THE **HEARTBEAT** OF NATIONAL UNIVERSITY HEART CENTRE, SINGAPORE (NUHCS)

National University Heart Centre Singapore

PULSE

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COVER STORY

OUR HEARTS ARE TRULY WORTH CELEBRATING

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TAKE ME HOME!

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Pulse is a biannual publication by the **National University Heart Centre, Singapore (NUHCS).**

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National University Heart Centre Singapore

NUHCS is an academic, national specialist centre that brings together the resources, expertise and capabilities in the areas of Cardiology, Cardiothoracic and Vascular Surgery to better meet the needs of the growing number of patients with heart disease and raise the future generation of medical professionals. As a national heart centre in Singapore, NUHCS has honed two Peaks of Excellence and six Core Clinical Programmes that provide leading care and treatment strategies for patients:

CORE CLINICAL PROGRAMMES

- Acute Coronary Syndrome Programme
- Congenital and Structural Heart Disease Programme
- Heart Failure & Cardiomyopathy Programme
- Heart Rhythm Programme
- Vascular Medicine and Therapy Programme
- Women's Heart Health Programme

INSTITUTIONAL PEAKS OF EXCELLENCE

- Minimally Invasive Cardiothoracic Surgery (MICTS)
- Aortic Centre

NUHCS SERVICES IN SINGAPORE

NUHCS Heart Clinic @ Ng Teng Fong General Hospital

NUHCS Heart Clinic @ Alexandra Hospital

National University Heart Centre, Singapore (NUHCS) at National University Hospital, Kent Ridge

NUHCS Heart Clinic @ Jurong Medical Centre

Cardiovascular Research Institute (CVRI): Research Pillar of NUHCS

Comprising a team of internationally-recognised cardiologists and surgeons from the cardiothoracic and vascular specialties, NUHCS serves as a referral national centre for cardiothoracic and vascular conditions and provides a comprehensive approach to the treatment of these patients.

The holistic patient-care approach is backed by leading translational research at the Cardiovascular Research Institute (CVRI) and Cardiovascular Metabolic Translational Program, all of which complements these advanced quaternary clinical services to deliver state-of-the-art treatment solutions to the most challenging heart, lung and circulatory diseases.

NUHS National University Health System

National University Health System (NUHS)

An integrated Academic Health System, serving as one of three public healthcare clusters

As a member of NUHS, NUHCS collaborates with professionals and centres across the health system to advance the tripartite missions of achieving clinical excellence for patients, developing the next generation of healthcare professionals, and changing the natural history of chronic diseases through research.

Editor's Message

Dear readers,

As we welcome 2025 with renewed hope and aspirations, it is an opportune time to reflect on our journey over this past year of NUHCS as a national Academic Medical Centre (AMC) and to look ahead to the exciting opportunities that the new year holds.

In 2024, one of the most notable strides we made was the concerted effort to build 'Community Cardiology' – a testament to our commitment and leadership in advancing cardiovascular care and disease prevention among the Western population of Singapore. At Jurong Medical Centre, we enhanced patient care by supporting outpatient cardiology services through non-invasive methods such as treadmill exercise testing and echocardiography.

Beyond clinical support, NUHCS also took every opportunity to actively engage the community through impactful initiatives, including hosting a national mandarin public symposium on cardiac care and setting up a Heart Failure exhibition at the Jurong Regional Library. To commemorate World Heart Day, we conducted population health screenings and organised educational events, all aimed at raising awareness about heart health. In addition, we worked closely with our patient support group (Caring Hearts Support Group) and partnered with the Singapore Heart Foundation to further educate the public about cardiovascular diseases.

As an AMC, we distinguish ourselves by not only delivering exceptional clinical service, but also by driving the education of the next generation of healthcare professionals through mentoring and leading innovative education programmes. At the same time, our research teams continue to push boundaries, securing competitive grants and publishing in high-impact journals. Their discoveries are being translated into tangible solutions that enhance patient outcomes.

It is most heartening to see our colleagues, both juniors and seniors, making a significant mark on the global stage. Whether presenting their research findings at international conferences or contributing to advancements in fields ranging from basic sciences and epidemiology to registries and randomised controlled trials, they continue to raise the bar for excellence in healthcare.

These achievements would not have been possible without the incredibly talented and dedicated staff of NUHCS. Their unwavering commitment to our mission and their passion for their work inspires us every day. It is with great pride that we spotlight some of our behind-the-scenes heroes, who constantly inspire us and are trailblazers in steering NUHCS forward on its journey.

I hope you enjoy reading this issue of PULSE and find inspiration in their stories and accomplishments. May the year ahead bring continued success, growth and new opportunities for all of us.

Tan Huay Cheem

Prof Tan Huay Cheem
Senior Advisor, NUHCS

OUR HEARTS ARE TRULY WORTH CELEBRATING

INSPIRING MORE IN THE COMMUNITY TOWARDS BETTER HEART HEALTH!

One unforgettable evening, Mr Azmi bin Said's life hung in the balance — until the courage and quick thinking of his family members gave him a second chance in life. The first to notice him in distress, Mr Azmi's wife saw him choking in his sleep and immediately alerted their son Mr Aqil bin Azmi — who quickly recognised the signs of cardiac arrest. As crucial seconds ticked away, Mr Aqil's sister rushed downstairs to retrieve the Automated External Defibrillator (AED) machine.

Keeping his cool despite the nerve-wrecking situation, Mr Azmi's son sprang into action and administered both CPR and the AED machine on his father, all the while carefully monitoring the time and urging his loved ones to call for medical help. CPR was performed for a continuous 15 minutes till the ambulance arrived. In those critical, heart-stopping moments, Mr Aqil and his family's calmness and bravery saved their father's life.

Setting off the fun and games was a heart-thumping Zumba session, where participants moved to the rhythm of upbeat music – demonstrating that heart-healthy exercises are not limited to treadmills, but can also include fun group workouts that get the blood flowing!

EARLY CPR + AED SAVES LIVES DURING CARDIAC ARREST!

A life-saving skill that everyone should learn, immediate application of CPR and AED can increase a victim's survival rates by as high as 50%.

(Right) Guest-of-Honour Dr Vivian Balakrishnan, Minister for Foreign Affairs and Adviser to Holland-Bukit Timah GRC GROs, presenting the Inspirational Caregiver Award to Mr Aqil bin Azmi (second from right) and his family.

HONOURING STRENGTH, COURAGE AND THE HUMAN SPIRIT

Mr Azmi's story is a powerful reminder that cardiac emergencies can strike at any moment, and that anyone, with courage and knowledge, can be the difference between life and death. For his heroic actions, Mr Azmi's son was honoured with the '**Inspirational Caregiver Award**' by the National University Heart Centre, Singapore (NUHCS) at the World Heart Day community outreach event on Saturday, 21 September 2024.

In partnership with the People's Association (PA) and Senja-Cashew Active Ageing Committee, NUHCS aims to nurture healthier communities by promoting heart-healthy lifestyles and inspiring meaningful change. Through community-based events, they bring heart health closer to residents, encouraging them to take charge of their well-being.

The event was graced by Guest-of-Honour Dr Vivian Balakrishnan, Minister for Foreign Affairs and Adviser to Holland-Bukit Timah GRC GROs. Over 500 participants attended, engaging in a variety of fun and insightful activities in celebration of World Heart Day.

Mr Azmi's experience highlights the importance of regular health screening and early detection. Identifying potential health issues early allows for timely interventions, which can significantly improve outcomes.

In line with Healthier SG initiatives and the Health Promotion Board's (HPB) goals of disease prevention and raising greater awareness, various screening tests were offered at no cost to participants at the event.

One such test was the Electrocardiogram (ECG) screening, a simple, non-invasive test that detects abnormal heart rhythms and can help diagnose serious heart conditions.

Participants young and old unleashed their best moves through educational mini games and activities!

1. **Peripheral Artery Disease (PAD)**: The narrowing or hardening of blood vessels that carry blood to the leg, usually by fatty deposits.
2. **Coronary Artery Disease**: A condition where the blood supply is insufficient to support the needs of the heart muscle.

DID YOU KNOW?

BLOOD CLOTS CAN ALSO HAPPEN IN THE LEGS, AND NOT JUST THE HEART!

When arteries in the legs become clogged with plaque, it can lead to Peripheral Artery Disease (PAD)[1], a condition that can result in serious consequences, including limb loss. A common tool used to diagnose PAD, the Ankle Brachial Pressure Index (ABPI) test which compares the blood pressure in the lower legs with the blood pressure in the arms, was also made available on site at the event.

Complementing these comprehensive screening efforts were educational health talks by our NUHCS medical team, who shared more on lung cancer and Coronary Artery Disease (CAD)[2] – two leading causes of death in Singapore – including practical insights on treatment and prevention of these conditions.

STEP UP TO BETTER HEART HEALTH!

Thank you for joining us at our heart-pumping event in 2024! Keen to discover more ways to maintain a healthy heart?

Stay tuned to our socials, and watch out for the next edition of "World Heart Month", coming to a neighbourhood near you!

ARTICLE BY
NUHCS PULSE Editorial

NUHCS Family Day 2024:

A Celebration of Growth, Teamwork and Fun

Committed to making a difference in the lives of patients, life at the National University Heart Centre, Singapore (NUHCS) is more than just working hard to deliver excellent care – but also about empowering one another to grow, strive and thrive to the best in our fields.

On 12 October, NUHCS staff from various departments, joined by family and loved ones, came together for a day of sun, sand and sea at Sentosa! An annual tradition, Family Day at NUHCS is not just an opportunity to celebrate the hard work and commitment of staff, but also an occasion to unwind and connect with co-workers and interact across departments, beyond the boundaries of the workplace.

Themed as a lively summer party, the event offered a kaleidoscope of exciting activities that had everyone donning their brightest summer attire and joining in high spirits. Kickstarting the day's lively festivities, A/Prof James Yip, Executive Director, NUHCS, took the opportunity to express his heartfelt appreciation for the team's unwavering dedication and hard work over the past year.

Joining in the lucky draw fun!

Asst Prof Kristine Teoh, Senior Consultant, Dept. of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS, showcased her musical talents during a heartfelt guitar cover.

Jennifer Gita, Service Team Leader, Division of Cardiothoracic Intensive Care Unit, NUHCS, took to the stage in a display of diverse talents

It was a day of athletic competition, friendly games and community spirit, as teams battled it out on the sand with volleyball matches and tug-of-war challenges! The excitement soared further with a range of exhilarating water sports, including Donut Ring rides, Banana Boat adventures, kayaking, and stand-up paddleboarding, which encouraged everyone to unleash their inner adventurer and step beyond their comfort zones.

Hamming it up for the camera!

Hearts in chorus: (Left) Prof Tan Huay Cheem, Senior Advisor, NUHCS, and (right) A/Prof James Yip, Executive Director, NUHCS, starting the day with a fun singing segment

Tug, sweat, conquer! Crushing their tug-of-war challenge with teamwork and technique

All smiles at the beach!

Good vibes only: Cheering our youngest participant on

From uncovering the hidden talents of co-workers to heartwarming moments of teamwork and fun, the NUHCS family celebrated growth, fostered friendships and new skills as well as a deeper appreciation for the diversity within the team. As the day came to a close, everyone left with a stronger sense of belonging and cherished memories which exemplified the spirit of teamwork and togetherness – the very essence of NUHCS Family Day. Here's to many more moments of joy, unity and camaraderie, on the shared journey ahead!

ARTICLE BY

NUHCS PULSE Editorial

"THE HEART TRUTH" Symposium 2024:

UNVEILING THE HIDDEN REALITIES OF CARDIOVASCULAR HEALTH

In its ongoing advocacy for cardiovascular health, the National University Heart Centre, Singapore (NUHCS) held its yearly public health talk, "The Heart Truth", on 20 July 2024, to raise awareness on managing and maintaining a healthy heart through sharing of expert insights by NUHCS' cardiologists and surgeons.

This edition explored the crucial cardiovascular health truths, including the prevention of rising high blood pressure, the latest progress in treating structural heart diseases and heart failure, and the importance of surgical intervention in improving patient recovery.

Hosted by local radio personality Anna Lim, this year's session was conducted in Mandarin, bringing together a diverse audience spanning various age groups, serving as yet another impactful platform for the community to deepen their understanding of heart health.

As hypertension cases leading to heart failure is on the rise, Prof Tan Huay Cheem, Senior Advisor, NUHCS, took his segment to stress on reducing high-salt food consumption so as to maintain healthy blood pressure and prevent the onset of heart attacks (myocardial infarction) and stroke events.

Recognising that hypertension can be caused by both genetic and environmental factors, Prof Tan encourages the use of lower-sodium substitutes, highlighting how a daily sodium reduction of 1000mg or 1.5 teaspoons, can significantly reduce systolic blood pressure by 5mmHg.

DID YOU KNOW?

75%

of sodium consumption in one's diet comes from seasonings, salt and sauces.

REDUCING 1,000mg or 1.5 teaspoons of daily sodium intake

REDUCES systolic blood pressure significantly by 5mmHg

Many tend to regard shortness of breath, leg swelling and fatigue as common signs of ageing, but these may be silent warning signs of structural heart disease. Showcasing illustrations and real-life images of heart defects, Adj A/Prof Low Ting Ting, Senior Consultant, Department of Cardiology, NUHCS, sheds light on how defects in the heart's structure can lead to decreased or failure of heart function, if left untreated.

Emphasising the importance of early detection and personalised treatment for effective management, Adj A/Prof Low shared on advanced treatment approaches, such as percutaneous catheter interventions[1], that offer hope in correcting structural heart defects and potentially restoring the heart's main function of transporting oxygen-rich blood throughout the body.

With recent technological advancements, even the most complex adult cardiac surgeries can be performed with minimal invasiveness and maximum safety.

Asst Prof Jimmy Hon, Senior Consultant, Division of Adult Cardiac Surgery, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS, addressed the complexities of heart surgery, looking at different cardiac conditions and their associated risks and complications. Looking to demystify cardiac treatment approaches, Asst Prof Hon shared the range of heart conditions, including valve stenosis[2] and septal defects[3], that can now be successfully treated with modern interventions such as Transcatheter Aortic Valve Implantation (TAVI)[4].

As the old adage goes – 'prevention is better than cure'. Considering Singapore's ageing population, the prevalence of heart failure is expected to rise significantly, making early and appropriate intervention vital.

Asst Prof Lin Weiqin, Clinical Director of Heart Failure and Cardiomyopathy Programme and Senior Consultant, Department of Cardiology, NUHCS, explained the key indicators for early-stage heart failure symptoms, and showcased the current available treatment options to manage this life-threatening disease timely.

