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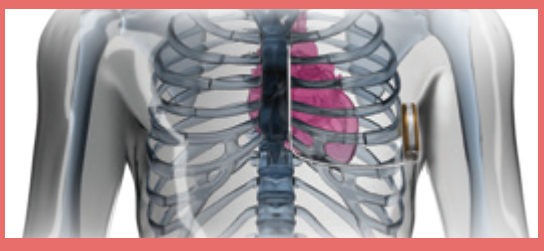
MURMURS®

NEW CHAPTER IN HEART CARE

PM LEE OFFICIALLY OPENS THE NHCS NEW BUILDING

SUBCUTANEOUS ICD GIVES NEW HOPE FOR PATIENTS WITH POOR VEIN STRUCTURE



HEART ULTRASOUND SCANNERS THAT FIT INTO YOUR POCKET

LAUNCH OF NHCS RESEARCH ARM TO FIND NEW TREATMENTS FOR HEART DISEASE

TOP LEADERSHIP CHANGE AT NHCS

MAKING PATIENT CARE BETTER WITH TECHNOLOGY – NHCS RECEIVES HIMSS EMRAM STAGE 6 AWARD

A NEW CHAPTER IN HEART CARE

25 SEPTEMBER 2014 WAS A MOMENTOUS DAY FOR THE NATIONAL HEART CENTRE SINGAPORE (NHCS).

Some 300 guests witnessed the official opening of NHCS' new 12-storey ambulatory facility, with Prime Minister Lee Hsien Loong as the guest-of-honour. In his speech, PM Lee outlined that Singaporeans have benefitted from the nation's efficient healthcare system, economic growth, and that "better education, nutrition, housing, public health, have all contributed to a healthier, longer-loved population." He cited that the life expectancy of Singaporeans has been extending by six months with each passing year, having risen from 75 years in 1990 to about 83 in 2013.

Prime Minister Lee Hsien Loong (third from left) officially opens the NHCS new building with leaders of SingHealth and NHCS (from left): Prof Ivy Ng, GCEO, SingHealth; Mr Peter Seah, Chairman, SingHealth; Mr Gan Kim Yong, Minister for Health; Adj Prof Terrance Chua, Medical Director, NHCS, and Adj Prof Koh Tian Hai, Senior Advisor, NHCS.

Prime Minister Lee added that specialist centres such as NHCS "are our peaks of excellence", and these need constant upgrading in order to deliver high quality care to patients who require specialised care.

"Since we were established in 1998, NHCS has been at the forefront of combating heart disease," said Adjunct Professor Terrance Chua, Medical Director, NHCS, "this 12-storey new building will greatly enhance our ability to achieve this mission and meet our nation's future needs for tertiary cardiac care."

Poised for growth and medical advancement

NHCS' new ambulatory facility is located opposite Block 4 of the Singapore General Hospital (SGH) and is close to four times the aggregate size of its former Mistri Wing and offsite facilities. It houses 38 specialist outpatient clinic consultation rooms and has the capacity for six cardiac catheterisation laboratories, three major operating theatres, and a new 24-bed Short Stay Unit. To accelerate cardiovascular research, the new building has one and a half floors of space dedicated to research. There is also a new Admissions Office/Pre-Admission Tests Centre located within the 50,000 sqm building, so that heart patients no longer need to travel to other parts of the SGH campus to get their admissions paperwork and tests done.

In preparation for the expansion of services in the new building, NHCS has bolstered its staff strength by 40 per cent to about 1,200 healthcare professionals since construction of the new building began in 2010. New staff members were recruited in strategic phases to ensure they were trained up to speed to better care for patients when the new building became operational.

Adj Prof Chua noted, "Given our ageing population, expanding capacity and manpower is necessary, but not sufficient to prepare for future needs. We also need to develop new models of care and improve transition to primary care for stable heart patients."

Evolving systems for better care

The new building presented NHCS with the golden opportunity to develop new ways to improve care. The new Short Stay Unit, for example, was set up for patients undergoing day procedures or surgeries, such as coronary angiography and coronary angioplasty. This will help free up more beds in the inpatient wards for patients with more severe heart conditions.

