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'RESISTANT' HYPERTENSION CAN IT BE TREATED?



SINGAPORE LIVE 2019
– LEARNING FROM
THE BEST



DIAGNOSING THE
HEART OF THE
PROBLEM



CHEST PAIN: WHAT'S
THE DIFFERENCE
BETWEEN HEART
ATTACK AND
CARDIAC ARREST?



National Heart
Centre Singapore
SingHealth

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'RESISTANT' HYPERTENSION – CAN IT BE TREATED?

By Assoc Prof Chin Chee Tang,
Senior Consultant, Department of Cardiology

Taking long-term medication is always a challenge to many patients with hypertension, especially for those who continue to have high blood pressure despite lifestyle changes and medications. Renal Sympathetic Denervation, a minimally invasive procedure that uses radiofrequency waves, might be the answer for patients with resistant hypertension, Assoc Prof Chin shared.

High blood pressure (also known as hypertension) is the most common modifiable risk factor for diseases affecting the cardiovascular system - not just in Singapore, but worldwide. According to the recent European and United States guidelines on blood pressure management, the recommendation is to lower systolic blood pressure (SBP) to 120 to 130mmHg in most patients with hypertension. For the majority of people

with high blood pressure, these targets can be achieved with appropriate lifestyle changes and drug treatment. Anti-hypertensive drugs (medications to reduce blood pressure) are widely available, relatively inexpensive, and generally do not have many side effects. Importantly, they have been shown to reduce blood pressure and improve cardiovascular outcomes such as reducing the chance of death, heart attacks and strokes. Studies involving

hundreds of thousands of participants have shown that by reducing SBP by 10mmHg, the risk of having a heart attack or a stroke is reduced by 25% and 33% respectively.

However, many people find it difficult to take their medication consistently as directed, and this results in poor adherence to medications; which contributes to the poor control of blood pressure. In studies where blood or urine samples have been taken to measure drug levels, the rates of non-adherence in hypertension medications were as high as 66%; that implies only a third of patients take their blood pressure medications as prescribed by their doctor.

We know that there are patients who, despite adhering to lifestyle interventions and medications, continue



to have very high blood pressure. This phenomenon, termed as resistant hypertension, is associated with very high rates of undesirable health outcomes.

The sympathetic nervous system in the body is known to be involved in the progression and development of hypertension. A proportion of the nerves of the sympathetic nervous system that run along the blood vessels and supply blood to the kidneys (renal arteries) have been considered to be a target for interventions to improve blood pressure control.

From reports of operations performed in the 1950 to 1960's, the removal of these nerves lowered blood pressure significantly. These results formed the basis for the development of contemporary minimally invasive approaches using radio-frequency, ultrasound, or injection of neurotoxic agents such as alcohol to affect the nerves located in the renal arteries.

Innovative Treatment That Targets Resistant Hypertension

The initial clinical trials¹ of renal sympathetic denervation (RSD) that focused on patients with severe resistant hypertension have shown encouraging results, reporting large falls in blood pressure with a favourable safety profile. Based on this, NHCS performed the first case of RSD in Singapore in 2011, for a patient who had uncontrolled blood pressure despite taking five medications at maximally tolerated doses. Since then, NHCS continues to perform the procedure for selected patients with resistant hypertension – the majority have had significant blood pressure reduction, and importantly, none of them showed any complications from the procedure.

However, a study² conducted in the United States in 2014 reported that resistant hypertension patients who were only on medications experienced blood pressure reductions that were

similar to those of patients who underwent RSD. Because of the lack of an obvious benefit of RSD in resistant hypertension, the technological development in RSD slowed down.

Despite this, there were continued research efforts to develop and advance the technology for RSD. The results of the most recent studies are encouraging and have re-ignited interest in the potential of this technology.

In one recent study³, patients with hypertension had their medications stopped and were randomly allocated to undergo RSD with the latest device and technique. The study was designed to remove any bias that might be present because of medications and inconsistent medication consumption. Blood and urine tests were also performed to ensure that patients were not taking medications without the knowledge of the investigators. The results of the study showed that patients who underwent RSD had lower blood pressure levels after the treatment, while those who did not have the procedure had no change in their blood pressure levels.