At the end of the symposium, Prof Tan Huay Cheem held a book-signing event to mark the release of his latest work, 《临床心得：心脏病防治新知三集》or "Clinical Insights: New Knowledge on Prevention and Treatment of Heart Disease, Volume Three." Many attendees stayed on with personal copies of the book, for the opportunity to engage in a one-on-one interaction with the esteemed author.

With over 30 years of expertise in cardiac care, Prof Tan advocates and imparts the importance of cardiovascular health through this third instalment of his book series, where he delves deeper into new knowledge on prevention and treatment of heart disease.

All sale proceeds of Prof Tan's newest book go to the NUHCS Heart Fund – established by NUHCS to assist financially disadvantaged heart patients on their journey towards better health and a renewed hope for the future.

The symposium concluded on a high note, where participants engaged with the four heart health experts in a Q&A session, gaining valuable tips on better cardiovascular health. Three lucky participants were also invited on stage for a lucky draw and every participant left with a hearty goodie bag, courtesy of NUHCS and their various supporting partners.

NUHCS' annual "The Heart Truth" symposiums empower participants with valuable heart health tips and deeper insights into cardiovascular care through expert-led discussions.

The next public symposium in mid-2025 will be conducted in English. Keen to be part of the audience? Follow NUHCS' social pages for the latest updates.

1. **Percutaneous catheter interventions** – Minimally invasive procedures to clear heart blockages or treat heart defects by inserting a flexible tube, also known as a catheter, into the affected area.
2. **Valve stenosis** – Condition where a heart valve is narrowed or stiffened, restricting blood flow from the heart to the rest of the body.
3. **Septal defects** – Congenital heart defect that presents as holes in the wall of the heart, separating the left and right chambers.
4. **Transcatheter Aortic Valve Implantation (TAVI)** – Minimally invasive procedure to replace a damaged aortic valve, by inserting a new valve using a catheter to replace the old valve.

ARTICLE BY
NUHCS PULSE Editorial

BUILDING HEALTHIER HEARTS, SHAPING STRONGER COMMUNITIES

Putting the spotlight on heart health at Jurong Regional Library

> **"Your heart is the engine that powers your life, but what happens when it starts to fail?"**

Heart Failure, a condition affecting approximately 4.5% of Singaporeans, has emerged as a leading cause of hospital admissions. When the heart struggles to deliver adequate blood flow, vital organs such as the brain and muscles can suffer from insufficient oxygen, leading to symptoms like breathlessness and fatigue.

Though Heart Failure presents numerous challenges, it isn't the end of the road. With the right care and lifestyle adjustments, patients can not only live longer, but also experience better health outcomes.

To bring this pressing health issue to the forefront, the National University Heart Centre, Singapore (NUHCS) organised a series of informative health talks in English and Mandarin, themed "What Does It Mean to Have Heart Failure?" at the Jurong Regional Library, on 17 and 24 August 2024 respectively. In collaboration with the National Library Board, these events aimed to educate and empower the community with essential information about Heart Failure.

Multidisciplinary experts from NUHCS addressing attendees at the Heart Failure Health Talk.

HEART FAILURE PATIENTS ARE ENCOURAGED TO:

- Stay active with mild to moderate exercise
- Follow a heart-healthy diet
- Take medications as prescribed

Living with Heart Failure, a chronic condition, can be overwhelming and challenging! However, with the right guidance and support, Heart Failure patients can successfully manage their symptoms and prevent complications.

The interactive exhibit at Jurong Regional Library featured 3D heart models that showcase the different types of Heart Failure.

How Much Do You Know About Heart Failure?

- Fundamentals of Heart Failure
- "Red flag" symptoms to look out for (e.g. shortness of breath)
- How is Heart Failure diagnosed and what are the treatment methods (e.g. Echocardiography)
- Importance of a multi-disciplinary approach in the Heart Failure care journey

Adj A/Prof Raymond Wong
Senior Consultant, Dept. of Cardiology, NUHCS

Asst Prof Lin Weiqin
Director of Heart Failure Programme & Senior Consultant, Dept. of Cardiology, NUHCS

Self-care Guide for Managing Heart Failure

- Specialised care for Heart Failure
- Lifestyle changes to help manage Heart Failure
- Medication use
- Remote monitoring to track clinical progress

Ms Tan Poh Tin
Senior Case Management Officer, Dept. of Cardiology, NUHCS

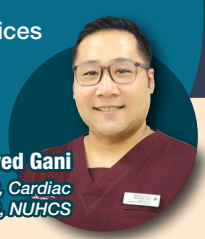
Ms Seow Yen Hoon
Senior Case Management Officer, Dept. of Cardiology, NUHCS

What Does It Mean To Have Heart Failure?
什么是心脏衰竭?

Recognising that caregivers play a crucial role in a Heart Failure patient's journey, the NUHCS team also shared valuable tips to help support the well-being of these important advocates. Keen to find out more about Heart Failure and other heart health-related topics? Follow NUHCS on social media to get the latest updates on upcoming talks and outreach events!

"Can I exercise even though I have an existing heart condition?"

- Benefits of exercise for Heart Failure patients and how to kickstart your routine
- Guidelines on safe exercise practices
- Guided workout using resistance bands



Mr Qamaruzaman Bin Syed Gani
Senior Physiotherapist, Cardiac Rehabilitation Unit, NUHCS

Embracing Heart-healthy Dietary Habits

- Heart-healthy foods: What to eat and what to avoid
- Tips to reduce fat and salt intake for a healthy heart

Ms Courtney Chong
Dietician, Dept. of Dietetics, National University Hospital (NUH)

The engagement continued beyond the talks to include a bilingual, interactive public exhibit in the library's Level 1 Foyer. This Heart Failure exhibit was organised into clear sections and not only dived into the different types of the condition - including its causes and symptoms - but also highlighted the intricacies of this lifelong condition through an animated video.

The prevalence of Heart Failure is set to rise against the backdrop of Singapore's ageing population. By fostering greater awareness in the fight against Heart Failure, we can all play a part in building a more supportive community, helping those with the condition live longer and better.

Together, we aim to build healthier hearts and stronger communities. Through education and support, we can make a meaningful difference in the lives of those impacted by Heart Failure.

Scan the QR code to discover the impact of different types of Heart Failure!

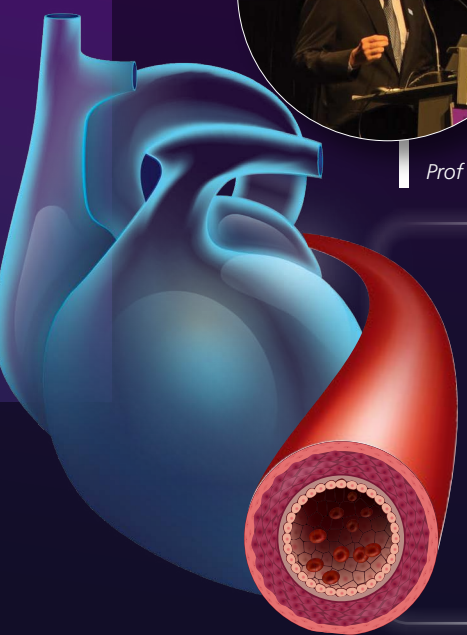
ARTICLE BY
NUHCS PULSE Editorial

ADVANCING NEW FRONTIERS at AICT-AsiaPCR 2024

Fostering closer ties within the cardiology community in Asia to advance cardiovascular outcomes

From 3 – 5 October 2024, Singapore hosted the landmark Asian Interventional Cardiovascular Therapeutics (AICT)-AsiaPCR 2024 conference, the region's premier interventional event. Attended by over 1,000 leading cardiologists and medical professionals from around the world, the conference underscored the dynamic growth of this annual gathering. What began as a regional meeting at the National University Heart Centre, Singapore (NUHCS) in 2014 has since evolved into the official scientific meeting of the Asian Pacific Society of Interventional Cardiology (APSIC) and is now held alongside EuroPCR, the official meeting of the European Association of Percutaneous Coronary Intervention (EAPCI)[1].

Prof Tan Huay Cheem, one of the Course Directors, delivers the opening address to an exciting two days ahead!



AICT-AsiaPCR

Formed in 2019, AICT-AsiaPCR is an educational platform built by local practitioners, with the support of centres of excellence in Asia Pacific and Europe, to focus on the diverse needs of patients in the landscape of interventional cardiology (diagnosis and treatment of heart and blood vessel conditions using catheters).

A global meeting hosted in the Asia Pacific region, this platform allows knowledge exchange between peers and the opportunity for healthcare professionals to showcase research and innovation, aimed at contributing to the latest developments in treatment and care possibilities to better serve the region's patients.

41 New fellows inducted

393 Clinical case submissions & abstract presentations

19 Industry partner exhibitions

7 LIVE cases from 3 LIVE Centres

6 International collaboration sessions

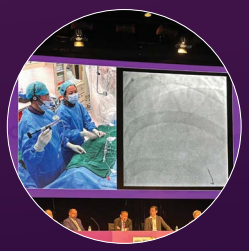
178 Faculty

150+ Presenters

Held at Suntec City Convention Centre, the event kicked off with the popular Fellows Course, offering early-career practitioners an opportunity to network, exchange ideas, and attend five educational sessions packed with practical insights they could apply in the catheterisation lab.

SHINING ON THE GLOBAL STAGE

This was followed by two days of immersive learning, including seven live demonstration cases from three leading centres in Sydney (Australia), Kuala Lumpur (Malaysia) and Singapore. As the only LIVE transmission centre in Singapore, NUHCS showcased three educational cases of complex heart procedures - including Transcatheter Aortic Valve Implantation (TAVI)[2] and Percutaneous Coronary Intervention (PCI)[3] - to the global cardiology community.



DCB-alone strategy or hybrid procedure in PCI for de novo lesions
Led by: A/Prof Adrian Low & Dr Sim Hui Wen

Complex left main bifurcation PCI
Led by: Prof Tan Huay Cheem & Dr Gavin Ng

TAVI for a patient with small aortic annulus[4]
Led by: Dr Ivandito, Dr Jimmy Hon and Dr Lim Yinghao

These live cases provided attendees with real-time demonstrations of advanced techniques, delivered with step-by-step guidance from some of the leading experts in the field.

INNOVATION THROUGH COLLABORATION

At the core of the conference were diverse presentations, workshops, and panel discussions aimed at advancing knowledge and clinical practice in interventional cardiovascular medicine. Keynote sessions conducted by renowned experts delved into cutting-edge research across a broad spectrum of topics, including coronary and structural heart interventions, imaging and diagnostic techniques.

Yet another highlight was the Training Village, a hands-on programme by industry partners. Themed training sessions provided attendees with practical experience using the latest medical devices and technologies for managing hypertension, heart failure and valvular diseases. Expert-led tutorials and workshops further allowed participants to refine their skills and gain personalised guidance on the latest tools and techniques, empowering them to confidently apply them during patient care.

> It was a heart-warming sight to see the Asia-Pacific community coming together to advance interventional cardiology and improve patient outcomes. We welcome all to return again to Singapore for the next edition of AICT-AsiaPCR in 2025!
>
> *- Prof Tan Huay Cheem, Senior Advisor, NUHCS*

SHAPING THE FUTURE OF CARDIOVASCULAR HEALTH

The conference also spotlighted international collaboration, with eight national societies from China, Hong Kong, Japan, India, Vietnam, Malaysia, Indonesia and Singapore participating in sessions on core topics such as intracoronary imaging[5], physiology, left main[6] and calcified lesions[7]. These sessions offered an invaluable opportunity for attendees to share knowledge and uncover global solutions to local challenges.

Panel discussions on hot topics, such as artificial intelligence in cardiology and managing complex clinical cases, facilitated dynamic exchanges and collaborative problem-solving among participants.

A high-level meeting of peers, mentors, and industry leaders, the conference not only brought together diverse approaches from the Asian-Pacific community, but further fostered a collaborative environment for knowledge sharing and innovation, towards the advancement of patient care.

ARTICLE BY
Prof Tan Huay Cheem
Senior Advisor, NUHCS

Prof Tan is a Professor of Medicine at the Yong Loo Lin School of Medicine, National University of Singapore and holds a Master of Medicine in Internal Medicine. He is an active clinical researcher, visiting professor at several hospitals in China, and an invited speaker at many international cardiology meetings.

1. **European Association of Percutaneous Cardiovascular Interventions (EAPCI)** – a registered branch of the European Society of Cardiology (ESC).
2. **TAVI** – Transcatheter Aortic Valve Implantation is a procedure used to treat severe aortic stenosis, a condition in which the aortic valve becomes narrowed and obstructs the outflow of blood from the heart.
3. **Percutaneous Coronary Intervention (PCI)** – a minimally invasive procedure whereby a catheter is inserted into one of the arteries through a small incision, also commonly known as stenting or ballooning.
4. **Aortic annulus** – fibrous ring at the aortic orifice to the front and right of the atrioventricular aortic valve and is considered the transition point between the left ventricle and aortic root.
5. **Intracoronary imaging** – the use of a catheter to provide a detailed view of the coronary artery from within.
6. **Left main** – the Left Main Coronary Artery (LMCA) that supplies blood to most of the left ventricle.
7. **Calcified lesions** – areas of tissue in the body that have accumulated deposits of calcium salts, leading to the formation of hardened or calcified regions.

Journeying to the Heart of Cardiology:

NUHCS at the ESC Congress 2024

About The European Society of Cardiology (ESC) Congress

The ESC brings together healthcare professionals worldwide, committed to advancing the field of cardiology in medicine and research, to enhance patient care and reduce cardiovascular disease incidence.

NUHCS delegates at the ESC Congress.

Being the largest annual cardiology congress in the world, the European Society of Cardiology (ESC) Congress 2024, held from 30 Aug to 2 Sept in London, United Kingdom (UK), was truly a remarkable event. Drawing an impressive turnout of 31,800 participants and 5,400 esteemed faculty and presenters, this four-day congress served as a platform for clinicians, researchers, and healthcare professionals to come together and explore the latest developments in cardiology.

The ESC Congress 2024 also saw a record-breaking number of presentations from the National University Heart Centre, Singapore (NUHCS), with the attendance of more than 30 delegates from NUHCS and the National University of Singapore (NUS), marking a significant milestone on the international stage.

Publishing of New Guidelines

This year's ESC Congress introduced four new clinical guidelines, aimed at providing healthcare professionals with the latest information to better improve the quality of patient care.

Elevated Blood Pressure and Hypertension

Elevated blood pressure is now defined as a systolic blood pressure between 120-139mmHg and diastolic blood pressure between 70-89mmHg. A stricter target of 120-129 mmHg is recommended for most, with an option to "opt out" of this intensive management, in case of intolerance or other factors suggesting a more lenient approach.