Prime Minister Lee said in his speech that specialist centres such as NHCS serve to provide the highest quality treatment for patients with complex cases, and these centres are "important training grounds for generations of specialists and healthcare professionals, and trailblazers in researching and developing better treatments for patients". In line with the purpose of specialty centres, NHCS works closely with general practitioners to transfer heart patients in stable condition to the latter for regular follow-ups, a process known as right-siting. More than 60 per cent of patients at NHCS were successfully right-sited in 2014, and this is double the proportion the year before.

Prime Minister Lee tries out the 1 Queue 1 Bill system at NHCS.

Some 80 per cent of outpatient encounters at NHCS are now fully electronic. Different areas of care delivery and day-to-day operations at the new building are effectively integrated with advanced information technology to enhance patient safety, convenience and comfort. Patients' medical records have been digitised so that vital patient information, imaging scans and reports can be shared instantaneously within NHCS and the healthcare system to help doctors make more timely clinical decisions, among other benefits. NHCS is working towards becoming a digital heart hospital that operates in a paperless, filmless, chartless and scriptless environment.

"The official opening of the NHCS new building presents a defining moment in cardiovascular care in Singapore," said Adj Prof Chua.

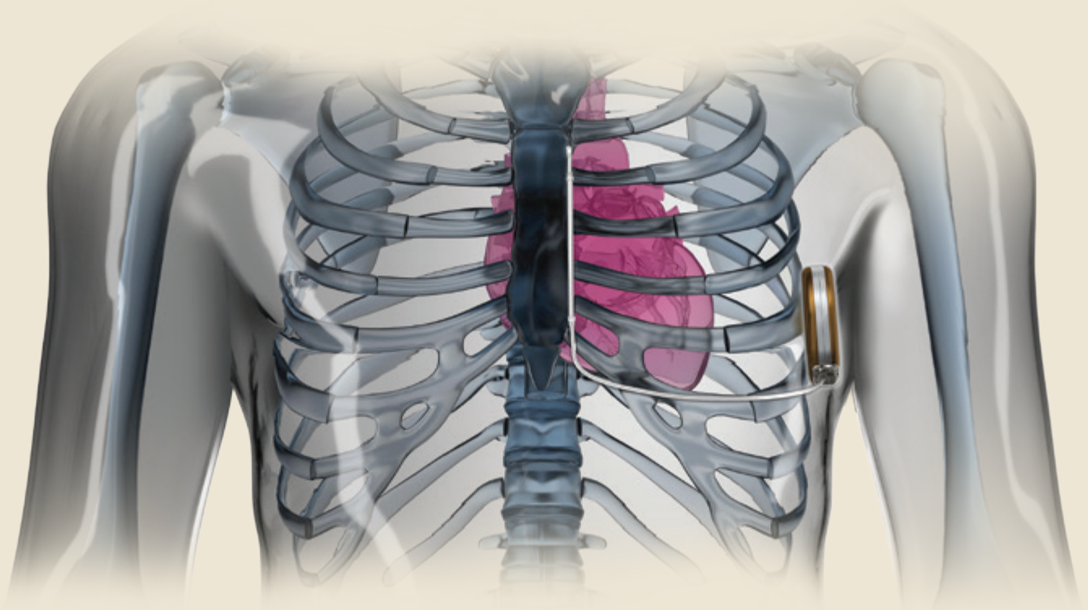
NHCS INTRODUCES NEW SUBCUTANEOUS ICD PROCEDURE TO PREVENT SUDDEN CARDIAC ARREST

For patients at risk of sudden cardiac arrest but are not suitable for the conventional implantable cardioverter defibrillator (ICD), there is now a new viable treatment for them. In April 2014, the National Heart Centre Singapore (NHCS) introduced a new procedure known as the subcutaneous ICD (S-ICD).

The S-ICD System is a defibrillator that senses, detects, and treats life-threatening rapid heartbeat. It uses highly sophisticated technology to identify and classify the heart rhythm — rather than individual beats — to effectively sense and discriminate rapid heartbeat and uncoordinated contraction of the heart muscle in the ventricles from other rhythms that do not require shock therapy.

