-cent coin beside for size comparison.

## Electrical System of the Heart (Fig. A)

The Sino-atrial (SA) Node sends out an electrical signal that starts each heartbeat by spreading through the atria and telling them to contract.

The Atrioventricular (AV) Node is the next stop for the signal as it travels through the heart. The AV node receives the signal from the atria and sends the signal to the ventricles.

The pathways carry the signal through the ventricles. As the signal moves through the ventricles, it tells them to contract.



By **Dr. Seow Swee-Chong**

Senior Consultant,  
Department of Cardiology, NUHCS

Director, Cardiac Electrophysiology  
and Pacing, Department of  
Cardiology, NUHCS

Programme Director, Heart Rhythm  
Programme, NUHCS

Dr. Seow is registered with the Singapore Medical Council, and is accredited in Interventional Cardiac Electrophysiology and Cardiac Pacing/Defibrillation under the European Society of Cardiology. He runs the heart failure clinic, concentrating on patients with concomitant arrhythmias and/or cardiac devices.



# Cardiology Secrets For The MBBS Exams

Recognising the daunting nature of the final year medical exams, the intensive Undergraduate Cardiology Review Course was started in 2010, and became an immediate success. The breadth of knowledge and energy required to run this course is only possible through the combined efforts of the entire Department of Cardiology in NUHCS. As the course director, Dr. Low Ting Ting offers an exclusive coverage of the annual course.

The 5<sup>th</sup> Annual Undergraduate Cardiology Review Course was held on 8-9 November 2014. The course was greatly welcomed by 257 exuberant students.

It is conducted for final year medical students preparing for their gruelling M.B.B.S examinations. Designed to provide a comprehensive overview of all relevant aspects of cardiovascular medicine, it comprises of lecture series, case discussions and clinical bedside tutorials.

## KEEPING ESSENTIAL ISSUES INTERESTING

The lecture series covered topics such as coronary artery disease, valvular heart disease, heart failure, hypertension, hyperlipidaemia, peripheral vascular disease, heart rhythm disorders, pulmonary embolism and adult congenital heart disease. Each topic is delivered by a specialist who is an expert in his own field. Prof. Chia Boon Lock, an all-time-favourite with the students, even had the audience roaring with laughter during his funny and insightful lecture on Hypertension and Hyperlipidemia.

*Prof. Chia (middle), Dr. Low (third from the left), senior residents and registrars who ran the review course.*

This year, we also added a case revision series with test questions held in an interactive manner. By using smartphones, answers were polled in real time via an online portal. We could identify common misconceptions, address controversies and drive in salient points. This was most well received and the students found it enlightening.

## THE MOST RIVETING AND CHALLENGING ASPECT

The clinical part of the course is often voted by students to be the best part of the course. Senior residents and registrars freshest out of their MRCP PACES exam effectively run it. In small groups of six, the students are rotated through a circuit of five different stations, each station consisting of a different cardiac case and physical signs. The myriad of cases

By **Dr. Low Ting Ting**

Registrar, Department of Cardiology, NUHCS

Dr. Low is a cardiologist with special interest in Adult Congenital Heart Disease, Heart Disease in Pregnancy and Women's Heart Health. Beyond clinical work and research, she enjoys teaching and nurturing the young (both her little boys and students alike). She is grateful for excellent mentors and teachers who have helped her come this far, and hopes to pay it forward with her involvement in medical education.



are specially selected to represent conditions that are hard to come by in the wards, but relatively common in exams, such as severe mitral stenosis, aortic regurgitation and marfan's syndrome, to name a few.

The feedback was overwhelmingly positive and we look forward to teaching and inspiring again next year!•



## Quotes from students

- 1 "Since M3, I have struggled to find reliable material to learn cardiology from, especially when different books and sources tell different things. The lectures are great as a summary of what's correct and important."
- 2 "Excellent excellent course and I wish all the other departments could do the same!"
- 3 "Really grateful to all the tutors who specially took the weekend to make this cardio review course a success and joy to attend!"
- 4 "Wow, all of them (the short cases). Everyone were good."



# Delving Into The Core of Aortic Root Cannulation

By **Dr. Ong  
Chin Siang**



Resident, Department of  
Cardiac, Thoracic and Vascular  
Surgery, NUHCS

Dr. Ong has been practising at the National University Hospital since graduating from the National University of Singapore Yong Loo Lin School of Medicine, and is currently in the cardiothoracic surgery residency programme.

Dr. Ong Chin Siang gives insight into the Aortic Root Cannulation workshop that was held to train new CTS residents on the procedure through hands-on practice, lectures and wet lab sessions.

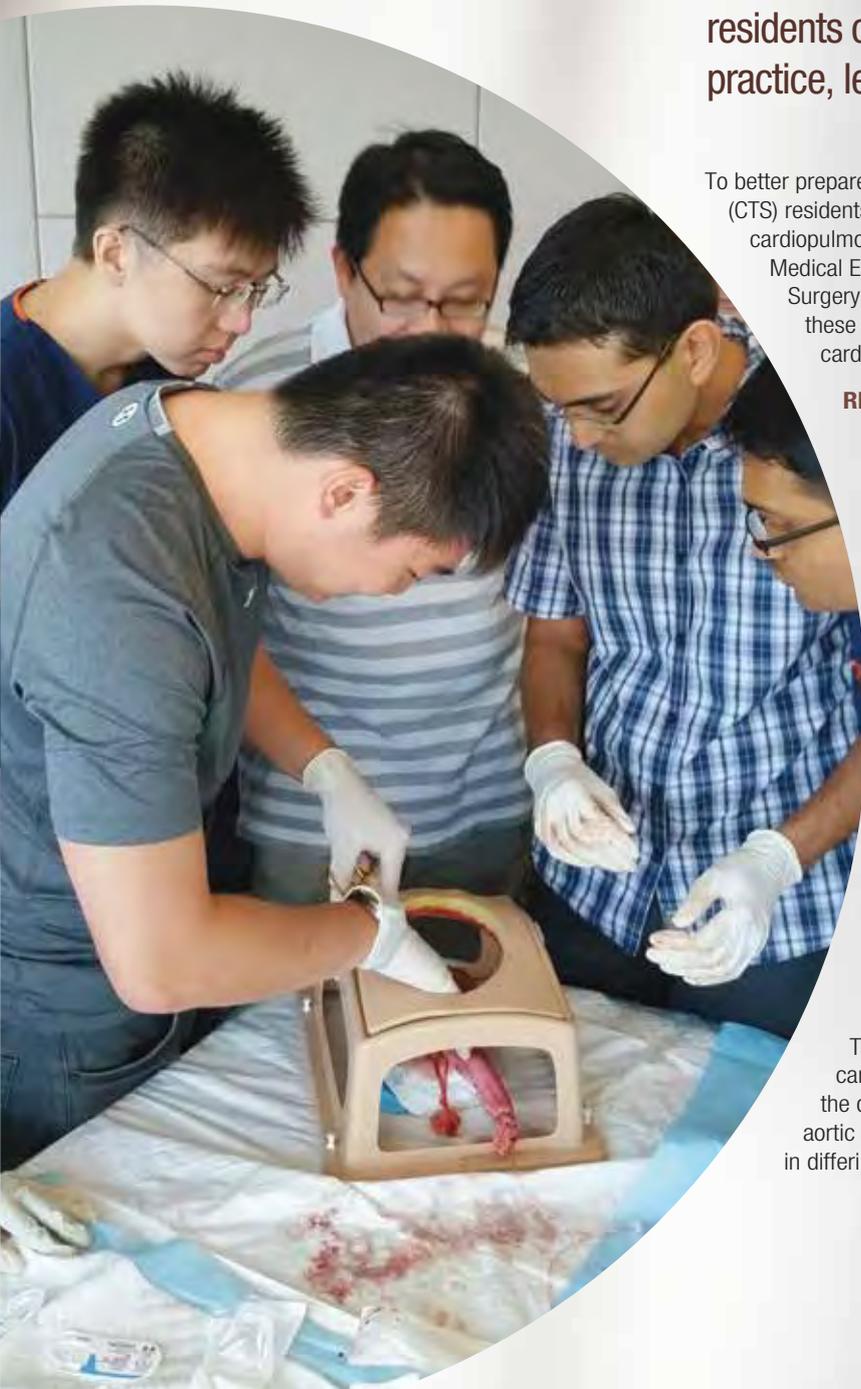
To better prepare National University Health System (NUHS) Cardiothoracic Surgery (CTS) residents who are new to cardiac surgery on techniques specific to cardiopulmonary bypass (CPB), Dr Ooi Oon Cheong, the then Postgraduate Medical Education Director of the Department of Cardiac, Thoracic & Vascular Surgery, organised a series of lectures with relevant wet lab sessions. One of these sessions was the aortic root cannulation workshop, for the delivery of cardioplegic solution during CPB.