Atrial Fibrillation (AF)

The AF-CARE pathway plays a crucial role in managing risk factors and the onset of comorbidities, preventing stroke and thromboembolism[1] occurrences. This allows greater heart rate and rhythm control to alleviate symptoms, while continuously evaluating and reassessing patients' progress.

Peripheral Arterial Disease and Aortic Disease

Updated protocol for more effective diagnosis and treatment methods with the newly merged guidelines of these two conditions.

Chronic Coronary Syndromes

There is improved focus on managing patients with chest pains, also known as angina, and no obstructive coronary artery disease[2], a condition known as ANOCA-INOCA.

Clinical Trials and Interactive Learning in Hot Line Sessions

At the ESC, results from 38 impactful late-breaking clinical trials were revealed in 12 hot line sessions. Announced in the first session and simultaneously published in the New England Journal of Medicine (NEJM), the randomised-controlled HELIOS-B trial showed promising outcomes in patients with **Transthyretin Amyloidosis with Cardiomyopathy (ATTR-CM)**[3], where **a new prescription drug could significantly lower all-cause mortality risks, including cardiac-related deaths, compared to a placebo**.

The FINEARTS-HF trial, similarly published in the NEJM, **found that compared to a placebo, there is another medication that can significantly reduce the risk of worsening heart failure events and cardiovascular-related death in patients with heart failure** and mildly reduced or preserved ejection fraction. Importantly, these benefits were seen even in patients on SGLT2 inhibitors[4], suggesting that this medication could be a key therapy for managing heart failure.

In line with the ESC 2024 theme, "Personalising Cardiovascular Care," several trials showed that **tailoring low-dose medications in triple or quadruple polypills for hypertension, may be more effective at lowering blood pressure than traditional dual or single-drug treatments**, reducing side effects while preserving efficacy and improving patient adherence.

In addition to the groundbreaking trials, this year's ESC also introduced hands-on tutorials, including the "Anatomy Meets Echocardiography in Wet Lab Dissection" session, featuring step-by-step dissection of porcine hearts with concomitant mirroring of live 3D echocardiographic images, providing deeper insights into the heart's structure. Other live demonstrations offered practical tips on echocardiographic techniques, including cardiac strain imaging and transcatheter mitral valve repair.

Dr Elinor Tan (Senior Resident) and Dr Chan Meei Wah (previous fellow at NUHCS, current Cardiologist at Serdang Heart Center, Malaysia) at the wet lab dissection tutorial.

Representing Singapore in London

Setting a noteworthy record at the ESC Congress 2024, researchers and clinicians from NUHCS and NUS co-authored 35 abstracts and presented 20, covering a wide range of studies on cardiovascular health, including acute myocardial infarction, cardiovascular disease prevention, aortic and mitral stenosis, heart failure, and cardiogenic shock.

A key highlight was the conference on the latest Artificial Intelligence (AI) advances in cardiovascular imaging, chaired by Adj A/Prof William Kong, Senior Consultant, Department of Cardiology, NUHCS, alongside A/Prof J. Grapsa from King's College London, UK, covering AI applications in cardiac Computer Tomography (CT) to detect low attenuation non-calcified plaques[5] to predict myocardial infarction and assess CT-derived fractional flow reserve for coronary artery disease management. This segment also explored the limitations and progress of AI in echocardiography and cardiac Magnetic Resonance Imaging (MRI), sparking debate on its effectiveness in clinical practice to manage cardiovascular diseases.

Senior residents (Dr Elinor Tan, Dr Joy Ong) presenting their research on the world's largest cardiology event stage.

The journey to this Congress in London not only fostered inspiration and learning but also strengthened both new and rekindled connections for the NUHCS team in working together to shape the future of cardiology.

ARTICLE BY

Dr Elinor Tan
Senior Resident, Department of Cardiology, NUHCS

Dr Elinor Tan is a second-year Cardiology Senior Resident at NUHCS. She has a strong interest in research and loves to gather evidence for theories which contributes to developing knowledge in the field of Cardiology.

Dr Jamie Ho
Junior Resident, NUHS

Dr Jamie Ho is a second-year Internal Medicine junior resident in NUHS. She is an Associate Chief Resident in the Internal Medicine Residency, and has a strong interest in cardiovascular research, having published articles on acute coronary syndrome, cardiomyopathies, valvular heart diseases and public health.

1. **Thromboembolism** – A condition where a circulating blood clot forms in a blood vessel (thrombosis), then travels through the bloodstream to block another vessel (embolism), reducing or restricting blood flow to vital organs.
2. **Obstructive coronary artery disease** – A condition where the blood vessels that supply oxygen-rich blood to the heart become narrowed or blocked from a buildup of plaque.
3. **Transthyretin Amyloidosis with Cardiomyopathy (ATTR-CM)** – A condition where an abnormal protein known as "transthyretin" builds up in the heart tissue, stiffening the heart and making it harder to pump blood.
4. **SGLT2 inhibitors** – A type of oral prescription medication that helps lower blood sugar in individuals with Type-2 diabetes, by preventing the kidneys from reabsorbing sugar and lowering the risk of heart failure.
5. **Low attenuation non-calcified plaques** – Soft, fatty buildups inside the arteries that does not contain calcium, which can obstruct blood flow, increasing the risk of heart attacks.

A COLLAPSED LUNG

Pneumothorax – a breathless encounter that warrants attention

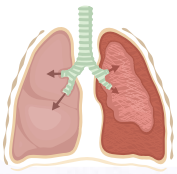
When air escapes from the lung & fills the space between lungs and ribcage, creating a buildup of air pressure on the lung

What is Pneumothorax?

Pneumothorax is a condition where air gets trapped between the lung and chest wall, causing the lung to collapse partially or fully. This can make breathing difficult and painful. Primary pneumothorax occurs spontaneously in otherwise healthy people, often due to small air blisters on the lung surface that burst. Secondary pneumothorax happens as a result of an underlying lung disease or injury, making it more serious and potentially life-threatening.

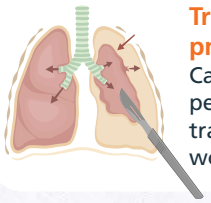
Other Variations of Pneumothorax

Pneumothorax can also occur along with other conditions, and in some cases, is associated with trauma or complication of a medical procedure.



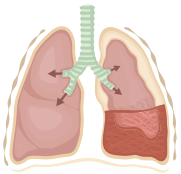
Haemopneumothorax

Abnormal collection of blood after pneumothorax from blood vessel rupture which warrants intervention



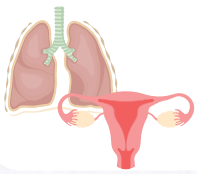
Traumatic pneumothorax

Caused by blunt or penetrating chest trauma (e.g. stab wound to chest)



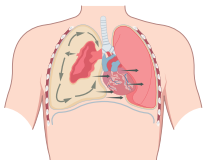
Iatrogenic pneumothorax

Air enters the space of the lungs during a medical procedure



Catamenial pneumothorax

Collapsed lung that occurs within 72 hours before or after the start of menstruation, often associated with endometriosis[1], causing symptoms such as chest or shoulder pain and shortness of breath



Tension pneumothorax

Excessive air collected within the space of the lungs causes severe pressure on the heart, major blood vessels and the opposite lung, compromising blood circulation

Symptoms of Pneumothorax

If not treated promptly, the severity of pneumothorax, a life-threatening condition, can vary. In some cases, the accumulating air can even cause pressure on the heart, pushing it across the chest cavity. This can lead to serious complications, making quick medical intervention crucial.

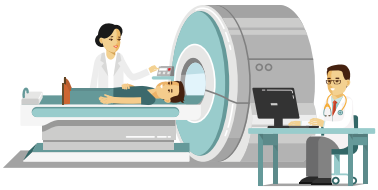
Often marked by sudden chest pain, neck or back pain, shortness of breath or difficulty breathing, the condition can be caused by a variety of factors and is typically classified according to the cause.

1. **Endometriosis** – A condition where endometrial tissue grows outside of the uterus.
2. **Bilateral pneumothorax** – When air leaks from both lungs and causes them to collapse.

Diagnosis of Pneumothorax

Generally diagnosed using ***Chest X-Ray***

In cases of suspected secondary pneumothorax, ***Computerised Tomography (CT) Scan may be needed*** to provide more detailed images



Seek immediate medical attention if breathing becomes increasingly difficult.

Surgical repair is required when there is:

- Persistent air leak for more than 3 days
- Recurrent pneumothorax
- Pneumothorax with bleeding
- Bilateral pneumothorax[2]
- Pneumothorax of the opposite lung; or
- In the case of high-risk professionals (pilots, divers)

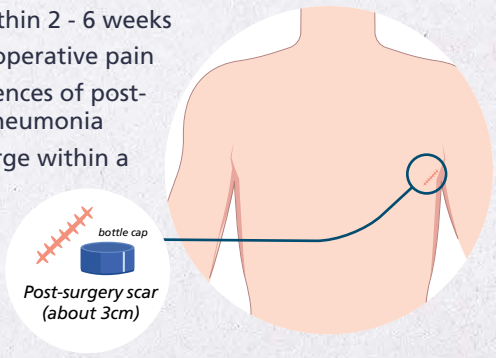
Pushing Boundaries In Lung Surgery: All Within One Keyhole

Over the past decade, surgical treatment for pneumothorax has become increasingly refined, given modern advances such as the development of minimally invasive techniques, which demotes less trauma and burden to patients. A leading example of this approach is Uniportal Video-Assisted Thoracic Surgery (UVATS), which allows lung surgery to be performed with just a single 3cm cut.

Introduced in 2009 by A/Prof John Tam, Head of Division of Thoracic Surgery, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS, who led his team to perform the first UVATS in Singapore, A/Prof Tam has since gone on to mentor a generation of thoracic surgeons in this single-incision surgery technique. Making a big difference with a small cut, NUHCS is proud to be the only centre in Singapore with a full team of thoracic surgeons experienced in this single-incision surgery.

Compared to traditional open surgery or multiport video-assisted thoracic surgery, UVATS offers several key benefits:

- Recovery within 2 - 6 weeks
- Lesser post-operative pain
- Lower incidences of post-operative pneumonia
- Early discharge within a day or two



SCAN QR CODE to discover NUHCS' innovative UVATS surgical technique!

Life After Pneumothorax

As pneumothorax carries a risk of recurrence, lifestyle changes are often recommended to reduce the likelihood of future episodes. For many, this means making long-term changes to their habits:

- **Quit smoking**
- **Avoid extreme activities** *(e.g. sky diving and deep-water diving)*

For those without underlying lung disease, recovery is generally quicker, and the risk of further episodes is significantly reduced following surgery. Return to work and getting back to normal activities is allowed once all symptoms have eased.

Pneumothorax is a common but sometimes overlooked condition. However, with advances in surgery and timely treatment, full recovery and a healthy, active life are possible. The key is catching it early and acting quickly. The journey doesn't end with treatment, though. By embracing lifestyle changes, you can reduce your chances of recurrence and set the stage for a vibrant, active future.

So take a deep breath and relax. With the right approach, pneumothorax doesn't have to leave you gasping for air!

ARTICLE BY

A/Prof John Tam Kit Chung

Head and Senior Consultant, Division of Thoracic Surgery, Department of CTVS, NUHCS

A/Prof John Tam is the founding Head of Thoracic Surgery at the NUHCS. He is a thoracic surgeon specialising in performing minimally invasive single-port keyhole surgery using advanced techniques in Uniportal Video-Assisted Thoracoscopic Surgery (UVATS). His research has been published across many high-impact medical and scientific journals. He also serves as the Chairman of the Singapore Residency Advisory Committee for Cardio-Thoracic Surgery. A/Prof Tam has won many awards in recognition for his service to patients and his contribution to the field of academic surgery.

Dr Hari Kumar Sampath

Associate Consultant, Division of Thoracic Surgery, Department of CTVS, NUHCS

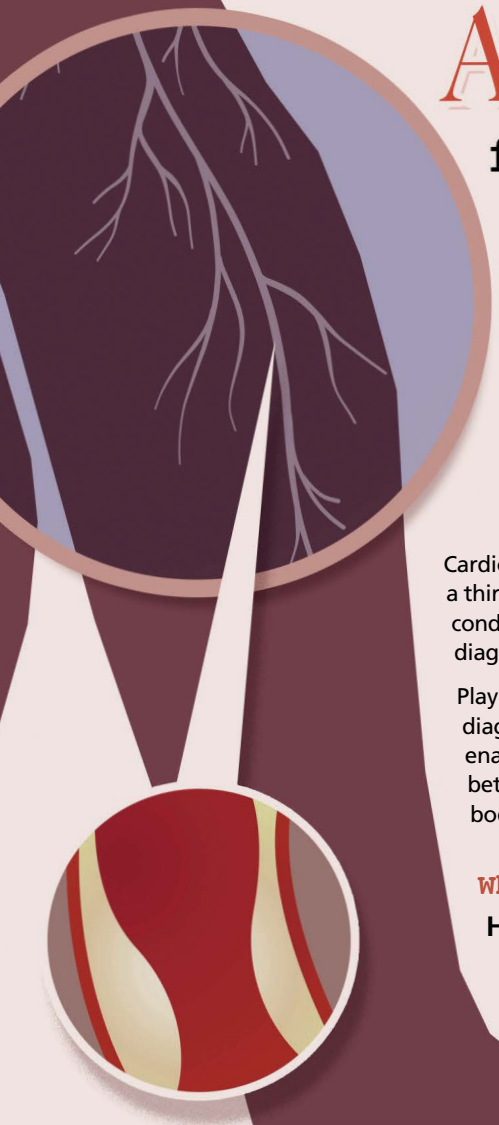
Dr Hari is currently an Associate Consultant in Thoracic Surgery, and was part of the NUHCS team which attended the South East Asian Thoracic Society (SEATS) inaugural meeting held in Hue, Vietnam. He also has a keen interest in bird photography.

NUHCS Achieves

ASIA'S FIRST INTERNATIONAL ACCREDITATION

for its Diagnostic Vascular Lab

International accolade recognises the institute's quality of diagnostic services and patient care provided.



Experiencing bulging veins, tired & painful legs, or numbness in the limbs?

Diagnostic testing can help pinpoint the presence and severity of vascular diseases, and promptly guide you to the right treatment.

Cardiovascular Diseases (CVD) are the number one cause of death in Singapore, accounting for a third of all deaths in 2023. Significantly affecting quality of life and mobility, common vascular conditions such as Deep Vein Thrombosis (DVT)[1] and Peripheral Arterial Disease (PAD)[2] can be diagnosed early through screening and imaging of blood vessels.

Playing a crucial role in early detection, imaging tests such as ultrasound scans – with an accurate diagnosis from a vascular lab – are key to quickly and effectively identifying the disease, enabling timely treatment and appropriate interventions. This will help vascular specialists better manage risks and improve outcomes in patients with such impaired blood flow in their body.

