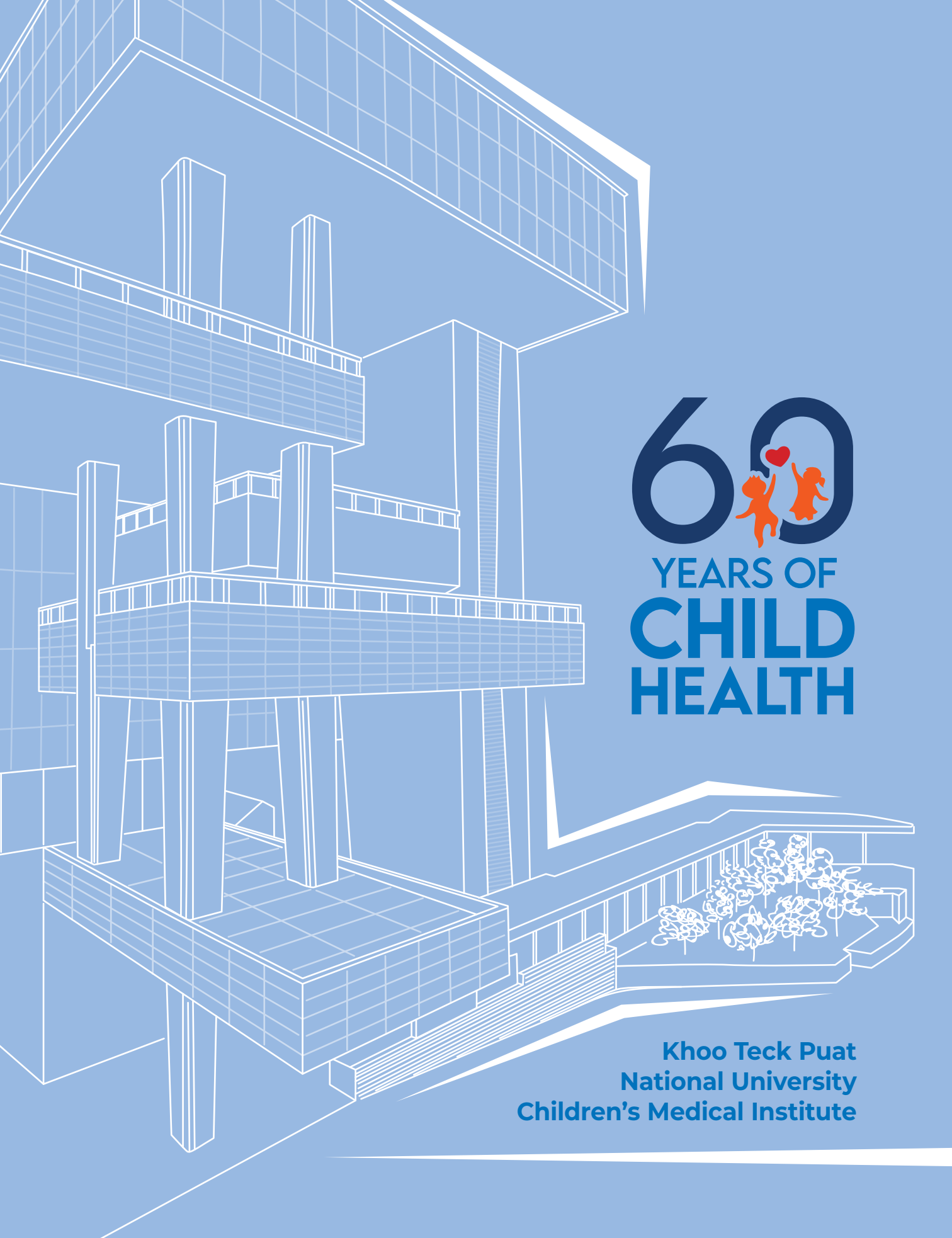

60 YEARS OF CHILD HEALTH

Khoo Teck Puat
National University
Children's Medical Institute

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National University
Children's Medical Institute

60 YEARS OF CHILD HEALTH

This publication charts the story of our department, through six decades of growth, with chapters celebrating our people and the lives we have touched. We acknowledge our determined pioneers who advocated for our nation's future by improving the health of children in Singapore. We highlight ground-breaking achievements in research and clinical excellence that have shaped the landscape of paediatrics in Singapore and we continue to be inspired by the children and families that have taken this journey with us. We hope that you will find great meaning within these pages and continue to be part of the Khoo Teck Puat – National University Children's Medical Institute story with us.