## REAL-LIFE SIMULATION

The workshop involved a hands-on procedure of aortic root cannulation. First, the frozen porcine aortas were thawed, with the branches and distal end of the aorta tied off with silk sutures 2-0. Next, red dye was injected into a bag of 500ml normal saline to simulate blood. The saline bag was then manually compressed to simulate "blood pressure", and the simulated blood was then infused into the porcine aorta. Once the aorta was turgid, two CTS residents, one operating and one assisting, would then put 2 purse-string sutures around the intended cannulation site. They would proceed to cannulate the aorta with a variety of aortic root cannulae. After the procedure, the residents would repair the aorta so that other residents could repeat the procedure again.

**All the residents took turns and managed to get the opportunity to practise aortic cannulation, as the operating surgeon, the assisting surgeon or both.**

The lectures allowed residents to understand the theory of aortic root cannulation. The wet lab sessions allowed residents to be familiar with the different techniques of aortic root cannulation, the various types of aortic root cannula, the aortic tissue, and the sequence of steps to be made in differing roles, as either the operating surgeon or the assisting surgeon. •





# Pushing Frontiers in Cardiovascular Research



Creating new knowledge through research to bring about betterment of care for our patients is a key mission in NUHCS. Heading the research arm of NUHCS, Prof. Arthur Mark Richards, director of Cardiovascular Research Institute (CVRI), spoke with Angeline about his research, the IMMACULATE study (**IM**proving outcomes in acute **MyocAr**dial infar**C**tion thro**U**gh reversal of early and **LATe** cardiac **rE**modeling), and achieving the Singapore Translational Research (STaR) Investigator Award.



## PROGRESSING NEW RESEARCH WITH STAR AWARD

The STaR Investigator Award is a prestigious award offered by the Singapore Ministry of Health's National Medical Research Council (NMRC) to attract and nurture established world-class clinician investigators to undertake cutting edge translational and clinical research (TCR) in Singapore.

Prof. Richards is honoured to receive the STaR Award for his IMMACULATE research project. He sees it as a degree of recognition and feels privileged to be part of a small and outstanding team. He is grateful to all who have helped him push this research forward, including A/Prof. Mark Chan (Senior Consultant, Department of Cardiology, NUHCS) and the specialists in Cardiovascular Research Institute (CVRI).

Prof. Richards' achievement of the STaR Investigator Award further validates NUHCS' continuous efforts to advance cardiovascular research.

## UNPRECEDENTED RESEARCH PROJECT TO IMPROVE CARDIAC TREATMENT

The study is based on an often-neglected issue of adverse left ventricular remodeling. Adverse left ventricular remodeling is a serious response of the heart to injury that may come from heart attacks. Prof. Richards' IMMACULATE study looks at how the heart heals or fails to heal from a heart attack, and this failure in healing is the most common cause for patients to return after having a heart attack. A clinical research will run trials to find better ways to predict which patient will have a cardiac remodeling and treat heart failure through blocking remodeling and managing its healing.

With the help of A/Prof. Mark Chan and A/Prof. James Yip (Senior Consultant,

Department of Cardiology, NUHCS), a registry will be put together to detect high risk of heart attack and cardiac remodeling in National University Hospital and Tan Tock Seng Hospital. Patients will be documented and monitored for 3-4 months to track ventricle changes. With intensified care, there will be lowered thresholds for access. The study will require special forms of scanning; monitoring of patterns and abnormal signs and risks; ensuring proper medication; and identifying clues to understand risks.

Through scientific research, the study aims to find new options and drugs to help cardiac remodeling. Still in the pre-clinical stages of animal testing, the research looks to donor drugs of H<sub>2</sub>S, which is administered in tissue and blood to help prevent the damage of inflammation and scarring from heart attacks. Prof. Phillip Moore, Dr. Eliana Martinez and Prof. Dominique de Kleijn will also help with the testing of animals for controlled treatments and work to improve sustained heart recovery.

Prof. Richards chose this research area as he saw it as an unmet need.

**Most treatments focus on the first heart attack, although many survive it, there is inadequate treatment following it, which increases vulnerability and threatens survival rates thereafter. Furthermore, heart failure is now the single most common reason for admission.**

Significant risks of heart failure include stress, high blood pressure, diabetes and smoking.

On a personal note, he would like to thank A/Prof. Tan Huay Cheem (Director, NUHCS), A/Prof. Ronald Lee (Senior Consultant, Department of Cardiology, NUHCS) and A/Prof. Adrian Low (Clinical Director, Angiography Centre, NUHCS), for their countless encouragement and support; the H<sub>2</sub>S Team with Prof. Moore and Prof. Brian Pymock, the Bio-marker SA team with Dr. Liew Oi Wah, and Duke NUS, for their resources and expertise. •



**By Ms. Angeline Tan**  
*(written on behalf of Prof. Arthur Mark Richards)*

**Assistant Manager, Communication & Development, Operations & Administration, NUHCS**

Angeline is one of the key members of the NUHCS Communications & Development team, responsible for orchestrating all events, internal and external communication. They ensure timely and effective messages on heart health matters to reach our patients, staff, media, corporate partners and the general public. Angeline manages the corporate and patient education collaterals under NUHCS, video production and The Heart Fund. She is also from the editorial team behind PULSE.

# CONTRAST - A Multicentre Study

*(Combined N-acetylcysteine and bicarbonate in PCI to reduce adverse side effect of contrast)*

**What is this big-scale clinical trial about and how does it benefit us? Read on as A/Prof. Tan Huay Cheem shares with us the groundbreaking results of the CONTRAST trial.**

Involved

6 

local and overseas centres

Took 

7 years to complete

Enrolled

548 Patients 

The trial studied three different renoprotective regimens for preventing contrast-dye induced acute kidney injury, termed contrast-induced nephropathy (CIN), among Asian patients with pre-existing renal impairment undergoing coronary angiography and angioplasty.

The three arms of the study are prehydration with intravenous normal saline and oral N-acetylcysteine (NAC), intravenous sodium bicarbonate (SOB) infusion, and combined therapies of the above two regimens (COM). The study showed that the combined therapies of NAC and SOB did not confer additional benefits in reducing CIN. Rather, it was the treatment with prehydration and oral NAC that showed the lowest incidence of CIN (6.5% vs. 12.8% in the SOB group and 10.6% in the COM group). The volume of contrast use and female gender were independent predictors of CIN in our study cohort.