What are Vascular (Circulatory) Diseases?

Healthy blood vessels are an important part of one's overall health – yet often neglected.

A common cause of disability and mortality in Singapore's ageing population, vascular diseases refer to any condition that affects the network of blood vessels, and are categorised into conditions affecting either the arteries (blood vessels carrying blood away from the heart) or veins (blood vessels carrying blood to the heart).

Arterial diseases are often linked to atherosclerosis, or thickening of artery walls due to buildup of fatty plaques, while venous diseases include varicose veins and DVT.

Symptoms may vary depending on where the disease occurs, such as pain or numbness in the legs when walking, bulging veins or muscle fatigue, or gangrene in the toes and feet in the later stages. When poor blood flow occurs in the abdomen, warning signs may include pain in the abdomen, back or groin, or a gnawing and/or throbbing pain that may last for hours or days.

How Can I Check My Symptoms or Seek Further Care?

If you or a loved one are concerned about your risk of vascular disease, or experience any of the aforementioned symptoms, an imaging test performed at diagnostic vascular laboratories can be useful for prompt diagnosis and treatment.

Through the use of vascular ultrasound scans or high-frequency sound waves, specialists can gain a detailed view of blood flow along arteries and veins throughout the body, to detect any blockages and provide an accurate diagnosis of any vascular condition. They can then administer the right treatment, which may include general management, medication and/or surgical options, etc.

Such timely diagnoses are key to proper treatment procedures that accelerate the patient's eventual recovery.

At NUHCS, a specialised team of vascular radiologists and medical technologists work alongside our vascular surgeons by reviewing scans and enabling proper interpretation of the scan findings. Skilled in the different aspects of vascular diseases and up-to-date with the latest instrumentation and vascular diagnosis techniques, their expertise enables not just coordinated patient care, but also enhanced accuracy throughout the treatment process.

First & Only Lab in Asia to Earn the Acclaimed Intersocietal Accreditation Commission (IAC) Accreditation

> "As the only centre in Asia to hold this accreditation, this achievement underscores our ongoing commitment to innovation in vascular imaging and our mission to enhance patient care."
>
> *– Adj A/Prof Rajesh Dharmaraj, Head of Division and Senior Consultant, Division of Vascular Surgery, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS*

Setting a new milestone in 2024, NUHCS is proud to announce that its Diagnostic Vascular Laboratory (DVL) has been internationally recognised and accredited by the Intersocietal Accreditation Commission (IAC) in blood vessel-related testing, in the areas of:

- Extracranial Cerebrovascular Testing[3]
- Peripheral Arterial Testing[4]
- Peripheral Venous Testing[5]

Such vascular testing provides doctors with valuable guidance and assists them in making clinical decisions across different fields such as vascular surgery, emergency medicine, orthopaedics and paediatrics.


Certificate of Accreditation

INTERSOCIETAL ACCREDITATION COMMISSION

VASCULAR TESTING

Experience Peace-of-Mind For Your Vascular Scanning Needs

Setting our team apart as experts in vascular investigation and interpretation, the IAC certification signifies the quality of the scans performed at NUHCS' Diagnostic Vascular Laboratory and empowers our patients and referring physicians to make informed medical decisions based on them.

The accolade further reflects NUHCS' ongoing commitment as a National Centre to excellence in medical tests and screening. Driven by a commitment to deliver the best possible care and treatment, the lab's recognised expertise is testament to its regional leadership in blood vessel scans, and ongoing commitment to improving patient outcomes and safety.

ACCREDITATION OF THE NUHCS DIAGNOSTIC VASCULAR LAB BY THE IAC FURTHER INDICATES ITS:

RIGOROUS ACCREDITATION PROCESS

- The NUHCS DVL has undergone a detailed and comprehensive **evaluation process**
- Met **one of the highest standards in** the **imaging** and intervention-based procedures fields
- **Compliant** with international practices

HIGHLY QUALIFIED TEAM BEHIND QUALITY CARE

- Scans **over 7,000 non-invasive vascular ultrasound** cases yearly
- **Helmed by board-certified experts** in vascular & endovascular medicine:
  - Dr Peter Chang is awarded the Registered Physician in Vascular Interpretation (RPVI) certification
  - Medical technologists in the NUHCS DVL are awarded the Registered Vascular Technologist® (RVT®) certification[6] by the American Registry for Diagnostic Medical Sonography (ARDMS)

Did You Know?

The NUHCS Diagnostic Vascular Laboratory (DVL) offers a range of diagnostic services, which utilises specialised technologies to assess the body's major blood vessels non-invasively.

◀ *The NUHCS DVL Medical Technologist team*

> "The certifications of our staff of medical technologists and IAC accreditation confirm our team's expertise in vascular (blood vessel) ultrasound. This assurance of quality means patients and doctors can trust the scans we provide."
>
> *— Dr Peter Chang, Director of NUHCS Diagnostic Vascular Lab, Department of CTVS, NUHCS*

1. **Deep Vein Thrombosis** – common vascular disorder where blood clots form in the veins.
2. **Peripheral Arterial Disease (PAD)** – a chronic condition where narrowed arteries reduce blood flow to the limbs, mostly the legs or lower extremities.
3. **Extracranial Cerebrovascular Testing** – a non-invasive ultrasound exam that measures blood flow in the arteries outside the skull, detects lesions, and assesses risk of stroke.
4. **Peripheral Arterial Testing** – evaluate blood vessels to detect Peripheral Arterial Disease (PAD) or other conditions where narrowed arteries reduce blood flow to the arms or legs.
5. **Peripheral Venous Testing** – measures valve closure time and diameter to diagnose conditions such as varicose veins or acute thromboembolism.
6. The RVT® certification assesses the competency needed to perform a vascular sonography scan.

ARTICLE BY
NUHCS PULSE Editorial

Three Generations, One Passion

87-year-old's Inspiring Marathon Journey with Son and Grandson After Two Heart Operations

As the countdown to the Standard Chartered Singapore Marathon in December 2024 begun, runners across the city were lacing up their shoes and hitting the pavement in preparation for it.

Among them is a three-generation trio from the Murthy family – 87-year-old Dr C.K. Murthy, a heart patient from the National University Heart Centre, Singapore (NUHCS), his 52-year-old son Abhishek, and his 16-year-old grandson Kiran.

What many may not know is that Dr Murthy had undergone not one, but two heart operations within the same year – a journey of resilience that tested not just his physical strength but also the support of his family to overcome this hurdle together. Through this experience, it has strengthened their bond, serving as an inspiring testament to perseverance and the enduring spirit of a shared passion.

For Dr Murthy, running is much more than a hobby — it is a lifelong passion that spanned for decades since childhood. Over the years, Dr Murthy could often be found running along the streets of Singapore with his sons, discovering new parts of the island together.

One fond memory stands out where he recalls their 25km run to Changi Airport, which inspired them to sign up for their first marathon together. That journey marked the beginning of a 30-year tradition of marathon running – a ritual he shared every year with his wife and sons.

However, Dr Murthy's active lifestyle was disrupted in July 2023 when he experienced a concerning tightness in his chest, during what was meant to be a routine practice run with his son.

Dr Murthy (middle), with his son, Abhishek (right) and grandson, Kiran (left)

An emergency visit to NUHCS revealed that he had two types of critical heart conditions – a severe mitral valve leakage[1], and blockages in three main coronary arteries. Faced with these pressing cardiac issues, Dr Murthy underwent an open-heart surgery in February 2024 to first treat the blockage in his coronary arteries.

Routine run as a family

The surgery proved to be no ordinary one when Dr Murthy's condition presented an unexpected challenge. During the operation, the doctors found that it was not safe to use a heart-lung machine for him, so he underwent an off-pump Coronary Artery Bypass Surgery[2] performed by A/Prof Kristine Teoh, then Head of Division of Adult Cardiac Surgery and Senior Consultant, Department of Cardiac, Thoracic, and Vascular Surgery (CTVS), NUHCS, to treat his coronary blockages.

Five months later, Dr Murthy then returned to NUHCS for the treatment of his second heart condition. A Transcatheter Mitral Edge-to-Edge Repair (TEER)[3] procedure was performed by Dr Lim Yinghao, Consultant, Department of Cardiology, NUHCS, to repair the leakage in his mitral valve using a tiny clip inserted through his blood vessels.

Determined to regain strength and confidence to return to running – his beloved past time – Dr Murthy embarked on a Cardiac Rehabilitation Programme at NUHCS after his two successful heart operations.

The programme offers personalised exercise plans and health guidance on lifestyle changes, for patients to gain strength and confidence in returning to their daily lives and favourite activities. Dr Murthy was committed to rebuilding and maintaining his heart health under the supervised guidance of the multidisciplinary medical professionals in this programme.

Three-generation family successfully participated in the marathon

Just one month after his surgery, Dr Murthy began with 5km runs and progressively stepped up to 10km with his doctors' approval. Today, Dr Murthy comfortably finishes 20km runs, exemplifying how heart patients can safely lead an active lifestyle post-procedure with the right care and discipline.

With two months left till his first half marathon post-operation, Dr Murthy maintained a disciplined routine of doing yoga and balancing exercises in the morning, followed by a 6km run to and from the gym where he focused on strength training, before concluding his evenings with another 6km run.

Graduating from the Cardiac Rehabilitation Programme

Through unwavering commitment to his recovery, Dr Murthy made remarkable strides, not just in physical endurance but mental resilience too. Being able to cross the finish line of the marathon alongside his son and grandson, this race is more than just a personal milestone but a reignition of the decades-long family tradition that he hopes will continue for generations to come.

1. **Mitral valve leakage** – A heart condition, also known as mitral regurgitation, when the mitral valve does not close tightly causing blood to flow backwards into the upper chamber instead of moving forward to the rest of the body normally.
2. **Off-pump Coronary Artery Bypass Surgery** – Operation performed to treat blocked or narrowed arteries while the heart is still beating, instead of using a heart-lung machine to keep the heart pumping.
3. **Transcatheter Mitral Edge-to-Edge Repair (TEER)** – Minimally invasive procedure to fix a leaky mitral valve in the heart by bringing the edges of the leaking valve together and stopping the backflow of blood.

ARTICLE BY
NUHCS PULSE Editorial

Pioneering the Same-Day Discharge Service

Setting a New Standard in Post-Cardiac Procedure Care

"Imagine undergoing a heart procedure and being able to be back home to rest, all on the same day. With NUHCS' Same-Day Discharge service, this is now made possible – offering cost savings while promising the same care standards as an overnight hospital stay."

Building on the groundwork laid by A/Prof Adrian Low, Clinician Mentor of Interventional Cardiology and Angiography Centre and Senior Consultant, Department of Cardiology, National University Heart Centre, Singapore (NUHCS), the **Same-Day Discharge (SDD)** protocol was officially rolled out at NUHCS in September 2023. The institute is one of the first in Singapore to implement a Same-Day Discharge service for all elective patients[1] undergoing coronary procedures, such as ballooning and stenting, setting a new benchmark in cardiac care.

This service allows patients to return home just hours after their heart procedure, eliminating the traditional need for an overnight stay for monitoring. Despite the shortened stay, the same standards of care are maintained.

Through an internal audit on patients' recovery and treatment outcomes that even tracks potential risks such as death rates, heart attacks, possible complications of puncture site, or urgent hospital readmissions, the results have shown that being discharged on the same day of a heart procedure is as safe and effective, with no adverse effects or significant difference in patient recovery, as compared to the conventional overnight hospital stay.

KEY BENEFITS OF SAME-DAY DISCHARGE SERVICE

- Enhanced patient experience through reduced hospitalisation stays, with no compromise on the recovery process
- Substantial cost savings for patients with reduced hospitalisation expenses
- Improved management of hospital bed occupancy rates, enabling more focused care on critical cases

Even with a shorter hospital stay, patients continue to benefit from comprehensive post-discharge care. This includes enrolment in the NUHCS Cardiac Rehabilitation Programme, which offers personalised exercise plans and health guidance, empowering heart patients to regain strength and confidence to return to their daily life. Additionally, patients will receive a prompt next-day teleconsultation with their medical team at the comfort of their homes, to ensure that their recovery is monitored closely.

"The Same-Day Discharge service after a Percutaneous Coronary Intervention (PCI)[2] procedure offers patients greater comfort and a more seamless transition from hospital to home. With detailed post-discharge care and advice, patients feel well-equipped and comfortable to recover at home. Most patients and their families had expressed their preference for a same-day discharge over an overnight stay at the hospital."

- Yap El Fuon, Assistant Nurse Clinician, Angiography Centre, NUHCS

SHAPING THE FUTURE OF CARDIOVASCULAR HEALTHCARE

Being one of the first institutes to launch the Same-Day Discharge service in Singapore, the success has garnered interest from other institutes eager to adopt this protocol. NUHCS @ Ng Teng Fong General Hospital (NTFGH) began introducing this service in January 2024, benefitting more patients with streamlined care. NUHCS is also looking into implementing this Same-Day Discharge practice for other cardiovascular treatment procedures, including heart rhythm disorders and structural heart diseases, which typically requires overnight stays.

This innovative approach is poised to significantly enhance patients' experiences and transform the management of post-cardiac procedures across the region.

"We are rolling out same-day discharge for selected pacing[3] and Electrophysiology[4] procedures following the success with coronary interventional procedures. We expect to reap the same benefits in reducing hospital stay without compromising patient safety.

- Asst Prof Yeo Wee Tiong, Clinical Director of Cardiac Electrophysiology and Pacing, Department of Cardiology, NUHCS

1. **Elective patients** – Individuals with planned medical treatments or scheduled non-emergency surgeries, for non-life-threatening cases.
2. **Percutaneous Coronary Intervention** – Minimally invasive procedure performed to open blocked or narrowed heart arteries.
3. **Pacing** – Surgery where a small medical device, called a pacemaker, is implanted to stabilise irregular heart rhythms.
4. **Electrophysiology** – Study to assess the heart's electrical activity and system, for diagnosis and management of abnormal rhythms.

ARTICLE BY

Asst Prof Gavin Ng
Clinical Director of Interventional Cardiology and Angiography Centre and Consultant, Department of Cardiology, NUHCS @ NUH

Dr Gavin Ng is the Clinical Director of Interventional Cardiology and Angiography Centre, National University Heart Centre, Singapore (NUHCS). He specialises in coronary intervention and is an Assistant Professor at the Yong Loo Lin School of Medicine, National University of Singapore.