A second study⁴ had a similar design but one major difference – medications were allowed. These medications were prescribed in a very tightly controlled manner, and regular blood and urine tests were performed to ensure that participants took the medications as directed. Similar to the previous study, patients who went through RSD had shown lower blood pressure levels after the treatment as compared to those that did not undergo RSD.

From these two recent studies, results have shown no significant adverse effects or complications among the patients who underwent RSD.

Now, with these latest results, there is fresh impetus for further studies involving more patients to understand how the treatment may be offered to different patient groups. For patients who have exhausted all possible management options, and yet continue to have high blood pressure levels, RSD may be the 'last resort'. There is also a likelihood where individuals who would rather not take long term medications and are keen to explore an alternative option of a safe and one-time procedure, may benefit from RSD.

At NHCS, RSD is only offered to patients who are unable to achieve good blood pressure control despite taking their medications, and those who have multiple allergies or side effects with medicines and cannot tolerate long term drug therapy. NHCS continues to look forward to further developments in this treatment option to help our patients to improve their health outcomes in the long run.

¹ Renal Sympathetic Denervation in Patients With Treatment-Resistant Hypertension (The Symplicity HTN-2 Trial), 2010

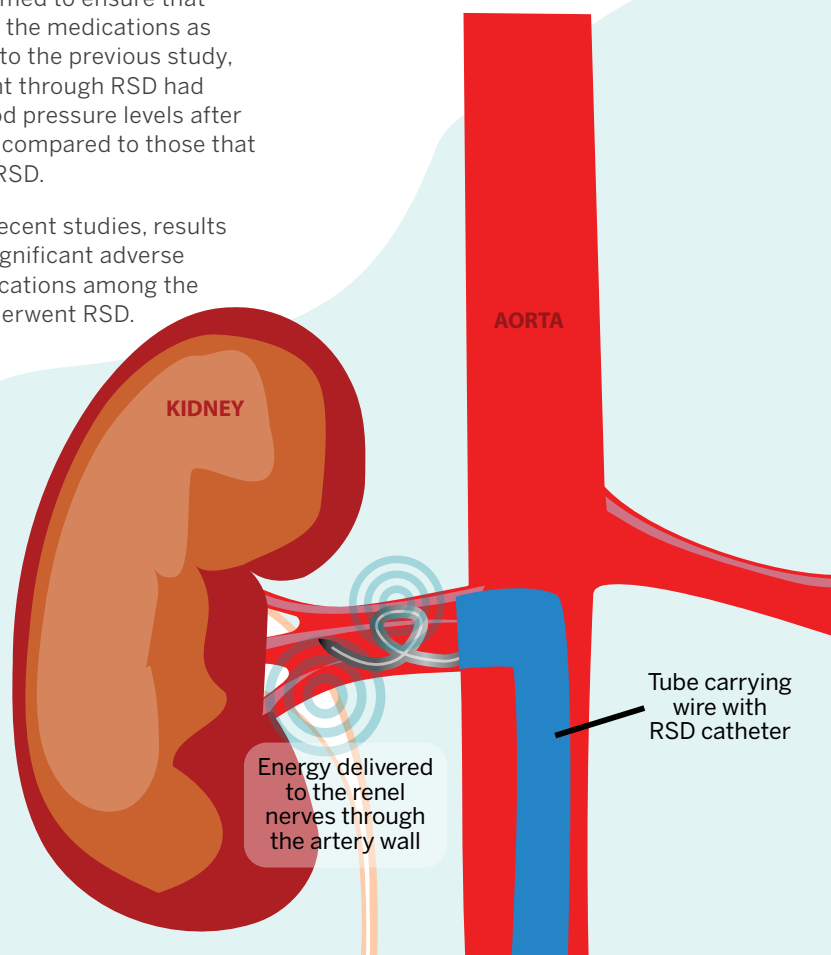
² A controlled trial of renal denervation for resistant hypertension (Symplicity HTN-3), 2014