Copyright Information

60 Years of Child Health: Khoo Teck Puat – National University Children's Medical Institute

This commemorative book is produced in celebration of 60 years of child health at the Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI).

Produced by Khoo Teck Puat – National University Children's Medical Institute, National University Hospital

The KTP-NUCMI is the paediatric arm of the National University Hospital and comprises the Departments of Paediatrics, Paediatric Surgery and Neonatology. We provide comprehensive and specialised medical and surgical services for newborns, children and adolescents. NUH is the only public hospital in Singapore that offers paediatric kidney and liver transplant programmes. Through a generous gift from the Estate of Khoo Teck Puat, we have set up an integrated outpatient facility with medical, diagnostic and rehabilitation services.

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PROFESSOR YEOH KHAY GUAN

Chief Executive,
National University Health System

Irene Tan Liang Kheng Professor in Medicine and Oncology

Senior Vice President (Health Affairs),
National University of Singapore

> NUHS and NUS will continue to support KTP-NUCMI in your mission to advance child health – going beyond healthcare to give every child the best start to life!

My heartiest congratulations to the Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) on the momentous milestone of 60 years of excellence in serving our children, the future of Singapore!

The Paediatric service has made exceptional strides since its beginnings as the University Department of Paediatrics. In these 60 years, you have consistently delivered holistic and compassionate specialised care for generations of newborns, children and adolescents, all while meeting the growing and increasingly complex care needs of this population group. In your unflagging pursuit of excellence, you have pushed the frontiers of translational research to deliver transformative impact on clinical care, as well as nurtured generations of child health providers to take on the challenges of an ever-evolving landscape in medicine.

This book proudly features the Department's rich heritage and distinguished contributions, as well as perspectives from patients and pioneer staff, each of them as inspiring as they are deeply moving.

The National University Health System (NUHS) and National University of Singapore (NUS) salute the department's past and present faculty, staff, students and alumni, for their dedication and myriad contributions. With the twin engines of research and education to boost and augment clinical care, the Department is well placed to shape the future of paediatrics.

With the recent announcement of Ministry of Health's Healthier SG initiative, where a life-course approach is adopted for population health and efforts are focused upstream in preventive health and early intervention, the role of the Paediatric service is more important and prominent than ever. NUHS and NUS will continue to support KTP-NUCMI in your mission to advance child health – going beyond healthcare to give every child the best start to life!

Note from

PROFESSOR AYMERIC LIM

Chief Executive Officer,
National University Hospital

> The team at KTP-NUCMI is defined by their tireless pursuit of innovative and groundbreaking therapies to improve treatment outcomes today and develop even better care for the future.

The Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) has its genesis in the University Department of Paediatrics which was founded in 1962 by Emeritus Professor Wong Hock Boon. From the beginning, the Department has exemplified clinical and academic excellence, qualities that continue to stand them in good stead today.

Over the years, this commitment to excellence has been matched by an unwavering advocacy for our young patients. Indeed, the KTP-NUCMI has been the voice for generations of children and young Singaporeans under our care.

The team at KTP-NUCMI is defined by their tireless pursuit of innovative and groundbreaking therapies to improve treatment outcomes today and develop even better care for the future. This ethos, nurtured through the years, is passed down to all present and future doctors, nurses, allied health professionals, pharmacists and administrators.

In the years ahead, I am confident that the KTP-NUCMI will continue to uphold its distinctive tradition, bring hope and provide world-leading care as the nation's leading paediatric centre.

Note from

PROFESSOR CHONG YAP SENG

Lien Ying Chow Professor in Medicine
Dean, NUS Yong Loo Lin School of Medicine

> KTP-NUCMI has been, for medical students, educators and clinicians alike, a nurturing space steeped in a vibrant teaching culture enlivened with an innovative, can-do spirit.

The Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) has seen an extraordinary 60 years.

From the early, formative years of paediatrics as a University Department, the Institute has evolved into a globally renowned facility dedicated to the comprehensive and holistic care for children.

KTP-NUCMI has been, for medical students, educators and clinicians alike, a nurturing space steeped in a vibrant teaching culture enlivened with an innovative, can-do spirit. Esteemed pioneers of clinical care and research have inspired and paved for us the pathways integrating novel models of paediatric care with translational research that the researchers and clinician-scientists from NUS Yong Loo Lin School of Medicine continue to advance today.