Dr Sim Hui Wen
Director, Cardiovascular Catheterisation Laboratory and Consultant, Division of Cardiology, Department of Medicine, NUHCS @ NTFGH

Dr Sim also runs the Women's Heart Health Clinic at NTFGH, and is an active member of the Women's Heart Health Programme under NUHCS. She has a special interest in the female-phenotype of coronary artery disease and frequently delivers talks on women's heart health to both public and healthcare professional audiences.

From Mystery to Miracle

Heart-Brain team collaborates to prevent stroke recurrences in PFO patients

UNRAVELLING THE MYSTERY

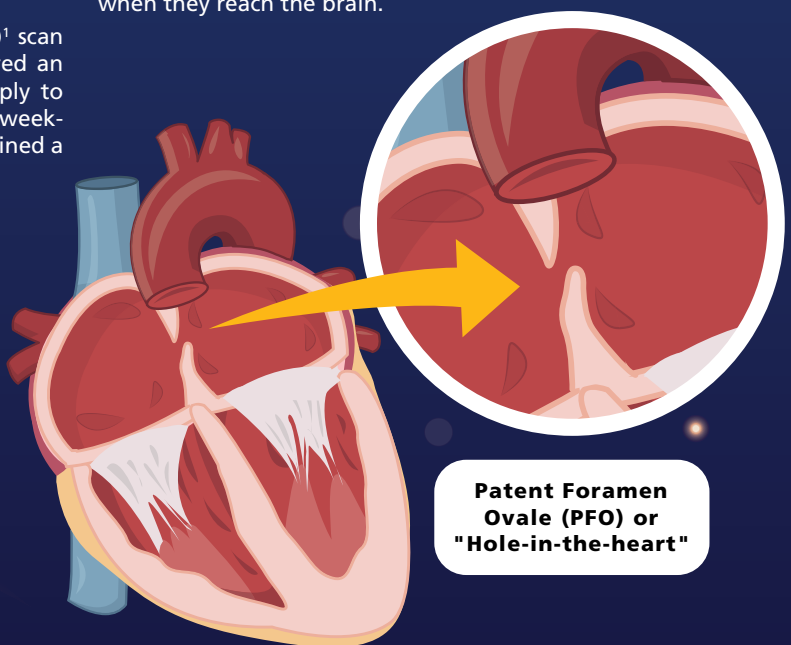
When 40-year-old Mdm Lem visited her father in the hospital abroad last November, she never imagined she would become a patient herself. What began as a routine morning by her father's bedside took a sudden turn when she was suddenly struck by severe giddiness, intense nausea, and an inability to stand without assistance.

An urgent brain Magnetic Resonance Imaging (MRI)[1] scan revealed the shocking truth – Mdm Lem had suffered an ischemic stroke[2], which occurs when the blood supply to part of the brain is blocked or reduced. Despite a week-long hospital stay and extensive tests, the cause remained a mystery until her return to Singapore.

Seeking answers, Mdm Lem consulted Adj Asst Prof Benjamin Tan, Consultant, Division of Neurology, Department of Medicine, National University Hospital (NUH). After initial tests suggested an abnormal connection within her heart, she was referred to Asst Prof Lim Yinghao, Consultant, Department of Cardiology, National University Heart Centre, Singapore (NUHCS).

A HIDDEN THREAT

The breakthrough came when the Heart-Brain team from NUHCS and NUH collaborated to confirm Mdm Lem's diagnosis - **Patent Foramen Ovale (PFO)**, a condition commonly known as a "hole in the heart". This condition allows small blood clots to pass between heart chambers, potentially obstructing blood flow and causing strokes when they reach the brain.



Patent Foramen Ovale (PFO) or "Hole-in-the-heart"

REDUCING THE RECURRENCE OF STROKES IN YOUNG PFO-ASSOCIATED STROKE PATIENTS

While PFO affects about 25% of the general population, a recent study conducted by the Heart-Brain team of NUHCS and NUH specialists reveals that this prevalence significantly increases to approximately 40% in young patients with unexplained ischemic strokes[2].

Each year, the team sees around 75 young adults with unexplained strokes, carefully considering PFO as a potential cause.

Most individuals with PFO never experience symptoms or require treatment. However, as in Mdm Lem's case and the high profile PFO case of then 25-year-old model, Hailey Bieber, a stroke can be the first sign of this heart condition.

A LIFE-CHANGING DECISION

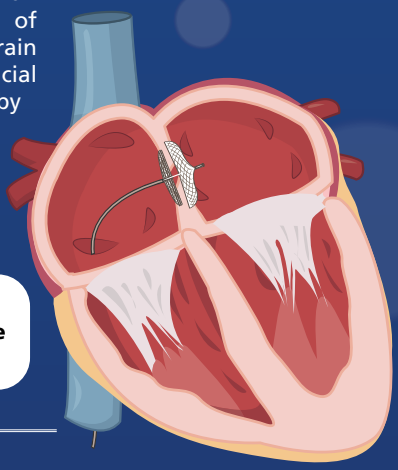
Faced with the risk of a more severe stroke in the future, Mdm Lem opted for a minimally invasive PFO device closure procedure, performed by Asst Prof Lim Yinghao.

Major international studies in recent years found that the identification of carefully-selected patients can significantly reduce their risk of recurrent strokes through PFO closure, and the Heart-Brain team also confirmed the effectiveness of this through a study published in October 2023.

A rising number of patients have benefitted from this PFO device closure procedure. Last year alone, over 30 patients successfully underwent PFO device closure procedures, performed by a dedicated team of experts at NUHCS.

This success stems from an increased awareness of the intricate Heart-Brain connection in such crucial conditions, made possible by the multidisciplinary team that ensures the right patients are identified for this potentially life-saving treatment.

Minimally invasive treatment procedure for PFO closure



A NEW LEASE OF LIFE

Just one day after her procedure in May of 2024, Mdm Lem was discharged well, and began a smooth recovery. That same month, she travelled abroad with her family, and even conquered a mountain hiking tour. Today, she treasures every moment with her young sons, aged 6, 12, and 14, grateful that the timely PFO closure procedure has greatly reduced her risk of a future stroke.

The story of Mdm Lem's recovery highlights the strength of collaboration between cardiologists and neurologists and the importance of their interconnected expertise in modern medicine. By bridging the gap between heart and brain health, the focus falls not only on stroke treatment, but also preventing stroke recurrence and giving young patients like Mdm Lem a chance at a healthier future.

1. **Magnetic Resonance Imaging (MRI)** – Non-invasive technique using strong magnetic fields and radio waves to create detailed images of the body for diagnosis and evaluation of medical conditions.
2. **Ischemic strokes** – A type of stroke that occurs when blood clot or fatty plaque blocks an artery leading to the brain.

The Heart-Brain team (Far left: Dr Lim Yinghao, Consultant, Dept. of Cardiology, NUHCS, far right: Dr Jing Mingxue, Consultant, Division of Neurology, Dept. of Medicine, NUH), with Mdm Lem and her three sons

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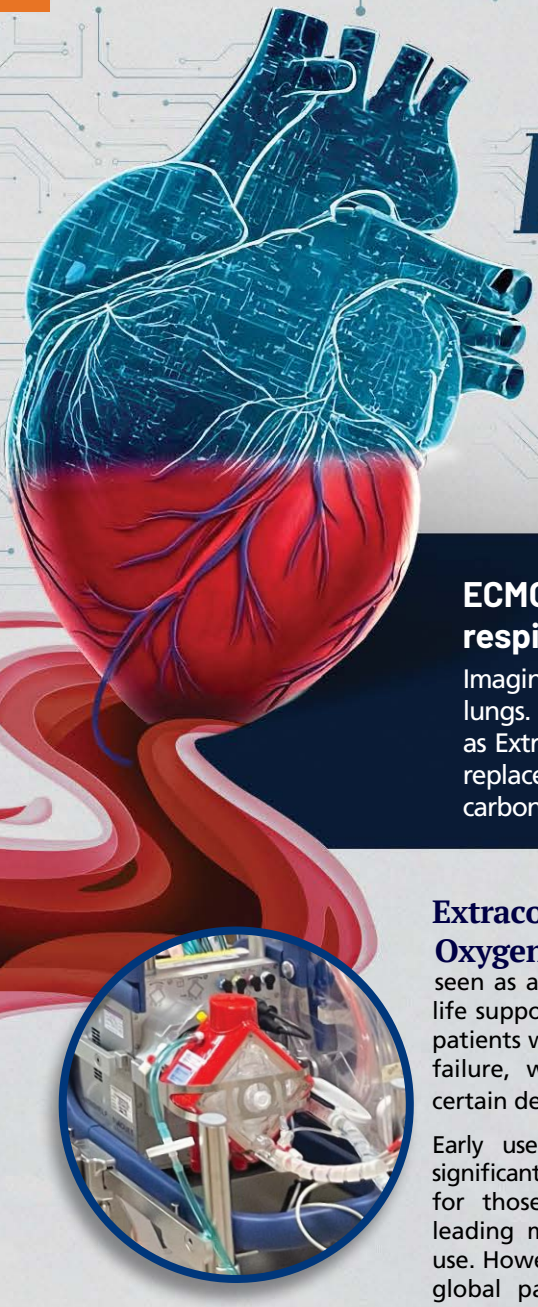


Revolutionising Critical Care

The Extracorporeal Membrane Oxygenation (ECMO) Journey

ECMO offers a lifeline for patients with severe cardiac or respiratory failure.

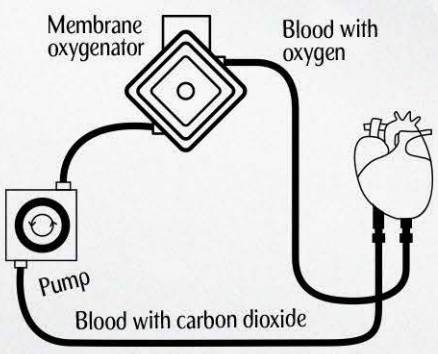
Imagine a machine that temporarily takes over the function of the heart and lungs. This is precisely what ECMO does. Known in the medical community as Extracorporeal Life Support (ECLS), this specialised technology temporarily replaces the heart and lungs' function by oxygenating blood and removing carbon dioxide through an external circuit.

Extracorporeal Membrane Oxygenation (ECMO) is often seen as an advanced, heroic form of life support, used to treat critically ill patients with refractory heart or lung failure, who would otherwise face certain death.

Early use of ECMO did not show significant improvements in outcomes for those with cardiogenic shock[1], leading many hospitals to pause its use. However, the Influenza A (H1N1) global pandemic in 2009 reignited interest and sparked a revolution in ECMO therapy.

Meanwhile, neonatal and paediatric clinicians had already begun to harness its potential, successfully treating children with refractory lung or heart failure since a landmark neonatal case in 1975.

Acting as a short-term artificial lung or heart, ECMO provides critical circulatory support, allowing patients time to recover, or as a bridge to a life-saving transplant.



Refining Usage of a Life-saving Technique

At the heart of this transformation is Dr Robert H. Bartlett, also known as the father of modern extracorporeal support. As a young resident at the Boston Children's Hospital in the mid-1960s, he had observed first-hand the effectiveness of cardiopulmonary bypass in keeping patients alive, even when the heart was stopped for surgery and the lungs were deflated. Determined to bring this promising technology into the Intensive Care Unit (ICU), he devoted his career in pursuit of this goal. He continues to run an ECMO research laboratory in Michigan and remains a leading authority in the field, gracing many ECMO meetings while serving as an inspiration to his successors.

As ECMO became a mainstay of therapy for patients in North America, especially in infants with severe Persistent Pulmonary Hypertension of the Newborn (PPHN)[2], Dr Bartlett set up an organisation where like-minded clinicians could maintain a data registry of their patients and discuss problems encountered. This culminated in the founding of the Extracorporeal Life Support Organization (ELSO) in 1989. Unlike most medical societies, ELSO encompasses a multidisciplinary team of diverse clinicians – including nurses, respiratory therapists, perfusionists, ICU physicians, surgeons, and neonatologists, who care for patients of all ages, from premature infants to octogenarians.

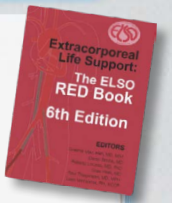
Singapore and NUHCS' Roles in Shaping ELSO Progress

Since then, the ELSO Registry has rapidly grown to become the most important data source for scientific research on patients supported with ECMO. At present, there are over 230,000 patients in the Registry[3], which is the single largest ECMO database in the world. Over 100,000 of these patients survived to hospital discharge. It is likely that most of them would have died without ECMO support.

ELSO is also the largest global, non-profit medical society focused on extracorporeal life support, having grown from 15 member centres in 1989 to nearly 750 in 2024, including many of the world's leading healthcare institutions.

In 2011, the Cardiothoracic Intensive Care Unit (CTICU) team (now part of the NUHCS family) at the National University Hospital became the **first in Singapore to join ELSO** and has since made substantive contributions to the global advancement of this life-saving technique.

Adj A/Prof Kollengode Ramanathan, Senior Consultant, Division of CTICU, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS, was an **active member of its Scientific Oversight and Data Review Committee**, and currently serves as Publications Chair on its Steering Committee.



Adj Prof Graeme MacLaren, Head of Division of CTICU, Department of CTVS, NUHCS, was the inaugural Chair of the Asia-Pacific Chapter of ELSO - established in 2012, and now with over 80 member centres. He is also the editor of three consecutive editions of the definitive ECMO reference textbook, which came to be known simply as **"The ELSO Red Book"**.

In 2023, Adj Prof MacLaren has become the organisation's **first President outside the United States of America (USA)** in its thirty-five-year-long history, putting Singapore on the world map of the critical care community.

A Life-saving Journey Through the COVID-19 Pandemic

In 2018, the Ministry of Health (MOH) in Singapore recognised ECMO's crucial role in optimising outcomes for the critically ill, but highlighted the importance of providing appropriate recommendations on usage and patient selection for this resource-intensive procedure. That same year, MOH established the National ECMO Services Advisory Workgroup, to set standards and protocols for its use, just before the onset of the COVID-19 pandemic.

This foresight proved invaluable, as healthcare teams scrambled to provide ECMO support for patients suffering from severe COVID-19-related respiratory failure. The committee has since evolved into the National ECMO Standing Committee, comprising representatives from every government-restructured hospital in Singapore. Together, they continuously assess ECMO services and patient outcomes. Meanwhile, the ELSO Registry provides important data to benchmark outcomes of ECMO support against that of similar patient profiles in the neighbouring Asia Pacific region and the rest of the globe.

Looking Ahead: The Future of ECMO

Gaining momentum over the past decades, ongoing research in ECMO is of vital importance to refine clinical practice, and move the field forward in critical care medicine. Fostered by Dr Bartlett and ELSO, the international ECMO community continues to advance interprofessional education, united by a shared desire to do everything possible for patients and their families.