The system consists of a subcutaneous pulse generator and a single subcutaneous lead. The pulse generator is implanted on the left side of the chest under the skin, next to the rib cage. The lead is implanted using a subcutaneous approach instead of the standard transvenous approach required to implant traditional ICD leads. Conventional ICDs are implanted in the chest below the collarbone, and the leads are inserted through an artery into the heart chambers. The S-ICD System, on the other hand, never touches the heart, is completely subcutaneous and does not require leads to be inserted into the heart.

Adj Assoc Prof Ching Chi Keong, Senior Consultant, Department of Cardiology, and Director, Electrophysiology and Pacing, NHCS, elaborated on the advantages. "S-ICDs can be implanted in patients with difficult venous access, such as dialysis patients who are at high risk of their veins collapsing. Infection is also less likely to have severe consequences since no part of the S-ICD system enters the heart and vascular compartment."



The heart pumps about 100,000 times a day, and this flexes and wears out conventional ICD leads over time. S-ICD Systems, on the other hand, are spared from the stresses induced by the heart muscle's pumping action, hence granting S-ICD leads greater durability.

"This is especially important in young patients who can be expected to need several transvenous lead changes during their lifetime," said Adj Assoc Prof Ching, "And should patients require lead extraction, removal of an S-ICD lead is a simpler and safer procedure compared to extracting a transvenous lead from inside the heart."

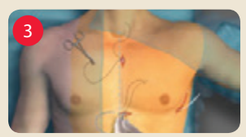
Sudden cardiac arrest is triggered by an electrical malfunction in the heart that causes fast and chaotic heart rhythm (typically known as ventricular fibrillation or ventricular tachycardia). As a result, the heart cannot pump blood to the brain, lungs and other organs. In just four minutes, the brain suffers irreversible brain damage and even if the heart is revived, the person may consequently become bed- or wheelchair-bound. In Singapore, there are 1,800 out-of-hospital cardiac arrests yearly with only 12 per cent who survived and a meagre two to three per cent who managed to resume a normal life.

NHCS has performed five cases to date and is the only institution in Singapore that offers the S-ICD procedure currently.

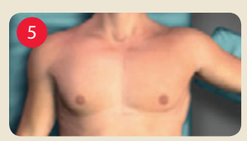
HOW AN S-ICD IS IMPLANTED

Before implanting the device, a 3-lead surface ECG will be recorded to assess the appropriateness of surface signals that correlate with device detection.

Once the patient has been properly prepped and draped, an incision is made to place the pulse generator at the mid-axillary line between the 5th and 6th intercostal spaces.



The electrode is positioned through two subcutaneous tunnels from the pocket to the xiphoid incision and from the xiphoid to the superior incision.



Images courtesy of Boston Scientific.

POCKET-SIZED HAND-HELD ECHOCARDIOGRAPHY: NOW AND FUTURE

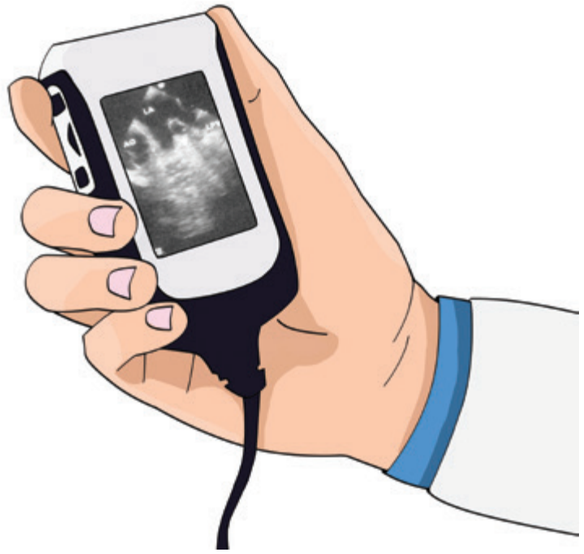
Echocardiography (hereafter referred to as 'echo') is a widely available non-invasive diagnostic technique in clinical cardiology that offers fast, accurate assessment of the cardiovascular structures without any radiation exposure. Most echocardiographic examinations are performed in the clinical setting in echo laboratories using high-end machines, which are expensive, bulky and heavy. These are generally complicated to use, and require extensive prior training and experience for proper usage. Portable systems were first developed in the late 1970s, but it was not until the late 1990s that commercial laptop-sized devices became available that lowered the threshold for performing bedside echo. Recently, pocket-sized hand-held echocardiographic (PHHE) devices have become available at a typical cost of S$6000 to S$12,000. These PHHE devices are designed for use at the point where medical care is provided (point-of-care echo).