From seeking powerful cures for childhood leukaemia, to developing methods to conduct safer transplants with better outcomes, the pioneers of KTP-NUCMI truly take to heart their mission to make a difference. It has positively impacted the lives of generations growing up, the children cared for, as well as their families.

I wish you continued success as the catalyst for change and look forward to inspiring health for all, together.

Note from

PROFESSOR LEE YUNG SENG

Head, Khoo Teck Puat – National University Children's Medical Institute

Head, Department of Paediatrics, NUS Yong Loo Lin School of Medicine

> The growth of KTP-NUCMI would not have been possible without the dedication of selfless individuals whose mission is to provide better care for their patients.

Paediatrics in Singapore has come a long way since the early days and for us as Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI), it has been an exciting journey of 60 years in improving paediatric care in the country and the region. 60 years on, equipped with our world-class clinical programmes, cutting-edge research and technology, and excellent training and education, we have grown into a comprehensive and leading paediatric tertiary centre at the forefront of medicine. Where there was no hope, we persevered to push boundaries in order to make a difference in the lives of our patients and their families.

2010 was a milestone in the making as we received a generous endowed gift from the Estate of Khoo Teck Puat, leading to our renaming as the Khoo Teck Puat – National University Children's Medical Institute. This transformational gift enabled us to develop a dedicated paediatric ambulatory centre and introduce integrated programmes to augment care.

Caring for patients extends beyond the hospital into the community, with two child development clinics, a children's urgent care clinic, and a homecare programme for children with complex medical conditions. Our collaborative work with the National University Hospital's Department of Obstetrics and Gynaecology, National University Health System Regional Health System and National University Polyclinics has also resulted in maternal and child preventive health programmes.

As the principal teaching facility of the Department of Paediatrics, NUS Yong Loo Lin School of Medicine, we strive to maintain the highest standards of child health. We have trained generations of doctors, nurses and allied health professionals through our paediatric undergraduate programme and postgraduate medical education.

The growth of KTP-NUCMI would not have been possible without the dedication of selfless individuals who provided incredible care for their patients. This commemorative book is not only a showcase of our journey, but a tribute to all past and present. With the patients at the heart of what we do, I hope we continue to strive to be the paediatric centre of excellence and serve as an inspiration to those in the future. To 60 and beyond!

A bust of the late Tan Sri Khoo Teck Puat stands in the lobby of the KTP-NUCMI building as a symbol of gratitude towards the transformational gift by the Estate of Khoo Teck Puat.

Note from

ESTATE OF KHOO TECK PUAT

Through our support of KTP-NUCMI, we hope to further strengthen its efforts to deliver transformative care, nurture and develop future child health thought leaders, and break new ground in translational research.

Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) has committed to advancing child health in Singapore for the past 60 years.

The exceptional milestones and achievements are testament to the relentless pursuit of providing the best care for children. It is the unwavering dedication of its people – committed to delivering care with compassion and sharing an innovative spirit to strive for better health outcomes – that has shaped KTP-NUCMI to be a leading institution for paediatrics.

Through our support of KTP-NUCMI, we hope to further strengthen its efforts to deliver transformative care, nurture and develop future child health thought leaders, and break new ground in translational research. We wish KTP-NUCMI continued success as it strives to bring a healthier tomorrow for the future generations in Singapore and around the world.

Chapter 1

Remembering our Roots

From our humble beginnings in Mistri Wing at the Singapore General Hospital, we have evolved into a full-fledged tertiary referral centre, pushing the frontiers of clinical care and research for better health outcomes and educating the next generation of clinicians for our future.

Our story is not complete without the mention of the Founding Professor of Paediatrics, Emeritus Professor Wong Hock Boon, and his pioneering contributions that paved the way for child health in Singapore.


The Children's Medical Institute

OUR HISTORY

The Mistri Wing at the Singapore General Hospital.
Source: Journal of Singapore Paediatric Society

Singapore is so blessed to have one of the best paediatricians of his era as the Founding Professor of Paediatrics in our medical school. One of the best tributes came not from a paediatrician but a very senior physician. He said, 'After I finished my MRCP in the UK, I came back to Singapore and decided to do a six-month attachment under Prof Wong – what I learnt from him in the six months was more than what I had learnt in the three years training in adult medicine in the UK', and I can wholeheartedly say amen to that!

A/Prof Quah Thuan Chong
Emeritus Consultant,
Division of Paediatric Haematology and Oncology

Our Beginnings

The history of our paediatric services dates back 60 years to the Mistri Wing at the Singapore General Hospital (SGH). The four-storey paediatric wing, named after its donor, N.R. Mistri, had eight wards with 280 beds/cots.