NUHCS is proud to play a pivotal role in this collective effort, enhancing knowledge, refining skills, and nurturing the next generation of ECMO practitioners. The journey of ECMO is far from over, and the institute remains steadfast in its commitment to bettering outcomes and shaping healthier lives through cardiac critical care.

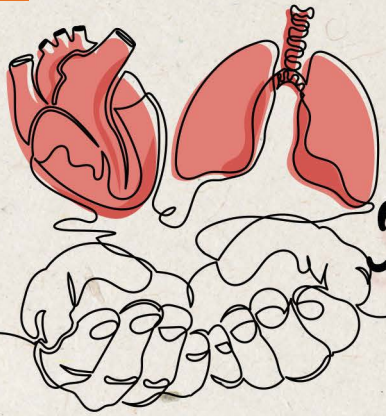
ARTICLE BY

Adj Prof Graeme MacLaren

Head of Division of CTICU and Senior Consultant, Department of CTVS, NUHCS

Prof MacLaren has been heavily involved with the Extracorporeal Life Support Organization (ELSO) since 2011, and was the Inaugural Chair of its Asia-Pacific Chapter. In 2023, he became the first President of ELSO in the history of the organization from outside the USA, and currently serves on the Board of Directors.

1. **Cardiogenic Shock** – a life-threatening condition where there is a sudden deterioration of heart function, resulting in a weakened heart and inability to pump sufficient blood around the body.
2. **Severe Persistent Pulmonary Hypertension of the Newborn (PPHN)** – a serious medical condition in which a newborn's circulatory system does not adapt properly to life outside the womb, and can be life-threatening.
3. Information accurate as at December 2024 (www.elso.org).



Shaping the Future of Heart-Lung Intensive Care

NUHCS leads the way in ECMO education at APICS 2024

What is ECMO

Extracorporeal Membrane Oxygenation (ECMO) is a life-support system that pumps blood from outside of the body to a heart-lung machine to remove carbon dioxide and replenish it with oxygen. This treatment is used in patients with critical cases of heart and/or lung failure, to help replace the functions of these vital organs.

ECMO is a critical life-saving intervention for patients with severe cardiac and respiratory failure, and its successful implementation requires a high level of skill, precision and teamwork. Aiming to raise greater awareness and enhance training in this life-changing treatment, ECMO specialists from the National University Heart Centre, Singapore (NUHCS), led a comprehensive ECMO course at the Asia Pacific Intensive Care Symposium (APICS) on 15-16 August 2024, which aimed to impart essential professional insights to allied health professionals across the region.

Endorsed by the Extracorporeal Life Support Organisation (ELSO), this is one of the few ECMO courses in Asia to receive such recognition. The programme is designed to develop and strengthen the skillsets of doctors, nurses, perfusionists, and respiratory therapists, empowering them to manage patients requiring or on ECMO with confidence and expertise.

Immersive Learning for ECMO Excellence

Spanning over two days, the course combined pre-learning materials, clear overview and interactive case studies before diving into practical training to deepen participants' understanding of ECMO. Key topics included indications, contraindications, anticoagulation, weaning, patient management, and the physiology behind ECMO. The team was led by experienced faculty members and simulation educators who facilitated critical clinical thinking and decision making. This course combined didactic talks, interactive water drills, and small group simulations on circuit checks, equipment handling, pressure monitoring and emergency troubleshooting procedures. Structured to maximise real-world applications for participants, the course leveraged expert insights and advanced educational tools to create an engaging learning experience, intuitively equipping participants with the foundational principles of ECMO care.

ECMO emergency training emphasised on bedside skills through high-fidelity simulation on manikins. Pre- and post-training evaluations ensured that participants were fully prepared before receiving ELSO certification upon successful completion. This rigorous assessment process has made the course a key credentialing tool for hospitals seeking to accredit their ECMO specialists.

Over the past decade, the course has evolved to emphasise hands-on trainings and small-group discussions, minimising lecture time. The inclusion of cutting-edge technologies such as Virtual Reality (VR) and simulation content, uniquely developed by NUHCS' perfusionists and technical experts, further enhanced the immersive learning experience.

Raising the Bar in ECMO Education

The impact of the ECMO course was evident in the feedback from participants, many of whom reported significant improvements in both technical knowledge and clinical confidence. Score comparisons before and after the test showed a marked increase in participants' understanding, while self-assessment surveys highlighted gains in both technical and non-technical skills.

The NUHCS faculty members also play a key role in the ELSO Education Committee, where they contribute to shaping global standards for ECMO training and accreditation. Regular quality assessments ensured that the course's effectiveness and delivery remained at the forefront of ECMO education. In addition to providing valuable training, this annual course also serves as a platform for professionals to network and exchange best practices. For many participants, this course is a pivotal step in advancing their careers and establishing ECMO services at their own institutions.

> *"Give a man a fish, he will live his day. Teach him how to fish, and he will live his life."*

At NUHCS, the ECMO course embodies the institution's values - Teamwork, Respect, Integrity, Compassion, Excellence and Patient-Centredness (TRICEP). This multi-dimensional programme is a crucial part of the National Centre's ongoing mission to advance global standards in cardiothoracic intensive care. As the centre continues to lead innovation in ECMO education, this programme plays a vital role in shaping the future of heart-lung intensive care, ensuring that healthcare professionals are well-equipped to deliver life-saving care for years to come.

A VR simulation content that promotes an immersive learning experience

Hands-on training and high-fidelity simulation on manikins

ARTICLE BY

Adj A/Prof Ramanathan K.R.

Senior Consultant, Division of Cardiac Thoracic ICU (CTICU), and Research Director, Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS

Adj A/Prof Ramanathan is an Adult Cardiac Intensivist in the Cardiothoracic Intensive Care Unit (CTICU) specialising in management of critically ill cardiac patients and mechanical cardiac support in the ICU. He is also the Director of the ICU Fellowship Programme.

NURSES' MERIT AWARD 2024

HONOURING THE HEARTFELT DEDICATION OF NURSES

Established in 1976, the Nurses' Merit Award, presented by the Ministry of Health (MOH), has served as a distinguished recognition for nurses who demonstrate exceptional performance, professional growth, and impactful contributions to the nursing profession. Nominated by their healthcare institutions, and selected by an esteemed panel from MOH, the recipients of this award stands as exemplars of dedication and excellence. In 2024, Fan Sen, Nurse Manager at the National University Heart Centre, Singapore (NUHCS), was honoured with this prestigious accolade, a testament to her unwavering commitment to patient care and exceptional leadership.

An Empathetic Leader Amongst Peers

With over 17 years of nursing experience, Nurse Fan Sen is known for her meticulous attention to detail and a steadfast commitment to clinical excellence, often going beyond her scope to ensure the highest standard of care for every patient. In her role as a Nurse Manager, she not only manages clinic operations with efficiency but also fosters a collaborative environment that unites nurses, allied health professionals, and operational staff to achieve optimal patient outcomes.

In busy outpatient[1] scenarios, Fan Sen's empathy shines as she anticipates patient needs and always provides satisfactory service to manage their expectations and resolve concerns. She also goes the extra mile to create a seamless process for inpatient wards, meticulously coordinating all appointments, providing clear and comprehensive discharge instructions, and proactively arranging blood-taking procedures before consultations, ensuring patients receive well-organised and thoughtful care at every step. Her impact, however, is not just limited to patient care. Fan Sen is deeply committed to creating a positive and supportive work environment for her colleagues.

She actively listens to her colleagues' needs, accommodates flexible rostering requests, and works tirelessly to foster a positive spirit and high staff morale at the NUHCS Heart Clinic. It is this balance of clinical expertise and compassionate leadership that has made her an indispensable pillar of the nursing team at NUHCS.

After obtaining her certification from the Cardiac Cardiothoracic Vascular Nursing Course (CCTVNC) in 2016, Fan Sen has continually used her technical expertise and soft skills gained to lead and inspire her team. Driven by a passion to advance the nursing profession, she aspires to nurture the next generation of nurses, serving as a role model to her nursing peers and even junior doctors. Her passion for education extends beyond her team, as she actively contributes to raising heart health awareness to a broader healthcare community. Through her yearly participation in World Heart Month activities, she generously shares her expertise, empowering the community with her knowledge.

An Innovative Trailblazer with Heart

Fan Sen's dedication to nursing is also evident in her effort to improve processes and elevate patients' quality care at the NUHCS Heart Clinic. From streamlining operations to enhancing patient management, she consistently seeks ways to improve clinical workflow and increase efficiency.

Her involvement in implementing various clinical services provided by nurses has been significant. An example of the services offered would be the management of complex wounds and dressings for patients at the Wound Clinic and Venous Leg Ulcer (VLU) Dressing Clinic, which not only helped to expand nurses' role but also allowed patients to be reviewed earlier in the clinics, enabling the early detection of infection signs or the need for further action.

To enhance staff ergonomics and achieve optimal blood-taking positioning, Fan Sen introduced thoughtful innovations, including a modified table for the blood-taking station. Additionally, Fan Sen improved the work efficiency in the blood room by ensuring each blood station has its own queue system, which minimises staff movement and enables the conversion to electronic service tracking. Furthermore, she leads the Specialist Outpatient Clinic (SOC) code-blue team[2], overseeing any code-blue related issues and ensuring all SOC nurses comply with annual drills.

Harnessing the ability to effectively lead her team across management and clinical aspects, Fan Sen maintains smooth clinic operations while upholding stringent clinical standards and addressing staff needs. With her resourceful and approachable nature as a Nurse Manager, she maintains strong rapport with other departments in the clinic, and clinicians often look to her as a go-to point of contact for expert opinions and advice.

The Nurses' Merit Award is a well-deserved recognition of Fan Sen's exceptional competence, collaborative spirit and unwavering commitment to her role at NUHCS, highlighting her exemplary patient support and dedication to advancing the field of nursing.

> I am deeply honoured to receive this recognition. It reflects not only my dedication but also the unwavering support of my colleagues and mentors.
>
> *— Fan Sen, NUHCS Nurse Manager*

ARTICLE BY
NUHCS PULSE Editorial

1. **Outpatient** – Patient who attends a hospital for treatment without staying there overnight.
2. **Code-blue team** – Healthcare professionals who are responsible for rendering immediate care when code blue is activated, which refers to an emergency situation in a hospital where a patient is in cardiac or respiratory arrest.

NURTURING *Future* POSSIBILITIES

Congenital Heart Surgeon and new Head of the Department of Cardiac, Thoracic & Vascular Surgery (CTVS) at NUHCS, A/Prof Laszlo Kiraly charts out his roadmap to drive value-added care, and how he intends to propel CTVS forward into the next era of healthcare.

A traffic accident at nine proved to be a life-changing event for A/Prof Laszlo Kiraly. Confined to bed for weeks, he was gifted a magazine which had heart surgery pioneer Dr Christiaan Barnard – who carried out the world's first human-to-human heart transplant – on its cover, igniting his childhood ambition to become a heart surgeon one day.

More than forty years after accomplishing his dream as a cardiac surgeon, A/Prof Kiraly is still enjoying every moment of the job and in September 2024, officially stepped into a new role as Head, Department of Cardiac, Thoracic and Vascular Surgery (CTVS) at the National University Heart Centre, Singapore (NUHCS). The accomplished yet humble surgeon shares with PULSE what keeps his heart for the field of congenital heart surgery beating, and what he hopes to impart to the next generation of surgeons and medical professionals!

RESTORING THE HEART'S SPLENDOUR

Whether he is recounting the successful outcome of a complex heart surgery, or sharing on how research has proven the heart to be more than a mere muscular pump, A/Prof Kiraly's enthusiasm for his profession shines through.

The Hungarian-born, who was also recently honoured with the 2024 Hungarian Order of Merit Officer's Cross for his contributions to advancing congenital cardiac surgery, is no stranger to the challenges of leadership, having previously led the establishment and development of a young cardiac team at an Abu Dhabi, United Arab Emirates hospital into a full-fledged, operational unit.

At NUHCS – the only public healthcare institute in Singapore with cardiac, thoracic and vascular surgery units housed under one roof, and already the provider of choice for complex cardiothoracic and vascular surgeries from birth to the elderly, the institute's competitive edge lies in its ability to provide care throughout the lifespan. It is here that A/Prof Kiraly found his next challenge: to take the CTVS department to greater heights.

Proud that the institute is able to provide a specialised suite of care from young to old, A/Prof Kiraly hopes that the department of CTVS can continue to push the frontiers of cardiothoracic and vascular surgery and medical education, ultimately leading to improved patient outcomes and higher standards of care.

Congenital Heart Disease (CHD) - one or more problems with the heart's structure that are present at birth - is the most common birth defect, affecting 1 newborn in every 120-166 live births.[1]

Hungary's Minister of Energy, Mr Csaba Lantos, presents the Hungarian Order of Merit award to A/Prof Kiraly (right).

He believes the next step in developing a centre of excellence in cardiothoracic surgery is to work towards performing "more complex procedures less invasively", and outlines how NUHCS can leverage on its academic health system positioning to combine state-of-the-art education and cutting-edge research.

> **"We want to provide the best possible care to our patients,"**
>
> **– A/Prof Laszlo Kiraly, Head, Department of CTVS, NUHCS**

Meanwhile, plans are underway to progressively roll out CTVS' specialised services to other NUHCS satellite clinics, namely the NUHCS Heart Clinics at Ng Teng Fong General Hospital (NTFGH), Jurong Medical Clinic (JMC) and Alexandra Hospital (AH). By reducing referral wait times, the department can further its objective of bringing heart health closer to the community, adds A/Prof Kiraly.

INTEGRATING TEAMWORK INTO THE FABRIC OF PATIENT CARE

With his wealth of surgical experience as a paediatric cardiothoracic surgeon, how does A/Prof Kiraly prepare himself for delicate congenital heart surgeries where patients might be as young as a few days old, with hearts as small as a walnut?

Sharing his personal *modus operandi*[2], A/Prof Kiraly finds that visualising every step ahead of surgery allows him to better draw from his rich personal mental library of over forty years' experience for decision-making, particularly when things do not go as planned.

"Nowadays, over 97% of babies born with CHD could have a chance to grow into adulthood. This means that treating patients with CHD is a lifelong commitment," he explained.

Discussing the use of prosthetic materials during surgery, A/Prof Kiraly emphasised that these would have to accommodate the baby's future growth to a greater extent, as compared to the same surgery done for adult patients. In addition, paediatric surgeons must exercise special care during surgeries to protect the delicate tissues involved.

Likening the surgical operation to a cohesive jazz band, A/Prof Kiraly describes how the 'leading' role is passed between team members as the operation progresses, as compared to a symphony orchestra where the ensemble follows the lead of a single conductor. The performance begins with anaesthesia taking the lead, then seamlessly transitions to the surgeons. At certain points, the nurses and perfusionists may come to the forefront, each playing a crucial role in the overall harmony of the procedure.