³ Catheter-based renal denervation in patients with uncontrolled hypertension in the absence of antihypertensive medications (SPYRAL HTN-OFF MED), 2017

⁴ Effect of renal denervation on blood pressure in the presence of antihypertensive drugs (SPYRAL HTN-ON MED), 2018

HOW RSD PROCEDURE WORKS

► A plastic tube is inserted into the main blood vessel (aorta) to reach the blood vessel (renal artery) supplying blood to the kidney. A wire is passed into the renal artery and after this, the RSD catheter is inserted into the artery over the wire. When the RSD catheter is activated, energy is transmitted across the renal artery wall to the overactive sympathetic nerves and leads to decreased nerve activity.





▲ One of the live case demonstrations done by Prof Lim Soo Teik and Dr Fam Jiang Ming, NHCS.

SINGLIVE 2019 – LEARNING FROM THE BEST

Singapore LIVE (SingLIVE), a premier live intervention conference in Asia Pacific, held on 16 to 18 January 2019 at the Raffles City Convention Centre, Singapore, drew a great turnout of 1,100 delegates from 31 countries.

SingLIVE, previously known as Live Demonstration Course in Basic and Advanced Techniques, is one of Asia's pre-eminent annual live course in cardiac interventions. It was first started in 1989 by NHCS and is now recognised to be one of the most reputable live interventional courses in the Asia Pacific region. For the past 10 years until 2019, SingLIVE was jointly organised with Asia PCR, and the course has evolved and opened up new horizons for the field of cardiovascular medicine in the Asia Pacific region. From 2019, NHCS is back to helming SingLIVE independently and continues to bring key expertise and the best experiential sharing and learning, right from the Singapore shore.



Prof Arthur Tan, the founding director of NHCS and the very first Course Director of SingLIVE, at the opening ceremony sharing "History of Singapore LIVE".



Participants at the exhibition learning the latest technological trends in cardiovascular interventions.

Cross-Border Exchange and Sharing

On 16 January 2019, SingLIVE 2019 kicked off with a pre-course workshop on Practical Percutaneous Coronary Intervention (PCI) skills development at NHCS. Participants of the workshop were given the opportunities to observe and interact with the live case operators in the NHCS Cardiac Catheterisation Laboratory. In addition, various faculty experts shared on topics such as small vessel disease, stents for left main disease, transradial PCI and calcified lesions.

The next two days of the Conference, hosted at the Raffles City Convention Centre, Singapore comprised keynote lecture, live case demonstrations, learning sessions and exhibition. The first day commenced with a live transmission from NHCS Catheterisation Lab, followed by opening remarks by Prof Koh Tian Hai, Senior Advisor, NHCS and SingLIVE Course Director. Prof Arthur Tan, the founding director of NHCS and the very first Course Director of SingLIVE, attributed the success of the SingLive to the many interventional giants from the local, regional and international cardiology community, making SingLIVE the foremost Asian live interventional conference in the region. Prof Tan also shared about the journey of SingLIVE from its inception 28 years ago and the future of the Conference.

More than 13 cases were broadcasted live over the two days from four major centres in Australia, India, Philippines and Singapore, allowing open discussions and sharing among the countries and first-hand experiential learning from experienced faculty. Amidst the conference highlights were the two new experiential learning formats (hands-on training) introduced this year - Training Village and Virtual Reality (VR) technology. VR technology was used for case illustrations in three teaching sessions to provide realistic learning experience and enable participants to better understand the device mechanics.

More Dynamic Learning Exposure

SingLIVE 2019 has closed with a great success, but it does not end here with the 28th edition, as the practice of medicine is ever evolving and staying at the leading edge of medicine is crucial for healthcare practitioners to deliver the optimal care for the patients.

The next SingLIVE, which will be held from 15 to 17 January 2020, will be yet another exciting conference. NHCS is holding the 29th SingLIVE in conjunction with the 10th Chronic Total Occlusion (CTO) Interventions Live Course for the first time. The SingLIVE 2020 will include CTO experts' sharing sessions as well as expertise on coronary interventions, structural heart interventions, imaging and physiology.