## FEATURING NUHCS'S LARGEST CLINICAL TRIAL

A/Prof. Tan presented the trial results at the

Transcatheter Cardiovascular Therapeutics (TCT) meeting held in Washington DC, USA, on 13 September 2014. Initiated by both A/Prof. Tan and Dr. Eric Chong, it marked the largest trial of its kind to be carried out by NUHCS. It involved 6 local and overseas participating centres (including Khoo Teck Puat Hospital, China's Guangdong Provincial Cardiovascular Institute in Guangzhou, Nanjing First Hospital and Shanghai Chest Hospital, and Malaysia's Institute Jantung Negara). The trial successfully enrolled a total of 548 patients for the study and took 7 years to complete. It was also supported by the Singapore Clinical Research Institute (SCRI) and Investigation Medical Unit (IMU) at National University Hospital.

The study could not have been successfully completed without the persistence and support of all the investigators, local and overseas alike. A/Prof. Tan is pleased to see its completion and looks forward to many more of such randomised clinical trials being carried out at NUHCS. He would also like to thank everyone who has contributed one way or another to this journey of learning. •

By **A/Prof. Tan Huay Cheem**

Senior Consultant,  
Department of Cardiology, NUHCS  
Director, NUHCS



With a Masters of Medicine in Internal Medicine and Membership of Royal College of Physician, UK, A/Prof. Tan went on to complete four other fellowships. He also received vascular ultrasonography and carotid stenting training. He is an active clinical researcher, senior consultant cardiologist at NUH, visiting professor to several hospitals in China and is an invited speaker to many international cardiology meetings.





# A New Approach to Adverse

# DRUG

# Reaction Monitoring



By **Asst. Prof.  
Chester Drum**

Consultant, Department of  
Cardiology, NUHCS

Asst. Prof. Drum focuses on regulatory science and advanced materials engineering, with funding from the Strategic Positioning Fund of the Biomedical Research Council, A\*STAR and Singapore MIT Alliance. He received multiple awards including the prestigious Harold Lampert Award for top dissertation in the Biological Sciences and had published in top tier journals.

Working hand in hand with Genome Institute of Singapore (GIS) and Biomedical Research Council (BMRC), NUHCS aims to improve drug safety in Singapore through monitoring technologies and new discoveries.



As part of a new SAPHIRE (Surveillance And Pharmacogenomics Initiative for Adverse Drug Reactions) project, Asst. Prof. Chester Drum of the Department of Cardiology and Cardiovascular Research Institute (CVRI) has been awarded a SGD2.1 million grant from the Biomedical Research Council (BMRC), A\*STAR, to better understand the determinants of drug side effects in the Singaporean population. The award is part of a larger SGD10 million effort to increase drug safety in Singapore through adverse drug reaction (ADR) monitoring technologies, including quantitative mass spec, electronic medical record analysis and pharmacogenomics. This project will serve as a model of how metabolite quantification can aid both adverse drug reaction monitoring and pharmacogenomics. This will, for the first time, bring quantitative mass spectroscopy technology to the Department of Cardiology and establish a centre for drug metabolite quantification and biomarker quantification using quantitative mass spectroscopy.

## REGULATORY-ACADEMIC COLLABORATION

With the aid of four new clinical coordinators and new post-doctoral associates, Asst. Prof. Drum will be working closely with GIS and BMRC to discover new genetic predictors of adverse reactions. The proposal brings together the pharmacovigilance expertise of the Health Sciences Authority with the scientific expertise of the BMRC, CVRI and clinical recruitment capability of NUHCS and National Heart Centre. Specifically, drug side effects of commonly prescribed statin medications will be studied. This unique regulatory-academic collaboration will create a centre of academic excellence and develop a competitive advantage in pharmacogenomics research and implementation in Singapore to advance the shared goals of public health and drug safety.

## IMPROVING DRUG SAFETY

**The SAPHIRE project seeks to establish a national active surveillance network using electronic medical record (EMR) capabilities to identify ADRs in Singapore,**

to discover and validate pharmacogenomic biomarkers of highest relevance to Asian populations, and to develop robust pharmacogenomic diagnostic tests through a College of American Pathologists (CAP)-certified laboratory. The BMRC, A\*STAR Strategic Positioning Fund (SPF) provided funding, which also includes a major award for cardio-oncology research, headed by Prof. Mark Richards and A/Prof. Ling Lieng Hsi. •



## Don't Deny The Heart Truth,

# *Face It.*

Which was exactly what our participants at our bi-annual NUHCS Mandarin Symposium did. They came, they listened, they shared and they learnt. Read on as Ms Yvonne Lin tells us more about this informational yet interesting day!



*A/Prof. Tan Huay Cheem (top left), Dr. Peter Chang (top right), Dr. Jimmy Hon (bottom left) and Dr. Lim Toon Wei (bottom right), our effectively bilingual speakers for symposium 2014.*



## ENTHUSIASTIC INTEREST FOR THE SYMPOSIUM

The air was thick with enthusiasm for the second Mandarin symposium 《心脏“真相”你知多少?》 held by the National University Heart Centre, Singapore (NUHCS) on 12 July 2014.

The response was overwhelming! Tickets were sold out within 2 weeks, the live screening was even extended to the adjacent room, and we received unexpected walk-ins on the event day. Such eagerness from almost 400 participants fueled the energy levels throughout the symposium.

## AN INFORMATIVE AND ENGAGING DAY

The afternoon saw our four cardiovascular specialists, Dr. Lim Toon Wei, A/Prof. Tan Huay Cheem, Dr. Peter Chang and Dr. Jimmy Hon captivating the participants with cardiovascular knowledge, laughter, questions and health pointers. They kept the participants enthralled with information and updates on Heart Failure, Heart

Attacks, Vascular Health and Cardiac Surgery. The host of the symposium, Anna Lim from UFM 100.3, who also hosted the NUHCS Mandarin Symposium two years ago, galvanised the audience throughout the event. The audience was especially engaged during the Q&A session, where our cardiovascular specialists addressed the endless stream of questions from the participants. Even when the symposium came to a close, our keen participants continued to clarify some of their queries with our doctors off-stage.

The symposium came to an end with a book-signing session by A/Prof. Tan, for his publication 《临床心得》. He was met with a long queue of supporters who hold him in high regard for his work at NUHCS.

It was heartening for NUHCS to be able to organise such an event that imparts knowledge, increases awareness, and features cardiovascular health through talks, CPR/AED demonstration and heart health education displays.

NUHCS looks forward to more successful symposiums in the coming years. •

By **Ms. Yvonne Lin**

Senior Assistant Manager, Communication & Development, Operations & Administration, NUHCS



Yvonne is a part of the Communications & Development Team, which works closely with colleagues across the NUHCS and its associates to maintain and develop the Centre's reputation. The team tells the stories of its people, patients and programmes, keeping in mind the mission to provide a comprehensive and holistic approach to the treatment of cardiovascular problems. She manages the website, media relations and external engagements for NUHCS.



Find out more about the Dietitian's Choice food bay at One@KentRidge, a collaboration with Fairprice on the next page!

Celebrating

# NUHCS

World Heart Month  
September 2014

Collaborating Partners:



Abbott

AstraZeneca



## Inpatient Heart Friendly Meal

(Picture A-B)

## Healthy Shopping Tour at Fairprice Supermarket

(Picture C)

## CPR/AED Certification Course for NUHCS Staff

(Picture D-E)

A specially curated heart-friendly Western meal was given to our inpatients as a lunch option on 10 September. To allow the meal to be replicated at home, an easy to prepare recipe of the meal was enclosed for takeaway. It was the great support from our in-house caterer, Sodexo, that made this initiative possible, and successful! There were 3 times more orders for the heart-friendly meal!