Adj Asst Prof Peter Ting
Consultant
Department of Cardiology
National Heart Centre Singapore

Adj Asst Prof Ting's sub-specialty interests are in cardiovascular rehabilitation and preventive cardiology and echocardiography. He graduated with his Bachelor of Medicine and Surgery from the National University of Singapore in 1999 and obtained his membership of the Royal College of Physicians, UK in 2003. Adj Asst Prof Ting is also the Medical Editor for Murmurs.

PHHE devices are, by design, much simpler compared with high-end echo machines, and have many limitations in hardware and software. They generally display a smaller image sector and in lower resolution. What they do offer, however, is unmatched portability with live grayscale imaging that can allow simple measurements, and colour Doppler to assess blood flow and valvular function. Most devices measure less than 18cm and weigh less than 800g, and they can also be used for non-cardiac imaging. The trade-off for miniaturisation is a loss of image quality compared to their bulkier cousins. Hence, they are not designed to perform complete echocardiographic studies; instead, they are typically used for quick examinations (usually five to ten minutes), providing quick but useful evaluation of the cardiac structure, size and function.

In several studies assessing the diagnostic accuracy of PHHE devices compared with reference echo, important diagnoses were rarely missed and the concordance between the two was fair to high. In particular, assessments for left ventricle size and function, pleural and pericardial effusions were found to be reasonably accurate. Assessment of valvular function can get more difficult, but recent studies have shown that PHHE devices can still provide clinically useful information on valvular morphology, particularly if colour Doppler is available.



As the technology is still relatively new, the experience of use is fairly limited and there is no strong evidence regarding the level of competence required to perform PHHE scans. The quality and accuracy of echocardiographic studies are user dependent, and due to the inherent limitations of PHHE devices, this is even more apparent. Nonetheless, publications on hand-held echo and PHHE have demonstrated add-on value as an adjunct to clinical examination both with inexperienced and experienced users. In these studies, PHHE as an adjunct to clinical examination was shown to increase diagnostic accuracy, and thus improve patient care.

So what are some of the clinical settings where PHHE might be useful? Presently, it seems that they are best used for quick, focused assessments of cardiac and non-cardiac structure and function, and they can possibly be used as an integrated part of the physical examination. This has been shown in intensive care units and surgical and cardiac departments to lead to better selection of patients for further medical imaging or invasive tests, or guide subsequent therapy or interventions. Usage in outpatient clinics or even in primary care can be further potential settings, though it is recognised that user competency and skill are still highly important. Both the European and the American Associations of Echocardiography agree that a certain level of competence and skill of the user is required. However, how this should be assessed or determined remains unresolved, as is the optimal level of training required.

Standard echocardiography machines are able to produce higher resolution ultrasound scans.

Ultimately, PHHE cannot replace a full echo examination with a high-end scanner evaluated by a cardiologist. A structured training programme for inexperienced doctors who should use point-of-care echo is highly advocated and in line with good patient care. Pocket-sized echo should primarily be regarded as a useful supplement to high-end echo and other diagnostic tests. Perhaps in future, hand-held ultrasound scanners might become standard tools of trade for physicians, much like the stethoscope today.

The above article constitutes the opinion of the author, and may not be representative of the view of the National Heart Centre Singapore.

CATALYST FOR DISCOVERIES

REGIONAL FOCUS ON CARDIOVASCULAR RESEARCH AT NHRIS

The National Heart Research Institute Singapore (NHRIS) is set to be a game-changer in the field of research.