The year was 1962, and the Medical School at the University of Singapore had set up the University Department of Paediatrics. Located in the Mistri Wing's west wing, the department was popularly known as Paediatric West and occupied half of the wards, namely Wards 26, 28, 30 and 32. It was led by Emeritus Professor Wong Hock Boon, the Founding Professor of Paediatrics. Paediatric East, on the other hand, was the government unit and consisted of Wards 25, 27, 29 and 31.

The paediatric outpatient clinic on the building's ground floor was run mainly in the afternoon. Unlike present-day clinics with individual consultation rooms, the clinic then was an open space shared by all doctors for clinical consultations with their patients. Privacy was a remote concept then, though the set-up benefited junior doctors, who could consult with their seniors conveniently at any time.

In the early days at Mistri Wing, the number of paediatricians was limited. All the doctors were thus trained as general paediatricians. They did not sub-specialise, and neither were they encouraged to do so. Eventually, however, as the standard of care improved and expectations from the patients and parents increased, sub-specialties were pioneered in the department. The early sub-specialties included human genetics, neurology, cardiology, and haematology and oncology. A neonatal unit was also established at the Kandang Kerbau Hospital (KKH), led by Professor Tan Kim Leong.

A typical paediatric ward within the wing.

Source: The SGH Museum

The University Department of Paediatrics led by E/Prof Wong Hock Boon.

Source: The SGH Museum

The Big Move

In 1985, the department moved to the National University Hospital (NUH), which had been newly set up as a teaching hospital to spearhead the future of medical education. The outpatient services were the first to move. By 1986, the entire department, together with the Medical School of the National University of Singapore (NUS) – now known as the Yong Loo Lin School of Medicine – completed the migration. The University's neonatal service, which had been housed in KKH, followed suit and subsequently formed the Department of Neonatology.

Prof Tan Kim Leong in the Neonatal Intensive Care Unit where infants are monitored round the clock.

Prof Wong convinced me that the future of the nation lay in the holistic care of our children. From the clinical problems, he reviewed the basic science and searched the advances to manage his patients. This unwavering commitment was the basis of his encyclopaedic knowledge, empowering him to become the teacher par excellence. With limited resources, he accomplished pioneering work in G6PD deficiency, haemoglobinopathy, neonatal screening and genetic services. His achievements inspired me to take paediatric cardiology from its infancy to new heights. To him, I pay my tribute: knowledge can be learnt, skill can be acquired, but the pioneering spirit can only be mentored.

Professor William Yip
Adjunct Professor, Yong Loo Lin School of Medicine

Following its move to NUH, the department underwent several changes, including a growth in staff strength. With the increase in the number of employees, it introduced more sub-specialisations and further enhanced its paediatric services. Apart from providing comprehensive paediatric clinical care and education, the department was also committed to advancing scientific research that would improve patient care.

To provide specialised treatment for children with end-stage kidney disease, Professor Yap Hui Kim established the Division of Paediatric Nephrology, Immunology and Urology in 1990.

Caring for our patients then...

In 2002, the first Shaw-NKF-NUH Children's Kidney Centre was officially opened with the support of the Shaw Foundation and the National Kidney Foundation (NKF). Today, it is the paediatric centre for kidney replacement therapy in Singapore and the paediatric nephrology training centre for Southeast Asia.

The department also launched the Children's Emergency. The 24-hour service attends to children up to 16 years old in a clinical setting focused on their unique needs.

The following year, the department established the Child Developmental Unit (CDU) as part of Singapore's national programme for managing children with developmental delay. The clinic was set up at the Jurong Medical Centre and then the Keat Hong Community Centre.

In 2009, Associate Professor Quah Thuan Chong, who headed the Division of Paediatric Haematology and Oncology then, and Associate Professor Allen Yeoh brought the division to new heights with the inception of the VIVA-University Children's Cancer Centre at NUH. Known for its cutting-edge childhood cancer treatment in Singapore, it is also the training centre for paediatric oncology in Asia.

A New Era: Khoo Teck Puat – National University Children's Medical Institute

The paediatric outpatient service, having been expanded over the years, eventually outgrew its physical location at Clinic A on the ground floor of NUH's main building. In 2019, it relocated to a new outpatient building funded by a generous donation from the Estate of Khoo Teck Puat in 2010.