Participants watching a Transcatheter Aortic Valve Implantation (TAVI) teaching case through VR goggles.



Hands-on interactive learning of complex Percutaneous Coronary Intervention (PCI) techniques with Assoc Prof Chin Chee Tang, NHCS.



Case transmitted live from Liverpool Hospital in Sydney, Australia, for cross-border exchange and sharing.

DIAGNOSING THE HEART OF THE PROBLEM

Ever wonder how one goes through a diagnosis of a heart problem? A patient typically goes through one or more cardiac diagnostic tests to allow the doctor to provide an accurate prognosis of a heart disease and the appropriate treatment required.

A typical diagnosis starts from a physical examination and assessment of the patient and the patient's family medical history. Based on the findings of the assessment, the doctor may request for selected cardiac diagnostic tests to be performed for the patient. Cardiac diagnostic tests are essential in the diagnosis of heart diseases such as coronary heart disease and arrhythmias (abnormal heart rhythms), and are usually carried out in a cardiac laboratory. Additional tests such as cardiac

computed tomography (CT) scans may sometimes be carried out to detect the presence of narrowing in heart arteries in some patients.

The cardiac laboratory in NHCS provides a wide range of diagnostic tests and services that are designed to identify abnormalities in the function of one's cardiac system. It is a full-fledged facility providing services to inpatients, outpatients as well as patients undergoing surgery in the operating theatre. The cardiac laboratory performs close to 45,000 echocardiograms (Echo) and 78,000 electrocardiograms (ECG) a year. The cardiac technologists are trained on-the-job at NHCS and accredited with allied health professional certification from American Registry of Diagnostic Medical Sonographers (Echo) and International Board of Heart Rhythm Examiners (Device Therapy/ Electrophysiology). They perform the non-invasive tests and generate preliminary reports for the cardiologists to decide on further invasive treatment.

SOME TYPES OF CARDIAC DIAGNOSTIC TESTS



EXERCISE STRESS TEST (TREADMILL EXERCISE)

Exercise stress test allows the cardiologist to assess the response of the patient's heart to the increased workload and demand for blood during exercise. It records the ECG of one's heart while walking on a treadmill machine. This test is useful in diagnosing ischaemic heart disease (reduced blood supply to the heart muscles due to coronary artery disease).



ECHOCARDIOGRAM

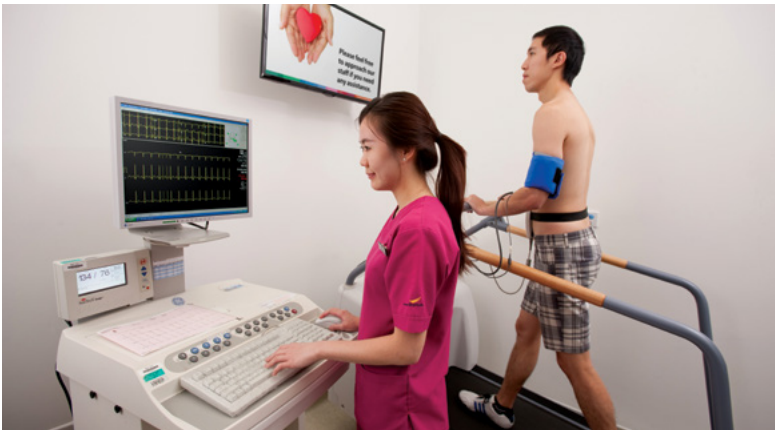
Echocardiogram is a diagnostic procedure using high frequency sound waves (ultrasound) to take moving pictures of the heart and its related structures such as valves. The pictures or images appearing on the screen may be in black and white or colour.

From the pictures, the cardiologist can measure the size and function of heart chambers, study the motion of heart valves, and assess the efficacy of the contraction of heart muscles and the blood flow pattern across the valves and within the heart chambers. This allows the cardiologist to have better assessment on how well the heart is working and whether there are any abnormalities.