A joint venture by the National Heart Centre Singapore (NHCS) and Duke-NUS, the NHRIS is a dedicated cardiovascular research institute whose mission is to develop improved treatments and discover new cures for heart disease. The NHRIS was officially launched on 5 September 2014 at the biennial SingHealth Duke-NUS Scientific Congress by President Tony Tan Keng Yam. The establishment of a research institute focused on cardiovascular conditions is of great significance as heart disease is a leading cause of death and disability globally and in Singapore.

The NHRIS is located in the NHCS new building and housed within a 4,000 sqm dedicated research space which is equipped with DNA and genetic analysis and processing equipment to better understand the inner workings of heart disease in Asians, whose genetic makeup differs from other genotypes. This is supported by the advanced 3T magnetic resonance imaging (MRI) system in NHCS which allows researchers and clinicians to study the function of the heart's pumping motion and arteries at exceptionally high resolution levels.

Advanced DNA and genetic sequencing equipment in the NHRIS laboratory allows researchers to better understand the inner workings of heart disease in Asians.

"If you want the best healthcare, you have to have the best research," said Professor Stuart Cook, Tanoto Foundation Professor of Cardiovascular Medicine Program in Cardiovascular and Metabolic Disorders, and Director of NHRIS, NHCS, "Our research in the Asian population will help us better understand the disease manifestation – this will change the way we treat cardiovascular disease and create a positive impact on outcomes for our patients."

Mr Sukanto Tanoto (third from left), founder and chairman of the Tanoto Foundation Board of Trustees, presents a cheque for S$3 million to President Tony Tan (middle) to advance research in cardiovascular medicine.

A gift for medical science

The NHRIS received from the Tanoto Foundation a S$3 million boost to its research efforts during the official launch. S$2.5 million from this will go into setting up the Tanoto Foundation Professorship in Cardiovascular Medicine and the remainder will fund the Tanoto Foundation Initiative for Genetics and Stem Cell Research at NHRIS.

Chairman of the Tanoto Foundation Board of Governance, Mr Bey Soo Khiang, said: "We are particularly delighted to contribute to the advancement of research in cardiovascular medicine for the Asian community, as we believe the breakthrough results will enable healthcare practitioners to address the region's medical needs more effectively in relation to heart disease."

NHRIS relies on the support and involvement of patient-volunteers for their research efforts to bear fruit. Its researchers and cardiologists at NHCS work hand-in-hand to draw out meaningful data from test results and medical records of patient-volunteers to shed new light on their heart conditions. According to Prof Cook, maintaining a high standard of research is the only way to go.

"Science is a long game. To attract the best researchers, interest heart patients and receive sustained funding, we need to do the best science."

NEW LEADERSHIP AT NHCS

On 1 June 2014, Adjunct Professor Koh Tian Hai, Medical Director of the National Heart Centre Singapore (NHCS) since 2003, handed the reins of leadership to Adjunct Professor Terrance Chua who also took on the position as Academic Chair of the Cardiovascular Academic Clinical Program.

Adj Prof Koh's 11 years as headship of NHCS saw the institution make great strides in its clinical practice where staff strength has more than doubled from the initial team of 650 healthcare professionals when he first took on the role. His foresight and dedication placed NHCS on the world map with the numerous 'firsts' that were introduced under his leadership, many of which were pioneering complex cardiac therapies that gave a new lease of life to patients who would otherwise have had no other viable treatment options.

Adj Prof Koh is also a strong advocate of education and training, and he established the strong partnership with Euro PCR to boost the international standing of AsiaPCR/SingLIVE, NHCS' flagship conference on interventional cardiology held yearly. The number of attendees to AsiaPCR/SingLIVE has risen by 10-fold since it started, making it one of Asia's premier events in the medical field.

Adj Prof Terrance Chua is known for his commitment to patient care, teaching and research. Together with Singapore General Hospital's department of nuclear medicine, he was responsible for setting up Singapore's first cardiac-dedicated nuclear imaging laboratory in 1994. Adj Prof Chua received the prestigious National Outstanding Clinician Award in 2013 for his exceptional contributions to the advancement of patient safety and quality care.

As the new Medical Director of NHCS, Adj Prof Chua will chart the institution's transformational journey towards Academic Medicine and spearhead the development of new models of care that will better serve the heart care needs of the nation.