**Supporting partners:** Sodexo, NUH Environment Services, NUH Dietetics

It started with a small idea about locating the healthy options in the supermarket at NUH. The idea became reality with a NUH Dietetics collaboration to host a healthy shopping tour at the Fairprice at One@KentRidge, as well as the installation of a 'Dietitian's Choice' food bay. Led by the leading lady of NUH Dietetics on 10 September, Dr. Lim Su Lin dished out insider tips to a group of our NUHCS patients on how to read food labels and sieve out low fat food alternatives and the types of fresh ingredient that can be used towards healthy and good dishes. This initiative received good media feedback on several channels, and was well-received by the attendees of the tour!

**Supporting partners:** Fairprice at One@KentRidge, NUH Amenities Space Management, NUH Dietetics

Survival from cardiac arrest decreases 10% with each minute from the time of collapse to defibrillation. The chances of survival lie in the hands of the bystanders. In a heart centre setting, any staff can be a potential lifesaver of a patient. On 19 September, 20 of our staff from NUHCS received CPR & AED training and certification from our nurses at NUH Nursing Education. The course was highly sought after and received great commendations. The spirit continues after World Heart Month! **Our colleagues in NUHCS Ops & Admin are now all CPR-AED certified!**

**Supporting partners:** NUH Nursing Education



26

NUHCS PULSE Issue 24



**NUHCS celebrated the World Heart Month with a myriad of activities that provided patients and the public with tips, ideas and knowledge on caring for the heart. We have Ms. Angeline Tan to bring you through the timeline of exciting initiatives for the first month-long campaign. There's a bit of everything for everyone!**



## Healthy Eating Need NOT Cost More! (Picture F & G)

To encourage our ancillary staff, who are mindful of their meal expenses and often consume unhealthy food options such as instant noodles to keep costs low, an exclusive customised talk was crafted to address how accessible and economical healthy meals can be. The talks were conducted in various languages and in 6 sessions across 3 days, from 22 to 24 September, to facilitate greater understanding and attendance. It was a great first step getting closer to our ancillary colleagues in boosting their awareness that healthy eating can be low cost as well!

**Supporting partners:** NUH HR Wellness

## Heart Failure Awareness Fair (Picture H-J)

The Heart Failure Awareness Day is a co-initiative by the NHG Joint-Institution Heart Failure Workgroup. NUHCS had the honour to host the event! Designed to raise awareness about the importance of recognising Heart Failure, education panels were placed at NUH Lobby B for a month, attracting many onlookers and readers. On 29 September, the exhibition panels were transformed into booths showcasing the different aspects of Heart Failure, where visitors got to interact with our topic experts and played games to gain useful knowledge and tips on reducing the risk of heart failure. Our nurses and doctors specially choreographed a fusion of zumba and line dance segment for this day, marking the finale of our month-long campaign!

**Supporting Partners:** NHG Heart Failure Workgroup, NUH Dietetics, NUH Pharmacy

By **Ms. Angeline Tan**



Assistant Manager, Communication & Development, Operations & Administration, NUHCS

Angeline is one of the key members of the NUHCS Communications & Development team, responsible for orchestrating all events, internal and external communication. They ensure timely and effective messages on heart health matters to reach our patients, staff, media, corporate partners and the general public. Angeline manages the corporate and patient education collaterals under NUHCS, video production and The Heart Fund. She is also from the editorial team behind PULSE.



Dr. Lim Su Lin, our chief dietitian, led the educational food tour for our heart patients.



**By Dr. Daniel Tan**

Assistant Chief Operating Officer, Operations & Administration, NUHCS

Daniel graduated with a double Bachelor's Degree in Science (Honours) in Cell Pathology and MBBS from University College of London. He earned his MRCS and subsequently obtained an MBA from the National University of Singapore. His current responsibilities in NUHCS include all clinical operations as well as research administration for Cardiovascular Research Institute (CVRI).

# FIRST

## hospital-supermarket

### collaboration to encourage

### healthy eating and shopping

Dr. Daniel Tan, together with his dedicated colleagues at NUH, pioneered a collaboration with FairPrice at One@KentRidge to develop a Dietitian's Choice corner to help patients and consumers make informed food decisions. It puts together groceries handpicked by the dietitians. How convenient is that!

It all started with a simple request by a patient I met at the FairPrice (supermarket) outlet at the NUH medical centre retail podium, One@KentRidge. She asked me if I could help her select the healthiest cooking oil as she did not have her reading glasses with her to look at the labels. This seemed like an innocent request but as there were so many choices, it could be a real challenge to decipher the food labels and differentiate between good and bad fats, versus high and low calories.

#### WHAT IS DIETITIAN'S CHOICE?

It dawned on me that we do not spend as much effort educating the public about buying the right kind of groceries. Seeking healthy staple items like bread, cereal, rice, noodles is akin to a treasure hunt as one would have to pick up the individual items and read the labels to know its hidden dangers or conversely, its healthy benefits. As I was heading back to the office, I serendipitously met our Chief Dietitian, Dr. Lim Su Lim, and Ms. Jessie Yong, the then Director in charge of the retail operations. I told them about the patient at FairPrice and blurted out wistfully that it would be nice to have all the right kinds of groceries grouped together, which would also educate our patients about nutrition and choosing the right food. They were enthusiastic about the idea and before I knew it we were fast circulating emails and meetings with the FairPrice branch manager to pilot this idea.

It is great to have passionate colleagues and co-workers who are supportive of novel ideas. Su Lin assisted in vetting almost the entire inventory of the Fairprice outlet's grocery list and selected a ready mix of everyday items from milk, cereals, noodles, biscuits, nuts, rice and cooking oils, just to name a few. We named this scheme the 'Dietitian's Choice' and promptly worked on the promotional materials placed within the FairPrice outlet.

#### AN EASY WAY TO A HEALTHIER CHOICE

The true test came when we invited some of our heart patients back for an educational food tour at the FairPrice outlet. The media also took interest in our concept and came

along for a look. The response from our patients was extremely positive. They hailed it as a ready guide for them to learn and identify the right items to buy. One of the patients summed it best – **"I do not need to go around to read the labels. I just pick it up, put it in the basket, make the payment and go off."**

So the next time you visit NUHCS, do come up to the FairPrice outlet at One@KentRidge and look for the Dietitian's Choice section and in case you were wondering, the cooking oil I recommended to the earlier patient can be found there. •

Dr. Lim was interviewed by the media reporters who took interest in the first hospital-supermarket collaboration to encourage healthy eating and shopping.



# Wet, watery and FUN!

## NUHCS Family Day 2014

Heading the organising committee, Dr. Peter Chang recaps on Family Day, an NUHCS tradition and a well-deserved downtime to reward our staff for all their hard work in the past year.

You have probably never seen the dedicated staff of NUH Heart Centre like this. Unlike Family Day in the past, the organising committee decided to give it a wet twist. On 22 November 2014, over 500 people from NUHCS and their families took over Singapore's only waterpark, Wild Wild Wet, and transformed it into a playground of our own. From the time the park opened, the action almost never let up. Adrenaline seekers braved the rapids as they experience white water rafting down the raft slide Ular-Lah. Children played with all things splashy in the Professor's Playground of slides and swings. Around the skirts of the park, you could catch sun tanners watched the world drift by either on beach

chairs or by meandering with the flow on rafts. Shortly after mid-day, everyone gathered near the Tsunami wave pool as A/Prof.Tan (Director, NUHCS) and A/Prof. Yeo (Head, Department of Cardiology, NUHCS) kicked off this year's festivities with blasts of champagne confetti. On cue, the four colour teams were off again into the water to compete in Telematch challenges of "Bouncing Babies", "Catch Em Fish", "Sponge up the Volume", and "Balancing Board".

There were high tea refreshments while the children played stage games, the adults mingled and socialised, and our colleagues danced and twirled in

synchrony to "Happy" from Pharrell Williams. The top winners of the lucky draw were announced and everyone gathered for a group photo, wearing NUHCS's favourite orange and blue along with big smiles on our faces.