Whether guiding as a soloist or playing a supporting role, the surgical team has to work seamlessly with one another, to ensure optimum patient safety, and smoothness of the operation throughout. This vital sense of camaraderie and trust is a key element which A/Prof Kiraly hopes can be further integrated into NUHCS' workflow. "A culture where co-workers are empowered to take the initiative in helping each other out, can help to fuel positive workplace emotions and in turn, enhance employee well-being," adds A/Prof Kiraly.

ENHANCING HUMAN INTERACTION IN MEDICINE THROUGH AI

Where a new era of Artificial Intelligence (AI) is set to revolutionise patient care with transformative possibilities, one significant way AI can enhance the patient journey is by automating tedious tasks like data entry and documentation. This helps to reduce the administrative load on doctors and healthcare providers, allowing them to refocus on meaningful human interactions.

A/Prof Kiraly holds up a 3D model of a baby's heart.

"Doctors are used to…facing the computer screen to record down clinical notes. With AI to transcribe and listen in, doctors can then fully concentrate on the patient, instead of busy taking notes on the computer," Highlighting the potential of augmented reality in enhancing doctor-patient engagement, A/Prof Kiraly believes this "will become standard practice" within the next five years.

With special expertise in three-dimensional (3D) printing and modelling for heart models, A/Prof Kiraly expresses optimism that advances in AI and big data analytics can unlock the next stepping stone in modern surgery. By leveraging augmented reality and creating 3D anatomical heart models, more realistic surgical visualisation and pre-operative rehearsals will be made possible, thus shortening the learning curve for new surgeons-in-training.

Having forged a successful path in this exciting multidisciplinary field, A/Prof Kiraly did not forget to leave future generations of surgeons with insightful advice in navigating professional career growth. "There will always be new innovations around the corner...don't forget to keep your mind open, keep your hands moving, and integrate humility in all your actions."

1. Current outcomes and future trends in paediatric and congenital cardiac surgery: a narrative review. Pediatric Medicine Vol 5 (November 28, 2022).
2. **Modus operandi** – an individual or group's habitual way of operating, which represents a discernible pattern.

ARTICLE BY
NUHCS PULSE Editorial

PASSION, PURPOSE & IMPACT: *Inspiring health for all*

As the first Chair of the AIG, American College of Cardiology (ACC) from Asia, Adj Prof Poh KK shares his fruitful journey through the world of clinical cardiology.

Multinational leadership: Prof Poh (Singapore) as immediate Past AIG Chair, Prof Antonio Chagas (Brazil) as the current Chair and Dr Benny Levenson (Germany) as the Chair-Elect

The first Singaporean and Asian to become the Chair of the Assembly of International Governors (AIG) of the American College of Cardiology (ACC), Prof Poh Kian Keong, Director of Research and Senior Consultant, Department of Cardiology, NUHCS, has flown both Singapore's and NUHCS' flags high during his two-year term. PULSE sits down with the Immediate Past Chair of the AIG to discuss his many commitments and milestones.

Assembly of International Governors (AIG), ACC

A leadership body for the American College of Cardiology's (ACC) global chapters, the AIG oversees the ACC's international strategy by finding synergies with clinical education and quality improvement efforts.

PULSE: Hi Prof Poh KK! Could you tell us more about the AIG, and your role as Chair?

Prof KK Poh: The AIG is the only global organisation of its kind in cardiology, with 43 international chapters, and over 16,000 members worldwide.

As AIG Chair, I reported directly to the ACC President and the Board of Trustees. I worked closely with several key committees, including the Board of Governors, Section Leadership, and the Diversity and Inclusion Committee. As an ex-officio member of the ACC Membership Committee, I had the privilege to plan and spearhead the ACC Leadership Forum – a platform designed to nurture a diverse, robust pipeline of future leaders, while supporting current leaders with a variety of membership initiatives.

PULSE: How did your involvement with the ACC begin?

Prof KK Poh: My journey with the ACC began as a Cardiology Trainee (Registrar) in the National University Heart Centre, Singapore (NUHCS). I actively participated in the ACC's Annual Scientific Sessions, submitting abstracts and attending multiple meetings, which provided invaluable networking opportunities with top cardiologists from the United States and globally.

I fondly recall attending every annual ACC Asia event – including the virtual edition in Singapore, which I co-chaired with Dr Fred Kusumoto. Along with ACC Middle East and ACC Latin America, these regional conferences play a critical role in advancing global heart health by presenting the latest cardiovascular science and evidence-based strategies tailored to local and regional practices. I am eagerly looking forward to ACC Asia's return to Singapore in May 2025 – where several NUHCS experts will also be contributing their insights!

PULSE: How did your work evolve into roles in global cardiovascular care?

Prof KK Poh: After stepping down as President of the Singapore Cardiac Society (SCS) in 2016, I had the opportunity to expand my leadership across the region, when I was entrusted as Governor of the Singapore Chapter of the ACC. In this role, I facilitated the partnership between the SCS and the ACC through events such as the ACC Annual Scientific Meetings. After that, I was promoted to the ACC Regional (Asia) Representative on the AIG Steering Committee, which met regularly to strategise on advancing global cardiovascular care worldwide.

PULSE: Who have been your role models or sources of inspiration along your professional journey?

Prof KK Poh: I was fortunate to learn from the legendary Sir Professor Huon Gray, the founding chair of ACC's AIG, during my early career. I had the honour

A certificate of appreciation from the ACC honouring Prof Poh for his contributions

With Prof Huon Gray (founding AIG Chair) at the ACC Scientific Session 2024

With the ACC leadership and staff in 2024

of serving alongside him as faculty at the inaugural ACC Asia in Shanghai. Sir Prof Huon Gray, who was the Director of the National Health System (NHS), United Kingdom (Cardiology). He was awarded the Master of the ACC in 2018, and the Commander of the Excellent Order of the British Empire (CBE) in 2019. He has made a profound influence in my career.

Additionally, working alongside the esteemed Dr Hani Najm, past chair of the AIG, was a pivotal experience. These leaders not only enriched my insights and perspectives, but also proved invaluable in preparing me for the rigours of my own term as AIG Chair from 2022 to 2024.

PULSE: Cardiovascular disease is a global issue. How do regional or global initiatives by the ACC help improve patient care and cardiovascular outcomes?

Prof KK Poh: Sharing data and best practices at the international level is one important way to address the global trends of cardiovascular disease. One research initiative through which we worked at improving heart attack outcomes is the Global Heart Attack Initiative (GHATI) project launched by the ACC in 2019. Presented as a late breaker for two consecutive years at the ACC Annual Scientific Meeting, participating centres – including NUHCS, contributed (unidentified) data on standard of care parameters for ST-elevation Myocardial Infarction (STEMI)[1] patients. Such data, which included the use of anti-platelets, and door-to-balloon time in STEMI, served as useful benchmarks in driving quality improvements, and fostering hope for better clinical outcomes.

Through initiatives like the 'localization of guidelines', a value-based healthcare project of which A/Prof James Yip, Executive Director, NUHCS, is an esteemed member, and the Global Graduate Educators Workgroup (GGEWG), the AIG continues to engage leaders, government officials, chapter or society staff beyond its own members. These strategic initiatives pave the way towards reducing the cardiovascular burden.

In addition, through programmes and resources tailored to every career stage, we support clinicians on the front lines of CVD prevention and treatment. The newly established William A. Zoghbi Research Award funds international ACC members in innovative research efforts aimed at preventing and treating cardiovascular disease in specific communities, while the Global Leadership Initiative (GLI) allows early- and mid-career cardiologists to attend a short weekend course in the Heart House of the ACC in Washington DC, which several NUHCS doctors have participated in.

During my AIG term, we implemented the Certified Cardiovascular Knowledge Examination (CCKE) – where international experts could earn credits toward becoming an Fellow, American College of Cardiology (FACC), the ultimate recognition of professional achievement, and one of the most distinguished designations the College offers to members. I have also contributed to the inaugural Modified Angoff method of standard setting exercise, with test questions that are comprehensive and cover a wide range of cardiology topics.

PULSE: Looking ahead, what's next for ACC and NUHCS?

Prof KK Poh: NUHCS has made significant contributions to various ACC initiatives and leadership development programmes, and I am proud to have played a role in advancing the global cardiology community. The ACC's mission to transform the practice of cardiology and improve heart health is something I hold dear, and I am confident that we are on the right path to furthering that mission.

1. **ST-elevation Myocardial Infarction (STEMI)** – a type of heart attack that is caused by a complete blockage in one of coronary arteries.

ARTICLE BY

Adj Prof Poh Kian Keong
Research Director and Senior Consultant, Department of Cardiology, NUHCS

Adj Prof Poh is presently a Senior Consultant and Research Director at the Department of Cardiology, NUHCS. He is the Associate Chairmain of the Medical Board (ACMB) at the National University Hospital (NUH) and immediate past Chair of the American College of Cardiology Assembly of International Governors.

Global Knowledge, Home Ground Impact

International Training to Advance Coronary Care

The National University Heart Centre, Singapore (NUHCS) is committed to providing world-class cardiac care. A key part of this mission is fostering growth of our cardiologists by offering global exchange opportunities, also known as fellowships.

Given the chance to further develop my expertise in coronary intervention[1], I embarked on a one-year attachment at Barts Heart Centre in London from 2022 to 2023.

What is a Fellowship and why do public healthcare institutes offer this?

A fellowship is an advanced training programme designed for specialists to delve deeper into their area of expertise, allowing them to refine skills, master cutting-edge techniques, and gain the knowledge and confidence to manage the most complex cases within their specialty.

Many public healthcare institutes, like NUHCS, offer doctors with fellowship opportunities for patients to access top-tier care from highly skilled experts, and foster groundbreaking research with fresh ideas.

Together with my mentor, Dr Elliot Smith, on my left, and fellow trainee, Dr Angelos Tyrlis, on my right, at the Barts Heart Centre's Catheterisation Lab

A time for learning

After the global disruptions of the COVID-19 pandemic, I had the opportunity to hone my skills in coronary procedures, focusing on Chronic Total Occlusion (CTO)[2] treatment, under the mentorship of Dr Elliot Smith at Barts Heart Centre – Europe's largest cardiac catheterisation laboratory. It was truly an honour for me to have been attached at this high-volume facility, renowned for handling complex coronary disease cases, allowing me to further strengthen my coronary care techniques.

Driven by the rising complexity of coronary disease cases due to factors including ageing population, high prevalence of diabetes, and increasing number of patients who have undergone prior coronary artery bypass surgery, I decided to pursue advanced training to proficiently address and resolve these challenges.

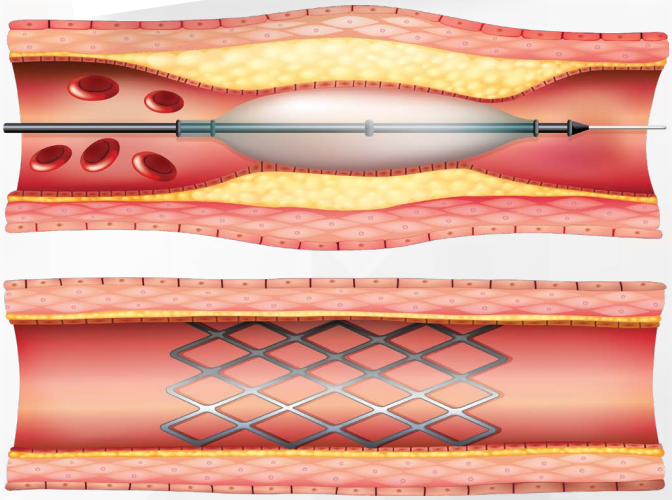
Through insightful teachings and hands-on training at Barts Heart Centre, I acquired valuable skills in managing highly calcified coronary arteries[3] using contemporary calcium modification devices[4], while gaining the expertise in treating CTO lesions through cutting-edge interventional techniques.

In just one year, the growth I experienced from this exchange was transformative, both professionally and personally. Besides the skillsets gained, meaningful connections were also forged with cardiologists from around the world with diverse backgrounds, allowing me to gain fresh, international perspectives on cardiac care.

This attachment empowered me to push the boundaries of modern coronary intervention and tackle Singapore's most challenging cases with a new level of precision and expertise.

Celebrating the end of training with my colleagues from Barts Heart Centre

An equally important aspect of this exchange was the opportunity for my family to join me in London, allowing us to create precious memories together while I pursued my professional goals. This year has become a cherished chapter of my life, balancing career growth and quality family time in a new city.



Enhancing work processes at NUHCS

After completing my overseas training, I am excited to bring the global insights I've gained back to my home ground. I look forward to applying this knowledge to positively impact patient outcomes at NUHCS. One key improvement I was inspired to enhance was the Same-Day Discharge protocol for patients undergoing coronary procedures.

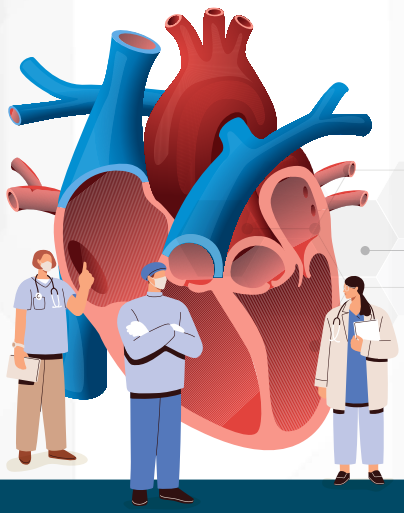
This service allows patients who have undergone a Percutaneous Coronary Intervention, such as stenting or ballooning, to return home safely within just a few hours after the procedure, without the need to be admitted overnight for monitoring.

By eliminating the traditional overnight stay requirement, it not only reduces medical costs for patients, but also optimises healthcare resources to maintain the highest standards of care for all patients in the hospital. *[Read more about the Same-Day Discharge service at NUHCS on Page 23.]*

Strengthening competence for the future

This year-long attachment has expanded my proficiency in managing and treating complex coronary disease, enabling me to foster stronger collaborations with senior colleagues at NUHCS.

As NUHCS aims to be a leading centre in Asia adept in managing intricate coronary cases, including those requiring mechanical circulatory support devices[5], I am inspired to share insights and impart the skills gained from this learning experience with my peers and juniors. Together, we'll continue to drive NUHCS forward to deliver cutting-edge cardiovascular care for years to come.



ARTICLE BY

Asst Prof Gavin Ng
Clinical Director of Interventional Cardiology and Angiography Centre and Consultant, Department of Cardiology, NUHCS

Dr Gavin Ng is the Clinical Director of Interventional Cardiology and Angiography Centre, National University Heart Centre, Singapore (NUHCS). He specialises in coronary intervention and is an Assistant Professor at the Yong Loo Lin School of Medicine, National University of Singapore.