UPRIGHT TILT TEST

The upright tilt test is used to detect recurrent syncope (fainting) of unknown origin. A common form of syncope is called a vasovagal syncope, also refers to fainting due to abnormally sensitive reflexes in the cardiovascular system during prolonged standing or when subjected to unpleasant stimuli. Though this form of faints may appear alarming, they are rarely life-threatening. The test requires the patient to be tilted (70 degrees) in a standing position to simulate a situation of prolonged standing and he or she will be closely monitored for any symptoms of fainting.



◀ Patient using the exercise stress test (treadmill exercise).

Advancing Cardiac Diagnostic Tests' Capability

A heart diagnostic device, the Spyder ECG, was recently mentioned by a minister on his Facebook, as he shared about how the Spyder ECG was used to monitor his heart rhythm.

The Spyder ECG is an innovative cardiac rhythm diagnostic solution developed by Assoc Prof Philip Wong, Senior Consultant of Department of Cardiology, NHCS and made in Singapore. Weighing only 49g, the Spyder ECG is a wireless wearable that can monitor one's ECG rhythm continuously for up to 2 weeks. It is also used in patients with very short and infrequent symptoms such as palpitations, 'missed beats', fainting spells or irregular heartbeats, to increase the chance of capturing the abnormal rhythm.

The uniqueness of the Spyder ECG is that the ECG data is continuously transmitted and stored in a secured and centralised cloud database, thereby allowing medical technicians and doctors faster, real-time direct access to the ECG data. Unlike the traditional Holter Monitoring devices,

where patients have to lug a recorder weighing 300g and put up with messy wires, the Spyder ECG is light-weight, inconspicuous, completely manageable by patients and even allows patients to view their own ECG on the paired smartphone.

Overall, the Spyder ECG system caters to an important disease area of cardiac arrhythmias; its compact size allows for increasing the duration of monitoring, and hence the likelihood of detecting abnormal rhythms such as Paroxysmal Atrial Fibrillation. Its fully digital and wireless data functionality allows quick turnaround time for reporting, shortening the diagnosis time needed for important treatments such anti-coagulation for atrial fibrillation, pacemaker implants, or other medical therapy to be instituted efficiently.



AMBULATORY ECG (HOLTER MONITORING)

The Ambulatory ECG - Holter Monitoring is a test where the ECG is continuously monitored for 24 or 48 hours and the signals are simultaneously recorded onto a special recorder worn by the patient, either at his or her own home or work environment. It allows any abnormal rhythms or ECG abnormalities to be captured during the monitoring period.

This test is useful for detecting transient rhythm disorders of the heart, which sometimes can be hard to detect. It is suitable for patients with palpitations, giddiness or fainting spells. By quantifying the amount and type of ECG abnormalities, it will be able to provide quantitative and qualitative information on the effect of the drug therapy.

The test can also help post-procedural patients, especially those who have undergone the electrophysiological studies, to determine if the procedure was successful.



CARDIAC COMPUTED TOMOGRAPHY (CT) SCAN

The Cardiac CT scan is a non-invasive test which examines the coronary arteries and vessels that supply oxygenated blood to the heart wall. It is a relatively painless scan which allows doctors to obtain information about the location and the extent of narrowing and plaque in the coronary arteries with a high degree of accuracy.

Build-up of fats and other substances (known as plaque), can narrow the arteries or even close off blood flow to the heart over time. This may result in chest pain or a heart attack.

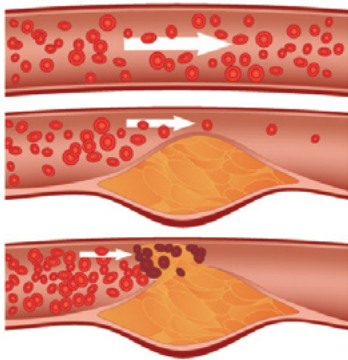
Two types of cardiac CT are available – CT coronary angiogram and coronary calcium scan.

A CT coronary angiogram is primarily done to examine the coronary arteries by injecting a contrast dye into one of the arm veins. This allows our doctors to visualise the arteries and identify any narrowing in them.