We were also grateful to the good weather and in keeping rain away despite a forecast of 95% chance of thunderstorm. My heartiest thanks for all the people who have donated precious time, money, able bodies to make this year's Family Day a tremendous success. •





By **Dr. Peter Chang**

Consultant, Department of Cardiology, NUHCS



Dr. Chang is board certified in internal medicine and was a hospital medicine specialist before completing his cardiology fellowship. He is also trained in vascular medicine and focuses on an integrated and interdisciplinary approach to vascular conditions with an emphasis on non-invasive diagnosis and management.



# A New Day In Heart Failure At ESC Congress 2014

The five-day European Society of Cardiology (ESC) Congress 2014 is one of the top cardiology meetings in the world and has attracted 29,000 participants, from Australia, Japan, Singapore and the United States. Dr. Lin Weiqin shares his afterthoughts on NUHCS' presence at the conference and the potentially game-changing PARADIGM-HF results.

The ESC Congress 2014 was held in Barcelona, Spain from 30 August to 3 September 2014. Traditionally the biggest cardiology conference in the world, a total of 3,331 posters – out of nearly 10,000 submitted – were picked by over 1,500 top doctors, to be presented at this year's congress.

'Prognostic implication of obstructive sleep apnoea diagnosed by post-discharge sleep study in patients presenting with acute coronary syndrome', headed by A/Prof. Ronald Lee and presented by Ms. Germaine Loo, was reported on My Paper. The study followed 68 patients over two years and showed that people with sleep apnoea have

All in all, ESC 2014 was truly an eye-opening and humbling experience. I was privileged to be given the opportunity to walk and breathe amongst the giants in the field of cardiology. I would like to thank my mentor, A/Prof. Poh for his guidance, the department of cardiology and my colleagues for their support. It was also a good bonding occasion for the NUHCS team. •

## More about the PARADIGM-HF trial

The clinical trial, involving more than 8,400 patients from 47 countries, was started in December 2009. By March this year, trials of the pill were so successful that they were stopped prematurely. It was clearly found to be superior to the current drug – which has been in existence for the past 25 years.

The new drug has a double action – it reduces the strain on the failure heart while promoting heart muscle recovery. It also has fewer side effects. The drug is slated to hit the market at the end of 2014.



NUHCS dinner in Barcelona on 31st August 2014.

## ARE WE A STEP CLOSER TO TAKING THE FAILURE OUT OF HEART FAILURE?

The major talking point of this congress was the result of the PARADIGM-HF trial. It showed that the combination drug, LCZ696 (mixture of valsartan and sacubitril), is more effective than the standard treatment as it brought about positive mortality and morbidity for patients with moderate to severe systolic heart failure. **(More information on the PARADIGM-HF trial is shared in the blue box on the right.)**

## HIGH CORRELATION BETWEEN SLEEP APNOEA AND HEART FAILURE

The National University Heart Centre, Singapore (NUHCS) was again well-represented, with 14 poster presentations at the conference.

7 times the risk of a heart attack or stroke as compared to other heart failure patients. Sleep apnoea occurs when a person's breathing is interrupted for a period between 10 seconds and several minutes during sleep.

## A SIGNIFICANT MOMENT FOR CARDIOLOGY IN NUHCS

On a personal note, I was honoured to be invited for an oral presentation for the symposium, 'State of the Art – Aortic stenosis: from epidemiology to treatment'. Our presentation was titled 'Does Body Mass Index Affect Left Ventricular Remodeling in Different Categories of Severe Aortic Stenosis?' It was the culmination of hard work by the team led by A/Prof. Poh Kian Keong. The symposium also provided new insights into this age-old disease, with original research by investigators all over the world.

By **Dr. Lin Weiqin**

Registrar, Department of Cardiology, NUHCS



Dr. Lin graduated from the National University of Singapore in 2008. He is currently undergoing advanced specialist training in cardiovascular medicine. Besides his interest in clinical cardiology, he is also an aspiring researcher, making his foray into clinical research.

# Asian Interventional Cardiovascular Therapeutics (AICT) 2014

The 10th AICT, the official scientific meeting of the Asia Pacific Society of Interventional Cardiology (APSIC), was held in Jakarta, Indonesia from 27 to 29 November 2014. AICT 2014 marked a significant milestone as the international meeting celebrated its 10th anniversary this year. It brought together 881 participants from 35 countries, with almost all the Asian countries represented.

AICT showcased the most advanced technology and expertise with LIVE demonstration cases from Bangladesh, Kuwait, Thailand and Indonesia. The moderated sessions and didactic lectures featured 151 top faculties from all over the world. The topics involved complex

percutaneous coronary intervention (PCI), pediatric, congenital, endovascular, peripheral and structural interventions. Various global organisations also held joint expertise sharing sessions.

NUHCS was heavily involved in AICT. A/Prof. Tan Huay Cheem, the current President of APSIC, and the Chairman of the APSIC Scientific Committee, helped develop the exciting scientific programme. Besides chairing and moderating roles, A/Prof. Tan delivered lectures as well as the opening and closing speeches.

A/Prof. Adrian Low and Dr. Edgar Tay also gave lectures while Dr. Ibandito Kuntjoro and Dr. Joshua Loh presented cases, with Dr. Loh

winning the 'Best Case Oral Presentation' Award.

Participants and faculty had fantastic interactions. Many are former NUHCS fellows who are now established interventional cardiologists and participated actively in the meeting. All thanks to the excellent hospitality of the hosts, we had absolutely enjoyed the culture and cuisine. •

By **Dr. Joshua Loh**

Consultant, Department of Cardiology, NUHCS



Dr. Loh has authored and co-authored more than 30 articles in peer-reviewed journals and has presented many abstracts in international scientific meetings. His specialty interests include coronary artery disease and acute coronary syndromes. He supervises the post-myocardial infarction clinic, focusing on patient care after their heart attack.



# Transcatheter Cardiovascular Therapeutics Angioplasty Summit (TCTAP) 2014

The TCTAP 2014 was held at the Coex Convention Centre, Seoul, Korea from 22 to 25 April. There were some interesting poster abstracts presented and distinguished experts of the field specially moderated this

session. Each author also delivered oral abstracts, with interactive discussions and Q&A between participants and presenters. We had the opportunity to showcase a few of our oral abstract presentations and posters exhibition.

I was honoured to win the best presenter in both the moderated poster (valvular heart disease category) and oral (Transcatheter Aortic Valve Implantation and Left Atrial Appendage category) abstract competition. It was an unforgettable experience. With many world-renowned scientists and clinicians, numerous major breaking trials were presented. I hope that NUHCS can continue to participate and present our late-breaking trials and research at this meeting in the near future. •

By **Dr. William Kong Kok Fai**

Consultant, Department of Cardiology, NUHCS



Dr. Kong achieved cardiology specialist training and the Academic Medicine Development Award, receiving subspecialty training in his research interests, echocardiography and structural heart disease/valvular heart disease.