1. **Coronary intervention** – Heart procedure performed to open blocked or narrowed heart arteries, through inserting a small balloon or stent into the artery.
2. **Chronic Total Occlusion** – Complete blockage in one or more coronary arteries, that lasts three months or longer, causing irregular blood flow to the heart.
3. **Highly calcified coronary arteries** – Heart arteries that have hardened due to calcium deposit buildup making arteries narrower and restricting blood flow.
4. **Contemporary calcium modification devices** – Tools used to break down calcium deposits in the heart arteries, for easier treatment, including atherectomy devices, and shockwave balloon treatment.
5. **Mechanical circulatory support devices** – Machines often used on patients with heart failure to help temporarily or permanently pump blood to the heart, when the heart is too weak to function properly.

At the HEART of Caring Hearts Support Group

By Patients, For Patients

CHSG

A volunteer initiative *by* patients *for* patients at NUHCS. The support group was launched with the vision to build an inspiring and caring heart patient support group that stays connected and supports fellow cardiac patients and the community through each other's journey to remain heart healthy.

Join CHSG!

Membership is open to heart patients who have completed the Basic Cardiac Rehabilitation Programme at NUHCS. For more information about CHSG or to join CHSG, please contact **Magdalene Chia, Programme Volunteer Lead, at mchia@kucinta.com.**

2024 was a busy year for the Caring Hearts Support Group (CHSG). Our diverse and enriching lineup of activities have been designed to encourage CHSG members' involvement, community engagement, and personal growth through education. We also continued our bi-weekly virtual exercise sessions, followed by the usual, casual small-group sharing discussions.

These sessions not only **kept our members active** but also helped reduce stress and **enhance physical health in a supportive environment**. Be it stress management, coping with daily challenges, building resilience, or just the friendly chatter, CHSG never fails to get together to improve our wellbeing and navigate life's hurdles with greater ease.

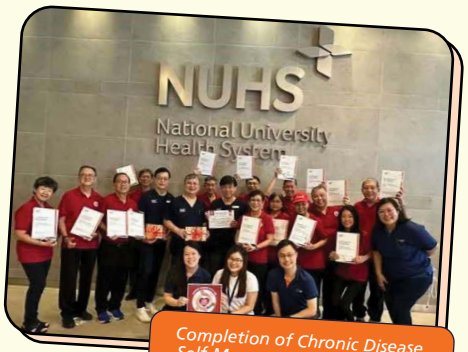
Embracing Self-Care to Empower Community Care

15 CHSG members were trained in the "Chronic Disease Self-Management Programme" led by the Relate, Integrate, Connect and Engage (RICE) Community Care Team at Alexandra Hospital (AH), enabling us to be more disciplined in 'Taking Charge, and Taking Action' of our well-being. Additionally, three out of the 15 members who completed the Chronic Disease Self-Management Programme went on to pursue the "Train-The-Trainer" programme, also provided by the RICE team at AH. Continuing their education, two members completed the "Foundations of Health Coaching" course at the National University of Singapore's (NUS) Yong Loo Lin School of Medicine.

Equipped with these skillsets, CHSG – with many members being heart patients themselves – is now more confident in leading improved lifestyles and even guiding our community of heart patients in managing their chronic conditions. Committed to supporting one another in maintaining a heart-healthy lifestyle, building connections and fostering friendships remains at the heart of CHSG.

> **"CHSG is a family guided by the principle – let all that we do, be done in love."**

Having celebrated our 6th year of care and support in 2024, we are enthusiastic about the opportunities that 2025 hold and are committed to making this year as impactful as our previous years in caring and supporting our heart patients and the community. Together, we can build a year full of support and connection, given that our motto is "Caring Begins With Me".

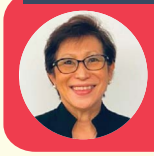


Completion of Chronic Disease Self-Management Programme


CHSG organised a walk to Mount Faber in commemoration of World Heart Day 2024


Celebrating our 6th Anniversary as a CHSG family

ARTICLE BY



Magdalene Chia
Programme Volunteer Lead, Caring Hearts Support Group (CHSG)

PUSHING BOUNDARIES IN HEART CARE THROUGH RESEARCH

Meet the New Director of NUHCS' Clinical Trials Unit (CTU)

At the heart of every healthcare breakthrough is a team driven by curiosity, collaboration, and a commitment to improving patient care.

At the National University Heart Centre, Singapore (NUHCS), the Clinical Trials Unit (CTU) plays a key role in steering the advancement of cardiovascular research, and ensuring that clinical trials[1] are conducted with the highest standards of safety, efficiency, and ethical compliance.

The unit does this by:

- **Adhering to internationally recognised guidelines such as Good Clinical Practice (GCP)[2]**
- **Providing infrastructure support for all aspects of clinical research**
- **Collaborating with academic researchers, pharmaceutical companies and healthcare institutions**
- **Evaluating and advancing cutting-edge treatments and tools**

The NUHCS CTU team

Ms Wong Cher Yi, Senior Clinical Research Coordinator (CRC), and now director of the CTU, NUHCS, shares more on how the engine of collaborative research plays a critical role in driving healthcare innovation and medical advancements, for the betterment of patient care.

PULSE: What is the role of NUHCS CTU?

Cher Yi: The NUHCS Clinical Trials Unit (NUHCS CTU) is a highly specialised team dedicated to the smooth and meticulous conduct of clinical research studies. Composed of 14 clinical research coordinators, we work with a diverse, multidisciplinary team to support and drive quality cardiovascular research activities at NUHCS, towards the aim of ensuring our patients receive the best possible care.

Any recent updates or interesting projects to share with our readers on how CTU's research translates into better patient care?

Cher Yi: We enable better outcomes for patients by supporting every phase of clinical research, from study design and participant recruitment to data collection and closeout. At CTU, our infrastructure and expertise allow us to manage the development of research workflows with precision, keeping studies on track using a strategic and hands-on approach. When we manage a research study efficiently, we not only streamline processes for our clinical researchers, but also speed up the delivery of new treatments, giving our patients access to potentially life-changing therapies more quickly.

One of our most exciting recent projects involves a novel clinical trial that utilises Gene Therapy[3], a cutting-edge approach that holds tremendous promise for treating genetic and rare diseases. This trial focuses on patients with Amyloidosis Cardiomyopathy[4], a debilitating condition with limited treatment options. What makes this trial so significant is that the treatment only requires one dose to be delivered intravenously, and it has the potential to have lifelong effectiveness.

By exploring gene therapy and other advanced treatments, we are not only addressing the urgent medical needs of today's patients but also paving the way for future medical innovations. Our work in this area exemplifies how clinical research, when conducted with dedication and precision, can lead to life-changing medical advancements.

What is your vision as the new CTU director?

Cher Yi: Beyond answering important clinical questions through research studies, I am dedicated to nurturing the skills and professional development of clinical research coordinators.

I believe in equipping my team members with the resources they need to excel through investing in professional development, and enabling access to cutting-edge tools and technology, so every team member feels empowered to innovate, contribute, and make a difference.

Only by fostering a culture of teamwork with mutual support and respect, can we truly empower our team members to put their best foot forward every step of the way!

"These research efforts demonstrate our commitment in pushing the envelope and ensuring that our patients have access to the most advanced and promising therapies available."
- Wong Cher Yi,
Director, Clinical Trials Unit (CTU), NUHCS

Take a Peek into the Work Behind Clinical Trials

SCAN QR CODE to discover more

By pushing the boundaries of what's possible, the NUHCS CTU is making strides in research that could transform the lives of cardiovascular patients across Singapore and beyond. Their work is a testament to the power of dedication, teamwork, and a shared vision for a healthier future.

1. **Clinical trials** - Research studies that explore the safety and efficacy of novel treatments, drugs or medical devices.
2. **Good Clinical Practice (GCP)** - An international ethical and scientific quality standard for the design, conduct, performance, monitoring and reporting of clinical trials, which serves to protect the rights, integrity and confidentiality of trial subjects.
3. **Gene Therapy** - A key subset of precision medicine which involves modifying cells, or DNA or RNA materials, so that they can be used as targeted therapeutic agents.
4. **Amyloidosis Cardiomyopathy** - A serious heart dysfunction caused by abnormal proteins deposits in the heart muscle, leading to heart failure.

ARTICLE BY
NUHCS PULSE Editorial

Congratulations

Awards & Accolades

MASTER CLINICIAN AWARD

The Master Clinician Award is conferred by NUHS to recognise clinicians who have contributed significantly towards elevating the quality of healthcare delivery through outstanding leadership with compassionate and skilled practice in their respective specialty fields.

Adj A/Prof Chai Ping
Head of Department of Cardiology,
NUHCS

Adj A/Prof Rajesh Dharmaraj Babu
Head of Division of Vascular Surgery,
Department of Cardiac,
Thoracic and Vascular Surgery,
NUHCS

NATIONAL MEDICAL RESEARCH COUNCIL (NMRC) AWARD

The NMRC oversees the development and advancement of medical research in Singapore. It provides research funds to healthcare institutions, awards competitive research funds for individual projects and is responsible for the development of clinician-scientists through awards and fellowships.

CLINICIAN SCIENTIST AWARD (SENIOR INVESTIGATOR)

Adj A/Prof Chester Lee Drum
Senior Consultant,
Department of Cardiology,
NUHCS

CLINICIAN INNOVATOR AWARD (INVESTIGATOR)

Dr Lim Yinghao
Consultant,
Department of Cardiology,
NUHCS

TRANSITION AWARD

Dr Sia Ching Hui
Consultant,
Department of Cardiology,
NUHCS

NUHS TEACHING EXCELLENCE AWARD

Dr Elaine Boey
Senior Consultant,
Division of Cardiology,
Department of Medicine,
NUHCS @ Ng Teng Fong General Hospital

Dr Perryn Ng Lin Fei
Consultant,
Department of Cardiology,
NUHCS

Chiang Yun Yun
Senior Medical Technologist,
Diagnostic Cardiac Lab,
NUHCS

NUHS DISTINGUISHED CLINICAL RESEARCH COORDINATOR AWARD (SENIOR CATEGORY)

Faclin Ng
Senior Clinical Research Coordinator,
NUHCS

Jolene Leong
Senior Clinical Research Coordinator,
NUHCS

Congratulations

DOCTORS' PROMOTIONS AT NUHCS

Dr Elaine Boey

Senior Consultant,
Division of Cardiology,
Department of Medicine,
NUHCS @ Ng Teng Fong General Hospital (NTFGH)

Dr Robin Cherian

Senior Consultant,
Department of Cardiology, NUHCS

Dr Lowell Leow

Consultant,
Division of Thoracic Surgery,
Department of Cardiac, Thoracic and Vascular Surgery (CTVS), NUHCS

Dr Qian Qi

Consultant, Division of Adult Cardiac Surgery,
Department of CTVS, NUHCS

Dr Shaun Chook

Consultant,
Department of Cardiology, NUHCS

Dr Marie Houdmont

Associate Consultant,
Department of Cardiology,
NUHCS @ Alexandra Hospital

ACADEMIC APPOINTMENTS WITH EFFECT FROM JULY 2024

Adj Prof Yeo Tiong Cheng

Senior Consultant,
Department of Cardiology, NUHCS
Group Chief, Cardiology, NUHS

Adj A/Prof Chai Ping

Head of Department of Cardiology,
NUHCS

Adj A/Prof Dharmaraj Rajesh Babu

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

Adj A/Prof Lim Toon Wei

Head of Community Cardiology,
Department of Cardiology, NUHCS
Director of Community Specialist Integration, NUHS

Adj A/Prof Loh Poay Huan

Head of Division of Cardiology,
Department of Medicine, NUHCS @ NTFGH

Adj A/Prof Ng Jun Jie

Consultant, Division of Vascular Surgery,
Department of CTVS, NUHCS

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ABSTRACTS

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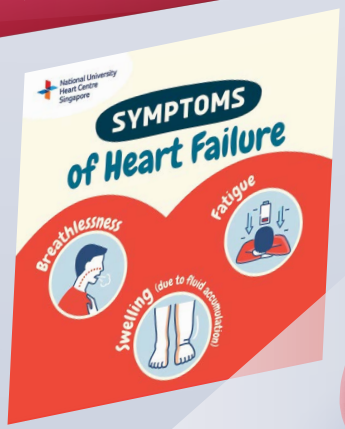

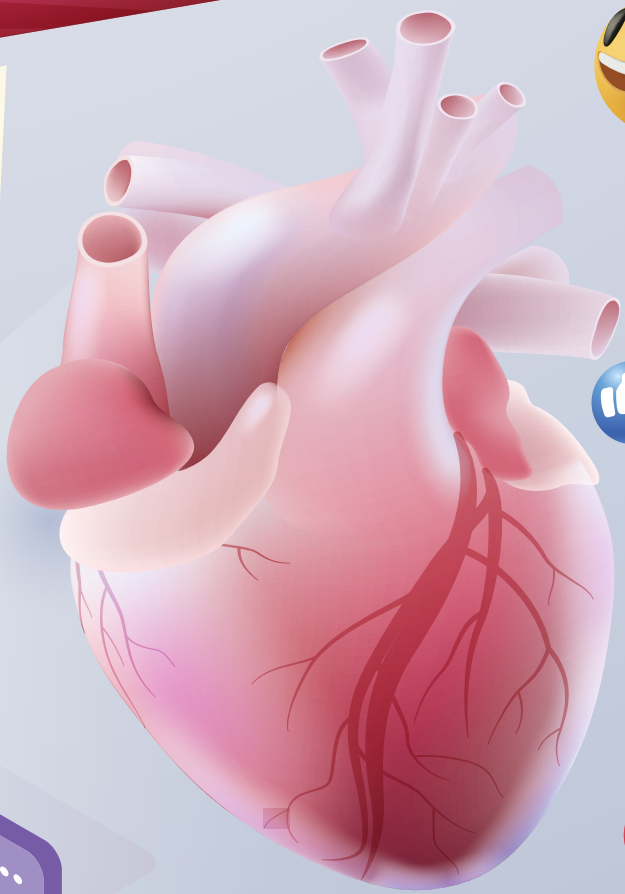

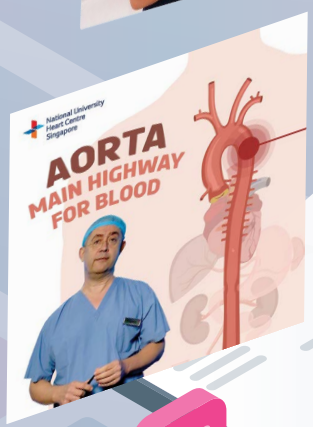

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