A coronary calcium scan does not require contrast injection and provides information about the location and extent of calcium build-up in the coronary arteries, which is a useful indicator of the amount of cholesterol deposition (atherosclerosis).

CHEST PAIN: WHAT'S THE DIFFERENCE BETWEEN HEART ATTACK AND CARDIAC ARREST?

If you are experiencing a sensation of discomfort, tightness or pressure in your chest, take heed.

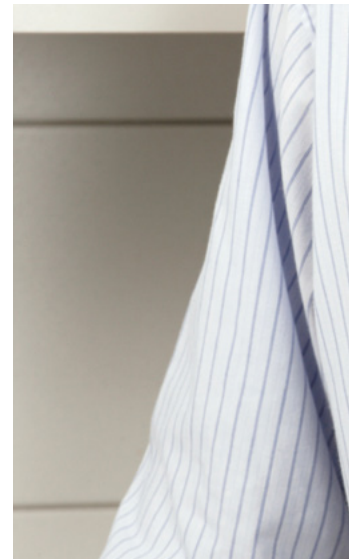


▲ Coronary arteries that supply the heart with oxygenated blood can slowly narrow due to a build-up of plaque leading to angina. In a heart attack, there is sudden plaque rupture leading to blood clot formation, blocking the artery.

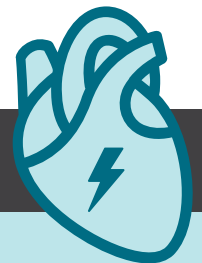
While a chest discomfort may simply be due to stress or indigestion, a recurring chest pain which is often provoked by exertion or stress, also known as angina, could be linked to coronary artery disease. Angina that lasts longer than 15 minutes and not relieved by rest might signal an impending heart attack.

A heart attack occurs when there is a sudden obstruction of blood flow in the coronary artery. The part of the heart muscle which does not receive blood would be at risk of injury, also known as myocardial infarction (MI). In such instances, emergency treatment is required. This involves blood-thinning medication and coronary angioplasty (e.g. ballooning or stenting) to quickly unblock the affected coronary artery, allowing blood to flow. In some cases, coronary artery bypass surgery (CABG) may be required.

Sudden cardiac arrest is different from a heart attack. Cardiac arrest occurs when there is a dangerous form of electrical malfunction in the heart, known as life-threatening arrhythmia. This causes the patient's heart to pump ineffectively, resulting in the inability of vital organs to receive blood and oxygen. If the patient does not receive emergency treatment, death usually ensues within minutes. However, with immediate cardiopulmonary resuscitation (CPR) and treatment with automated external defibrillator (AED), the patient may recover with restoration of normal heart rhythm.



HEART ATTACK vs CARDIAC ARREST



SYMPTOMS

A heart attack can trigger life-threatening arrhythmia, leading to sudden cardiac arrest. The symptoms of a heart attack are typically more pronounced. They include:



Sudden onset of severe chest pain or discomfort lasting longer than 15 minutes



New onset of chest pain or discomfort at rest or with minimal exertion



Sudden onset of shortness of breath, with or without chest pain



Cold sweat, nausea or light-headedness typically associated with chest pain/discomfort or shortness of breath

SYMPTOMS

Sudden cardiac arrest often occurs without warning symptoms. A person with sudden cardiac arrest might lose consciousness, collapse suddenly and become pulseless. Dr Lee Phong Teck, Associate Consultant, Department of Cardiology, says that occasionally, short-lived warning symptoms might occur, which include:



Chest pain



Shortness of breath



Heart palpitations



Light-headedness



WHO'S AT RISK?

Certain risk factors increase the probability of developing a heart attack. These include:

- Smoking
- High blood pressure (hypertension)
- Diabetes mellitus
- High cholesterol (hyperlipidaemia)
- Family history of heart disease or stroke (male first-degree relatives aged below 55, or female first-degree relatives aged below 65)
- Overweight, physical inactivity and a diet high in saturated fats

WHAT TO DO

As a heart attack is serious and can be fatal, Dr Lee advises that immediate medical attention should be sought when one experiences any sort of chest pain or discomfort which is not relieved by rest or medication.