A



# SPECIAL HIGHLIGHTS

C



E



G



F



I





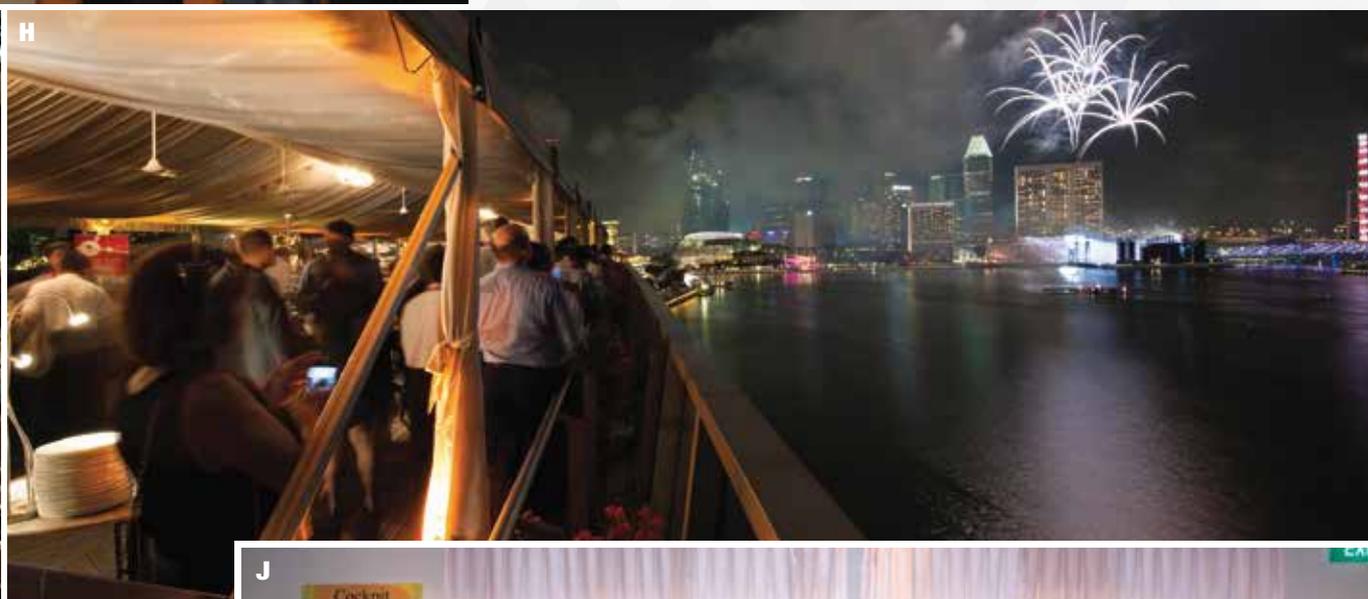
# HAPPENINGS at NUHCS



**A-H** The CVCT Asia Forum, 4-6 July 2014, follows the successful example of the main CVCT meetings in Paris, where international participants brainstormed on current cardiovascular issues.

**I** The NUHCS Chinese Alumni in Shanghai, China at the China Interventional Therapeutics meeting, 20-23 March 2014.

**J** A farewell dinner to bid goodbye to Dr. Saket S Junagade and Dr. Zhong Xiao Ming on 26 September 2014. We wish them all the best!







# HAPPENINGS at NUHCS

- A** A/Prof. Carolyn Lam was one of the winners at the JCI Singapore Ten Outstanding Young Persons of the World (TOYP) Awards 2014 for Medical Innovation.
- B** A/Prof. Tan Huay Cheem, A/Prof. Arthur Mark Richards and A/Prof. Carolyn Lam led a press event on 'Heart Failure in Asia', which was ultimately featured in various local media channels.
- C-D** Dr. Seow Swee-Chong presented on Atrial Fibrillation at the Singapore Heart Foundation (SHF) Pulse Check Health Talk 2014 on 2 August 2014.
- E** A delectable gala dinner with Coronary Care Unit colleagues after the Oral Presentation at the 9<sup>th</sup> Biennial Joanna Briggs International Colloquium on 10-12 November 2014.
- F** We held a farewell dinner on 21 July 2014 to bid farewell to our electrophysiology fellow, Dr. Choy Chun Ngok. We wish him all the best!
- G** A/Prof. Tan Huay Cheem with Dr. Cheung Ling Ling, NUHCS first Hong Kong cardiology fellow, at her farewell dinner.
- H** In celebration of the SHF World Heart Day on 27 September 2014, NUHCS and A/Prof. Tan Huay Cheem provided our full-hearted support.



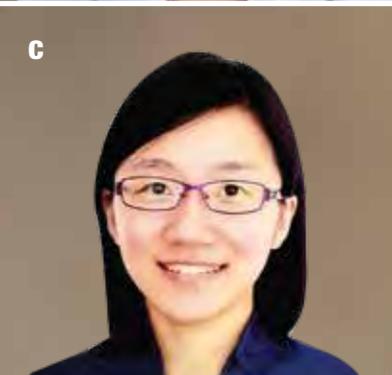


# HAPPENINGS at NUHCS

- A** Ward 63/64/7A Christmas Celebration and New Year Party  
Date: 29 December 2014
- B-C** Cardiothoracic Intensive Care Unit (CTICU) Ward 20 Christmas Party  
Date: 18 December 2014
- D-H** Heart Clinics Christmas Party  
Date: 18 December 2014







.....NEW COLLEAGUES.....

**A Dr. Gavin Ng Yeow Peng**  
*Department of Cardiology  
Senior Resident  
Jul-14*

**B Dr. Isabel Ahmad**  
*Department of Cardiology  
Senior Resident  
Jul-14*

**C Dr. Jeanette Ting Hsin Yeen**  
*Department of Cardiology  
Senior Resident  
Jul-14*

**D Dr. Jesse Ong See Jin**  
*Department of Cardiology  
Senior Resident  
Jul-14*

.....PROMOTIONS.....

**E Dr. William Kong Kok Fai**  
*Department of Cardiology  
Consultant  
Jul-14*

**F Dr. Lim Toon Wei**  
*Department of Cardiology  
Senior Consultant  
Jul-14*

**G Dr. Wong Siong Sung**  
*Department of Cardiology  
Consultant  
Jul-14*

**H Dr. Ramanathan Kollengode Ramaswamy**  
*Department of Cardiac,  
Thoracic & Vascular Surgery  
Consultant  
Jul-14*

**I Dr. Sorokin Vitaly**  
*Department of Cardiac,  
Thoracic & Vascular Surgery  
Consultant  
Jul-14*

**J Dr. Kristine Teoh Leok Kheng**  
*Department of Cardiac,  
Thoracic & Vascular Surgery  
Senior Consultant  
Jul-14*



# Heartfelt Compliments from Our Patients

## Excellent care at hospital

I THANK all the doctors, nurses and staff who took care of me when I was admitted to the National University Hospital last month with a suspected heart attack...

*Extracted and edited from The Straits Times, 25 July 2014*

By **Mr. Anil Bhatia** (patient)

Compliments to:

**A/Prof. Adrian Low Fatt Hoe**

Senior Consultant, Department of Cardiology  
Clinical Director, Angiography Centre, NUHCS

**Dr. Joshua Loh Ping Yun**

Consultant, Department of Cardiology, NUHCS

## Appreciation of A/Prof. Tan Huay Cheem

... I wish to place on record about his excellent interaction with patients such as myself. ... In my view, he is an asset not only to NUH but also to the whole of Singapore.

By **Mr. Thirukkonda K M Babu** (patient)

Compliments to:

**A/Prof. Tan Huay Cheem**

Senior Consultant, Department of Cardiology  
Director, National University Heart Centre,  
Singapore (NUHCS)

## Truly world-class care

... The surgery was a success and I thank Dr. Hon's team of doctors and nurses as well as the staff in the Cardiothoracic Intensive Care Unit (CTICU), who were very professional and caring. We knew my mother was in good hands.

*Extracted and edited from The Straits Times, 9 August 2014*

By **Ms. Janice Poh**

(daughter of patient, Ms. Tan Siok Geok)

Compliments to:

**Dr. Jimmy Hon Kim Fatt**

Consultant, Department of Cardiac, Thoracic and  
Vascular Surgery (CTVS), NUHCS  
Director, CTVS Postgraduate Education, NUHCS

## Thank you Dr. John Tam

... We would like to express our deep appreciation to NUHCS, Dr. John Tam and staff at Heart Clinics for their excellent medical service and expert treatment and care of my wife. ... I salute you.