RESEARCH HIGHLIGHT

Circulation. 2013 Oct 8;128(15):1623-33. doi: 10.1161/CIRCULATIONAHA.113.002518. Epub 2013 Aug 21.

The prevalence and prognostic significance of right ventricular systolic dysfunction in nonischemic dilated cardiomyopathy

Gulati A, Ismail TF, Jabbour A, Alpendurada F, Guha K, Ismail NA, Raza S, Khwaja J, Brown TD, Morarji K, Liodakis E, Roughton M, Wage R, Pakrashi TC,Sharma R, Carpenter JP, Cook SA, Cowie MR, Assomull RG, Pennell DJ, Prasad SK.

ABSTRACT

BACKGROUND: Cardiovascular magnetic resonance is the gold-standard technique for the assessment of ventricular function. Although left ventricular volumes and ejection fraction are strong predictors of outcome in dilated cardiomyopathy (DCM), there are limited data regarding the prognostic significance of right ventricular (RV) systolic dysfunction (RVSD). We investigated whether cardiovascular magnetic resonance assessment of RV function has prognostic value in DCM.

METHODS AND RESULTS: We prospectively studied 250 consecutive DCM patients with the use of cardiovascular magnetic resonance. RVSD, defined by RV ejection fraction≤45%, was present in 86 (34%) patients. During a median follow-up period of 6.8 years, there were 52 deaths, and 7 patients underwent cardiac transplantation. The primary end point of all-cause mortality or cardiac transplantation was reached by 42 of 86 patients with RVSD and 17 of 164 patients without RVSD (49% versus 10%; hazard ratio, 5.90; 95% confidence interval [CI], 3.35-10.37; P<0.001). On multivariable analysis, RVSD remained a significant independent predictor of the primary end point (hazard ratio, 3.90; 95% CI, 2.16-7.04; P<0.001), as well as secondary outcomes of cardiovascular mortality or cardiac transplantation (hazard ratio, 3.35; 95% CI, 1.76-6.39; P<0.001), and heart failure death, heart failure hospitalization, or cardiac transplantation (hazard ratio, 2.70; 95% CI, 1.32-5.51; P=0.006). Assessment of RVSD improved risk stratification for all-cause mortality or cardiac transplantation (net reclassification improvement, 0.31; 95% CI 0.10-0.53; P=0.001).

CONCLUSIONS: RVSD is a powerful, independent predictor of transplant-free survival and adverse heart failure outcomes in DCM. Cardiovascular magnetic resonance assessment of RV function is important in the evaluation and risk stratification of DCM patients.

LESSONS IN DIVERSITY

Dr Daniel Chong, a Consultant with the Department of Cardiology at the National Heart Centre Singapore (NHCS), recently returned from his fellowship at Cleveland Clinic where he spends most part of each day working on complex arrhythmia cases. After work, he enjoys soaking in the beauty of the seasons with his family at the many picturesque Cleveland Metroparks and hunting for good Asian eateries. MURMURS speaks to Dr Chong to learn more about his exciting stint abroad.

Dr Daniel Chong, Consultant, Department of Cardiology, NHCS, (second from left) with the cardiac electrophysiology team at Cleveland Clinic.

How was the training like?

I went to the Cleveland Clinic for a fellowship in Cardiac Electrophysiology and Cardiac Implantable Electronic Devices (CIED), as it is one of the largest centres in the United States specialised in this area. Every year, about 1,500 ablations and more than 1,600 CIED procedures are performed there. In addition, Cleveland Clinic has the largest lead extraction programme in the world. The wealth of complex cases gave me tremendous learning opportunities, and I also had the chance to work with many world renowned cardiac electrophysiologists including Dr Bruce Lindsay and Dr Bruce Wilkoff. Dr Lindsay is on the Cardiac Electrophysiology Exam Committee of the American Board of Internal Medicine and Dr Wilkoff was a former president of the Heart Rhythm Society based in the United States.