WHO'S AT RISK?

"Cardiac arrest usually develops in a person with pre-existing, possibly undiagnosed heart condition," shared Dr Lee. These conditions include:

- Coronary artery disease, including a heart attack
- Heart failure, especially when the left ventricular ejection fraction is less than 30-35%
- Significant valvular heart disease
- Complex congenital heart disease
- Inherited arrhythmias

WHAT TO DO

Dr Lee adds, "A sudden cardiac arrest is a medical emergency. In the first instance of sudden cardiac arrest, call 995 for an ambulance immediately. Perform CPR and deliver treatment with an AED while waiting for medical help to arrive. By doing so, it increases the person's chances of survival."

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NHCS HEART FAILURE PROGRAMME

Heart failure is identified as a priority area for disease management in Singapore due to its high prevalence. Comprehensive heart failure disease management programmes have been shown to improve the outcome of patients with heart failure.

With the Heart Failure Programme at NHCS, we aim to improve the quality of life and survival of heart failure patients and reduce the number of re-hospitalisation through our multi-disciplinary team-based approach which comprises heart failure cardiologists, cardiothoracic surgeons, nurse clinicians, physiotherapists, dieticians and pharmacists.

Stabilised patients are able to return to the primary healthcare system for continual care.

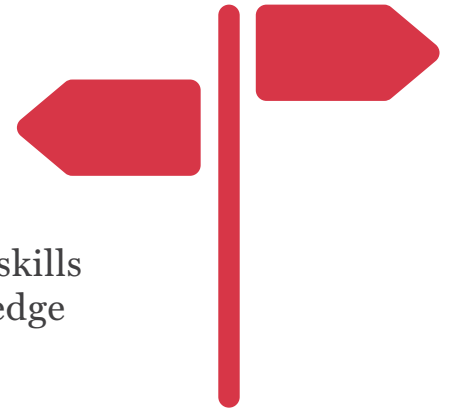
OUR SPECIALISTS

| | |
|--|--|
| Assoc Prof David Sim Kheng Leng | Senior Consultant Director, Heart Failure Programme |
| Prof Carolyn Lam Su Ping | Senior Consultant Director, Clinical & Translational Research Office Director, Women's Heart Clinic |
| Asst Prof Laura Chan Lihua | Consultant |
| Asst Prof Louis Teo Loon Yee | Consultant |
| Dr Julian Kenrick Loh Xingyuan | Consultant |
| Dr Ng Choon Ta | Consultant |
| Dr Audry Lee Shan Yin | Associate Consultant |
| Dr Khoo Chun Yuan | Associate Consultant |

For the full list of NHCS services and specialists,
please visit www.nhcs.com.sg.



LEANING TOWARDS BETTER PATIENT CARE



Knowledge is of no value unless you put it into practice. Indeed, and so after going through the 10 months of Lean skills training programme, the staff of NHCS applied the knowledge in their workplace to improve their processes, patient care delivery and experience.

The Lean skills training programme trains professionals in Lean thinking and practices. A Lean healthcare organisation can improve quality of care through minimising waste in every process and focusing on activities that add value to patients.

Recognising the need to build a continuous improvement culture, NHCS embarked on a Lean journey in September 2017; starting with two departments – the Specialist Outpatient Clinic (SOC) and the Echocardiography Laboratory (Echo Lab). With a collective goal to reduce patients' waiting time and to increase overall patients' satisfaction, staff members across different disciplines from medical, allied health, nursing, frontliners to administrative worked closely together to identify key areas of improvement.

Better Visibility and Shorter Waiting Time

Adopting the Lean tools learned from the course, both SOC and Echo teams conducted a series of "Go See" observations – following the patients through their journey at the Clinics and Echo Lab to identify areas for improvement. Through the observations, the teams found variations in waiting times between patients and noted the inadequate visibility on patient flow that could affect the productivity and performance of the teams.