By **Mr. Tan Ban Cheng**

(husband of patient, Mdm. Kaan Wai Jun)

Compliments to:

**Dr. John Tam Kit Chung**

Senior Consultant, Department of Cardiac, Thoracic  
and Vascular Surgery, NUHCS

Head, Division of Thoracic Surgery, Department of  
CTVS, NUHCS

## Thank you for your reassuring care

... The care and concern from Dr. Maung and Dr. Shankar are simply different from the other doctors we have met as they provide us with an extra sense of "security". ... The nurses, particularly Mary Ann Duarte, Staff Nurse of CTICU, are extremely attentive...

By **Mr. Freddy Pang**

(son of patient, Mr. Pang Kok Kiang)

Compliments to:

**Dr. Sriram Shankar**

Visiting Senior Consultant, Department of Cardiac,  
Thoracic & Vascular Surgery, NUHCS

**Dr. Winn Maung Maung Aye**

Consultant, Department of Cardiac, Thoracic &  
Vascular Surgery, NUHCS

## Thank you to the Department of Cardiac, Thoracic & Vascular Surgery

... Our greatest appreciation and gratitude to Dr. Shankar and Dr. Maung... We are so glad he (the patient) found you.

By **Gary & Lia** (parents of patient, Ethan Joseph Wu) and all their immediate and extended family and friends

Compliments to:

**Dr. Sriram Shankar**

Visiting Senior Consultant, Department of Cardiac,  
Thoracic & Vascular Surgery, NUHCS

**Dr. Winn Maung Maung Aye**

Consultant, Department of Cardiac, Thoracic &  
Vascular Surgery, NUHCS

**Ms. Jacqueline Kong Wai Ming**

Case Management Officer, Department of Cardiac,  
Thoracic & Vascular Surgery, NUHCS

**Jeannie Lim**

Patient support group member, CHAPPS  
<http://chapps.org.sg/>

## Sincerest gratitude to doctors and nurses

... From the time of admittance at A&E to discharge, the quality of care has been exemplary. ... The commitment and professionalism of your staff has saved my dad's life and prevented our family from an insurmountable loss. We wish to thank all your staff with heartfelt gratitude.

By **Dr. S Krishna Kumar** (son of patient, Mr. Saminathan Shanmuganathan)

Compliments to:

**A/Prof. Ronald Lee Chi Hang**, Senior Consultant,  
Department of Cardiology, NUHCS

**Dr. Ivandito Kuntjoro**,

Registrar, Department of Cardiology, NUHCS

## A big thank you to Dr. Lim Toon Wei

... He is both an amazing physician and surgeon who goes above and beyond his call of duty for his patients. His talent both in and out of the operating room is a beacon of hope for the future of all his patients...

By **Ms. Ng Koon Leng Joyce** (patient)

Compliments to:

**Dr. Lim Toon Wei**

Senior Consultant, Department of Cardiology, NUHCS

## Impressed with nurses' care

... I am impressed with the level of professionalism and care given to my dad after his operation, especially John Johnncy, Staff Nurse of CTICU...

By **Mr. Calvin Chung**

(son of patient, Mr. Chung Meng Whye)

Compliments to:

**Nurses of Cardiothoracic Intensive Care Unit (CTICU)**



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# Abstracts

## 19<sup>th</sup> Cardiovascular Summit TCTAP 2014, Seoul, Korea, 22 - 25 April 2014

Congenital quadricuspid aortic valve, a rare etiology of aortic insufficiency: 10 years experience in a tertiary cardiac centre  
Kong W, Yip J, Ling LH, Poh KK.

Improvement of LV systolic and diastolic function 6-months after successful Transcatheter Aortic Valve Replacement (TAVR)  
Kong W, Liang M, Kyu K, Poh KK.

Early regression of indexed left ventricular mass together with diastolic function improvement after successful transcatheter aortic valve implantation  
Kong W, Liang M, Kyu K, Poh KK.

## Heart Failure 2014, Athens, Greece, 17 - 20 May 2014

Effect of transcatheter aortic valve implantation on improvement of heart failure symptoms and functional class in patients with severe degenerative aortic stenosis  
Kong W, Liang M, Kyu K, Poh KK, Tay E, Yip J.

Improvement of heart failure symptoms and functional status in high surgical risk patients with severe mitral regurgitation following percutaneous mitral valve repair with mitralclip system  
Kong W, Liang M, Kyu K, Poh KK, Tay E, Yip J.

## EuroPCR 2014, Paris, France, 19 - 22 May 2014

Combined catheter-based renal sympathetic denervation and left atrial appendage closure  
Kong W, Yip J, Tay E.

Percutaneous closure of aortic prosthetic paravalvular leak is effective to prevent hospital admission due to heart failure and haemolytic anaemia  
Kong W, Yip J, Tay E.

## 2014 Tissue Engineering & Regenerative Medicine International Society, European Chapter Meeting, Genova, Italy, 10 - 13 June 2014

Porcine cardiac extracellular matrix restores myocardial function and structure in both acute and chronic myocardial injuries  
Sarig H, Sarig U, De Berardinis E, Chaw SY, Ramanujam V, Jallil RBA, Vu DT, Seliktar D, Kofidis T, Venkatraman S, Machluf M.

## Basic Cardiovascular Sciences 2014 Scientific Sessions, Las Vegas, Nevada, 14 - 17 July 2014

GY4137, a slow-releasing hydrogen sulfide donor, attenuates adverse remodeling and modulates atrial natriuretic peptide-mediated cGMP signal transduction following myocardial infarction in rats  
Shera Lilyanna, Peh MT, Liew OW, Moore PK, Richards AM, Eliana C. Martinez.

MicroRNA-31: a novel therapeutic target for ischemic heart disease  
Eliana C. Martinez, Shera Lilyanna, Leah A. Vardy L, Arunmozhiarasi Armugam, Kandiah Jeyaseelan, Richards AM.

## European Society of Cardiology Congress 2014, Barcelona, Spain, 30 August - 3 September 2014

Age-related dysfunction of endothelial progenitor cells and improvement with thymosin beta-4 treatment  
Lee PS, Ye L, Yeo TC, Richards AM, Tan HC, Poh KK.

Are there gender difference in endothelial progenitor cell number and function and the effect with thymosin beta-4 treatment?  
Lee PS, Ye L, Yeo TC, Richards AM, Tan HC, Poh KK.

Comparison of the safety and efficacy of bio-absorbable versus permanent polymeric platinum-chromium everolimus eluting stents in real-world Asian cohort  
Sy AAT, Khin LW, Tai BC, Low AFH, Lee CH, Chan MY, Tay E, Chan KH, Tan HC.

Does body mass index affect left ventricular remodeling in different categories of severe aortic stenosis?  
Lin WQ, Kuntjoro I, Yeo TC, Poh KK.

Impact of energy loss index on left ventricular mass regression after successful transcatheter aortic valve implantation  
Kong W, Liang M, Tay E, Yip J, Yeo TC, Ling LH.

Interaction between access site and antithrombotic therapy and impact on bleeding outcomes in STEMI  
Kajiya T, Wa KLI, Tai BC, Lee CH, Chan KH, Tay E, Richards AM, Tan HC, Low AF, Chan MY.

Left main percutaneous coronary intervention (PCI) improves lv systolic function by tissue doppler imaging (TDI) echocardiography  
Kajiya T, Low AF, Tan HC, Poh KK.

Left ventricular vortex formation time index in mitral valve stenosis  
Ambhore A, Loh J, Yeo TC, Poh KK.

Long-term mortality among young patients with acute myocardial infarction referenced against a background population  
Chan MY, Gao F, Jing M, Sim L, Koh T, Foo D, Ong H, Tan H, Yeo T, Chua T.