My experience at Cleveland Clinic has widened my perspective to the different methods and styles of performing the same procedure and managing the same clinical condition. There were almost 30 clinicians in the Cardiac Electrophysiology section, each with his or her specific way of performing various complex procedures. I came to appreciate that for each method, there are benefits and limitations that have to be considered. I was also exposed to new and upcoming technologies, such as the leadless pacemaker and subcutaneous implantable cardioverter defibrillator.

How is a typical day at Cleveland Clinic for you?

My day starts at 6.45am with a review of the details of all the cases that will be performed for the day. By 7.15am sharp, all the doctors will meet with their entire team by the patient bedside to run through the procedure. This is called the "huddle" where everyone participating in the procedure will be there, and the team can consist of 10 to 15 members including the nurses, anaesthetists, technical support staff, device and ablation technology staff and others. At 7.30am, I will attend a one-hour teaching session with the other fellows. Procedural cases will start at 8.30am, and depending on the number and complexity of cases, the day ends when the last case is done, which is usually around 7pm but may stretch till midnight. After dinner, I will attempt to catch up on some reading of medical literature before starting again the next morning.

Any plans you would like to introduce at NHCS?

We can expand the remote monitoring programme post-CIED implantation at NHCS. The Cleveland Clinic remotely monitors its CIED patients from all over the world, and they had more than 16,000 remote transmissions in 2013. A remote monitoring programme at NHCS could potentially reduce the number of routine visits our patients make to our arrhythmia and device clinics, and free up the appointment slots for patients with more serious conditions.

NHCS WINS MULTIPLE AWARDS

Adj Prof Terrance Chua (left), Medical Director, NHCS, and Asst Prof Ho Kay Woon (centre), Consultant, Department of Cardiology, NHCS, receives the JCI reaccreditation certificate on from Dr Nathan Erteschik, Surveyor, JCI.

The National Heart Centre Singapore's commitment to patient safety and quality care has been given the seal of approval from the Joint Commission International (JCI) for the fourth time on 21 August 2014. The JCI accreditation is the international gold standard for healthcare, and NHCS was the first heart hospital outside the United States of America to obtain the accreditation in 2005. Reaccreditation is required every three years to ensure that clinical practices are kept to strict standards.

Minister for Health, Mr Gan Kim Yong, presents the HIMSS EMRAM Stage 6 award to NHCS Medical Director Adj Prof Terrance Chua (left).

NHCS received the HIMSS Electronic Medical Record Adoption Model (EMRAM) Stage 6 award on 15 September 2014 for its integration of advanced information technology in enhancing the delivery of patient care. The HIMSS EMRAM is a global standard that measures the use of technology, on an ascending scale of 0 to 7, in healthcare institutions to improve patient safety, care quality and workflow efficiency.

Ms Jan Koh, Senior Medical Social Worker, NHCS, receives the PS21 Distinguished Star Service Award from Mr Teo Chee Hean, Deputy Prime Minister and Coordinating Minister for National Security.

Senior Medical Social Worker Jan Koh did NHCS proud by clinching the prestigious PS21 Distinguished Star Service Award at the Excellence in Public Service Awards ceremony on 23 May 2014. This is the second consecutive year that NHCS has won the award, which is given to officers serving the public who have gone beyond their call of duty to deliver excellent service. A total of 133 officers were recognised for their commitment to service excellence at this year's ceremony.

PROMOTIONS / APPOINTMENTS

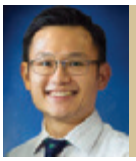
ADJ PROF TERRANCE CHUA
Medical Director and Senior Consultant, Department of Cardiology, NHCS

ADJ PROF KOH TIAN HAI
Senior Advisor and Senior Consultant, Department of Cardiology, NHCS

ADJ ASSOC PROF KENNY SIN
Deputy Medical Director and Head and Senior Consultant, Department of Cardiothoracic Surgery, NHCS

ADJ ASSOC PROF LIM CHONG HEE
Head, Thoracic Surgery Unit, Director, Heart and Lung Transplant Programme and Senior Consultant, Department of Cardiothoracic Surgery, NHCS

ADJ ASST PROF DAVID SIM
Director, Heart Failure Programme and Consultant, Department of Cardiology, NHCS



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