The Echo team implemented various key initiatives which included the setting up of visual boards to provide an oversight of the daily patient volume, conducting daily department huddle for information sharing and feedback as well as the introduction of a new role, the Floor Manager, to manage and facilitate patient flow. These initiatives have contributed to more than 50% reduction in waiting time for patients in the laboratory.

"My most gratifying moment is having everyone from patient service associates, healthcare assistants, nurses, medical technologists and reporting doctors, working together with

a common goal in mind, that is to provide better services to patients," shared Assoc Prof Ewe See Hooi, Director of the Echo Lab and Senior Consultant from the Department of Cardiology.

Ann Chan, Nurse Manager of the Cardiac Clinics who was part of the SOC team recalled during the "Go See" exercise, "We found that most of the patients appeared a little lost when they came out of the consultation room. They don't seem to know where to go next." Determined to improve patient experience, the SOC team initiated a few quick-fixes such as improving wayfinding signs within the clinic premises and providing patients with an instructional folder to guide them to the next touchpoint.

In addition, the SOC team redesigned the template for doctors' schedule to allow better reflection of the actual time the doctors spent with their patients; which in turn, has helped with appointment planning. The Floor Managers are also making more frequent clinic rounds to engage patients who might experience longer wait and attend to them promptly. These initiatives have helped to improve consultation waiting time and patient experience.

"With the initiatives, we saw a 6% reduction in the numbers of patients who have had to wait more than 60 minutes at 4B Cardiac Clinic. The Lean concepts such as value stream mapping allow us to systematically evaluate our processes as we continue to look at ways to improve patient experience", added Teeu Keng San, Senior Manager of the Cardiac Clinics.

The positive results have paved the way for greater adoption of Lean approach in NHCS. Three departments - Pharmacy, Cardiothoracic Surgery Intensive Care Unit (CTICU) and Catheterisation Laboratory (Cath Lab) have also jumped on the bandwagon to be trained in Lean concept; with the aim to improve processes, patient care delivery and experience.



▲ Lean programme's trainer delivering fundamental Lean concepts to the NHCS staff.



▲ More wayfinding signs were installed at the clinics to guide the patients and improve patient experience.





JOIN US!

Check out NHCS website for the latest updates on the events.
For enquiries, please email nhccme@nhcs.com.sg.

Heart Failure Public Forum 2019

Heart disease is one of the leading causes of death in Singapore but many of us still do not know much about heart failure or the symptoms. Our cardiologists will share on how to recognise, treat and manage heart failure, and get tips on how to care for a patient with heart failure.

DATE 13 July 2019
VENUE NHCS Lecture Theatre, L7
REGISTRATION FEE S\$6



13th Cardiovascular Update 2019

Be updated on the latest advances in cardiovascular medicine from the different subspecialty in cardiology! This course shares with the medical practitioners the latest updates relevant to general cardiology practices.

DINNER SYMPOSIUM
DATE 16 August 2019
VENUE To be confirmed

FULL DAY COURSE
DATE 17 August 2019
VENUE NHCS Lecture Theatre, L7

REGISTRATION FEE
PHYSICIANS S\$150
MEDICAL STUDENTS/NURSES/ ALLIED HEALTH S\$80

7th Coronary Care Symposium 2019

The Coronary Care Symposium is a basic course in coronary intensive care designed for Residents, Trainee Doctors, Fellows, Medical Students and Nurses. The course includes dedicated hands-on workshops and facilitated interactive case discussions that cover important management concepts and in-depth learning of the various tools and techniques essential to daily cardiac intensive care.

DATE 14 September 2019
VENUE NHCS Lecture Theatre, L7
REGISTRATION FEE
PHYSICIANS/TRAINEE DOCTORS S\$200
MEDICAL STUDENTS S\$50
NURSES S\$110 (full day)/ S\$80 (afternoon session)

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Dr Cynthia Chia Ming Li
Associate Consultant,
Department of
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Dr Sivaraj Pillai Govindasamy
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Dr Audry Lee Shan Yin
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