Mitral isthmus linear ablation does not affect mitral valve function  
Nalliah CJ, Lim TW, Koay CH, Kooor P, Thomas L, Ross DL, Thomas SP.

Persistently elevated pulmonary arterial pressure in patients successfully undergone percutaneous transvenous mitral commissurotomy (PTMC)  
Kong W, Liang M, Tay E, Yeo TC, Poh KK.

Posterior left atrial isolation in impaired diastolic function results in superior arrhythmia free survival  
Nalliah CJ, Lim TW, Koay CH, Kooor P, Thomas L, Ross DL, Thomas SP.

Prognostic implication of obstructive sleep apnoea diagnosed by post-discharge sleep study in patients presenting with acute coronary syndrome  
Loo G, ATan AY, Koo CY, Tai BC, Richards AM, Lee CH.

## 15<sup>th</sup> Congress of Asian Society for Vascular Surgery and 9<sup>th</sup> Asian Venous Forum, Hong Kong, 5 - 7 September 2014

Clinical outcome of asian severe limb ischemia patients with chronic total occlusion of the lower limb arterial system  
Thant KZ, Goh CHJ, Ho P.

Early experience of combined maggots debridement therapy and negative pressure wound therapy to heal wounds in critical limb ischemia patients after revascularization  
Singh A, Ho P.

Percutaneous angioplasty balloon assisted thrombin injection for pseudoaneurysms  
Wijerathne S, Ho P.

Successful closure of inadvertent subclavian artery cannulation during central venous catheter placement using a percutaneous closure device  
Ng JJ, Ho P.

Successful limb salvage relating to wound location, infection and revascularization for critical limb ischemia patients  
Majumder A, Ho P.

## 24<sup>th</sup> World Congress of the World Society of Cardio-Thoracic Surgeons, Geneva, Switzerland, 6 - 10 September 2014

Post-infarction ventricular septal rupture in a tertiary institution  
Chang GH, Kang GS, Kofidis T.

## 25<sup>th</sup> Annual Extracorporeal Life Support Organization Conference, Michigan, United States of America, 16 - 18 September 2014

Centrifugal VAD or VA ECMO: does one carry a greater risk of brain injury than the other?  
Wiertsema C, MacLaren G, Butt W, Thuys C, Mandelstam S, Galati J, Millar J.

## University Surgical Cluster Undergraduate Research Week, Singapore, 20 - 25 October 2014

ACEF score can be used as for preliminary assessment of mortality risk for patients undergoing CABG operation  
Tan WC, Madhavan S, Yang J, Luo HD, Ooi OC.

Comparison of five cardiac risk scores for prediction of mortality and morbidity in CABG patients  
Liang S, Lim YZD, Yang J, Luo HD, Ooi OC.

Retrospective review of vascular access outcomes  
Quah KHK, Thant KZ, Ho P.

SAKIES Score – a predictor of acute kidney injury following coronary artery bypass graft  
Ng ZYZ, Yeak ZES, Mithiran H, Subramanian S, Bonney GK, MacLaren G, Kofidis T.

Why SYNTAX score predicts secondary cardiovascular events in patients undergoing coronary intervention. Proteomic analysis of aortic wall patients undergoing coronary artery bypass surgery  
Chiong XBT, Cheow SHE, Woo CC, Lin XY, de Kleijn D, Khin LW, Lee CN, Hartman M, Sze SK, Sorokin VA

## 24<sup>th</sup> Annual Congress of the Association of Thoracic and Cardiovascular Surgeons of Asia, Hanoi, Vietnam, 5 - 8 November 2014

Debranching of brachiocephalic trunk of DeBakey Type-I AoD followed by emergency TEVAR for subsequent aorto-esophageal fistula  
Sazzad MF, Kang GS, Teoh LKK.

## Transcatheter Cardiovascular Therapeutics 2014 Washington, DC, United States of America, 13 - 17 September 2014

Combined N-acetylcysteine and bicarbonate in cardiac catheterisation to reduce adverse side effect of contrast (CONSTRAST)  
Tan HC, Chong E, Loh J, Singh D, Kyu K, Low TT, Poh KK, Junagade SS, Yeo TJ.

Pre-closure of vascular access site with the suture-mediated proGlide system during transfemoral TAVI and mitralclip implantation  
Kong W.

## 8<sup>th</sup> Congress of Asia Pacific Society of Thrombosis and Haemostasis, Hanoi, Vietnam, 9 - 11 October 2014

Simple detection of DVT using lateral flow immunoassay  
Girish VM, Lo MC, Drum CL.

## American Heart Association Scientific Sessions 2014, Chicago, United States of America, 15 - 19 November 2014

Circulating microRNAs as diagnostic and prognostic markers for heart failure  
Wong LL, Lim JY, Zhou LH, Zou RY, Chan MY, Lam SP, Too HP, Richards AM.

Effects of renin-angiotensin blockers on left ventricular remodeling in severe aortic stenosis  
Goh SN, Lee PS, Tay LW, Kong KF, Yeo TC, Poh KK.

Gender differences and flow category effects on left ventricular remodeling in patients with severe aortic stenosis and preserved left ventricular ejection fraction  
Lin WQ, Ivardito K, Tay LW, Kong KF, Yeo TC, Poh KK.

Identification of MicroRNA in an ovine model of heart failure  
Wong LL, Lew KS, Chen QY, Rademaker MT, Elmers LJ, Charles CJ, Richards AM, Wang PP.

Thymosin Beta-4-Treated endothelial progenitor cells improve cardiac function and vasculogenesis in diabetic obese rats with myocardial infarction  
Lee PS, Lei Y, Chen YT, Khoo YH, Yeo TC, Tan HC, Richards AM, Poh KK.

## EuroEcho-Imaging 2014, Vienna, Austria, 3 - 6 December 2014

Assessment and utility of left atrial appendage function by transthoracic echocardiogram.  
Kyu K, Kong WKF, Songco GG, Galupo MJ, Castro MD, Shin Hnin W, Lee CH, Poh KK.

Improvement of heart failure symptoms and functional status in high surgical risk patients with severe mitral regurgitation following percutaneous mitral valve repair with mitralclip system  
Kong W, Liang M, Kyu K, Yip J, Tay E, Poh KK.

# Healthy Ways to Celebrate

Most traditional Lunar New Year goodies are packed with sugar and fat and have little nutritional value. Some of these snacks are equivalent to a small meal. We provide tips on how to shop for healthy treats, consume them in moderation and/or exercise to avoid unwanted weight gain.

## Shopping Tips

- Visit **Fairprice supermarket at One@Kent Ridge** for the **Dietitian's Choice** on healthier food selections!
- Choose **sugar-free** sweets or auspicious dried fruits with no salt and sugar (e.g. dried apricots or dried apple rings).
- Beverages with **reduced or no sugar**.

## Tips to Moderate Your Intake

- **Portion** out the festive treats on a small plate.
- **Consume more fresh fruits** such as mandarin oranges.
- **Share** your festive treats with your friends and relatives.



**370**  
CALORIES

**1** slice of Bak Kwa, Pork = **47** Mins of Jogging



**246**  
CALORIES

**3** pieces of Pineapple Tarts = **31** Mins of Jogging



**335**  
CALORIES

**5** pieces of Twisted Cookies = **43** Mins of Jogging

## HOW much are you consuming?

Calories of various New Year goodies and the equivalent amount of physical activity needed to burn them off:



**836**  
CALORIES

**2** small plates of Peanut Crackers = **106** Mins of Jogging



**175**  
CALORIES

**4** rolls of Love Letters = **28** Mins of Jogging



Source: Adapted from Health Promotion Board. \*\*Values are based on a 60 kg man.