In recognition of the gift supporting the advancement of paediatric education, research and patient care, the University Children's Medical Institute was renamed the Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI).

Caring for our patients now.

OUR FOUNDING FATHER

Our story cannot be fully told without acknowledging the remarkable achievements of Emeritus Professor Wong Hock Boon (1923–2008). Affectionately known as the Father of modern Paediatrics in Singapore, he was an outstanding clinician, researcher and teacher, and a passionate advocate of child health.

Born in 1923, E/Prof Wong graduated from the University of Malaya in 1952. After he passed the higher qualifying examination, the Membership of the Royal College of Physicians (Edinburgh), in 1957, his medical career advanced at a phenomenal pace. In 1962, he was promoted from Senior Medical Registrar to be the Founding Professor of Paediatrics at the University of Singapore. He led the Department of Paediatrics for 26 years until his retirement in 1988.

Nurturing a Generation of Paediatricians

E/Prof Wong was the epitome of the academic physician and an inspirational mentor. Known as a "walking encyclopaedia", he was highly regarded for his unparalleled paediatric knowledge. He imparted his knowledge and experience to a whole generation of paediatricians, especially during his daily ward rounds (which he did unfailingly), weekly tutorials and clinical conferences. Whenever he encountered a clinical problem on his rounds, he would write it down and then assiduously check the Index Medicus in the library for the latest advances so he could resolve it. His published works, including more than 50 volumes of Paediatric Clinical Conference Notes, are testament to his scholarship and even now serve as the go-to sources of information for countless medical students.

E/Prof Wong Hock Boon teaching medical students in a lecture room.

Source: The SGH Museum

My father spent almost every waking hour thinking about, reading up on, teaching and writing about paediatrics, about the conditions his patients had. He was a man of few words. The only advice he gave me when I graduated from medical school was 'work hard, always go and see the patient when you're asked to, never prescribe medication without seeing the patient, and ... work hard!' He lived his life with honesty and integrity, never self-serving. He was an honourable man.

Dr Julia Wong

Paediatrician and daughter of E/Prof Wong Hock Boon

In 1962, Singapore had only six trained paediatricians. The increase in paediatricians obtaining higher qualifications from the United Kingdom or Australia had been slow. In 1965, E/Prof Wong became the first director of the School of Postgraduate Medical Studies (PGMS) at the University of Singapore. The PGMS enabled paediatricians to be trained and qualified locally with the Master of Medicine in Paediatrics degree. Within 10 years, the number of paediatricians trained in Singapore increased tenfold.

Groundbreaking Research

E/Prof Wong identified the association between hyperbilirubinaemia, kernicterus and glucose-6-phosphate dehydrogenase (G6PD) deficiency in newborns. Subsequently, he initiated G6PD deficiency screening using cord blood, which has since almost eliminated the incidence of death and permanent disability from severe neonatal jaundice and kernicterus in Singapore. He also discovered three previously unknown hemoglobinopathies, *Hb Singapore, Hb J Singapore* and *Hb J Meerut*.

Elevating Child Health in Singapore

In the 1960s, malnutrition and childhood infectious diseases such as bronchopneumonia, gastroenteritis and tetanus were the leading causes of paediatric deaths in Singapore. Professor Wong spared no effort in fighting these conditions and improving child health through public education. He initiated educational programmes that emphasised proper childcare practices, immunisation and healthy parent-child relationships. He also campaigned actively in the community to help overcome childhood malnutrition, which was at a high of 20% at that time.

Professor Wong is the undoubted Father of Paediatrics in Singapore. As a student, I was awed to see him lead daily ward rounds. He was exceedingly knowledgeable – a generalist and a specialist of all sub-specialties all rolled in one. Unbelievable, but that's how good Prof was. He would always be reading and researching in the library in his free time. Work was his passion. Work was his life. His commitment was unparalleled, and he was a true role model to us all.

Professor Quek Swee Chye
Head and Senior Consultant,
Division of Paediatric Cardiology

E/Prof Wong Hock Boon on ward rounds with post-graduate students.

Source: The SGH Museum

Prof Wong will always stand out as the authority on paediatrics of his time. He was respected for his wisdom and clinical diagnostic acumen internationally, and I had the honour to be one of his last paediatric trainees. Prof Wong was dedicated to teaching and he was always ready to impart his knowledge to junior doctors, as evidenced by the treasured weekly clinical sessions and conferences. He diligently conducted daily ward rounds from 7.30am, starting from the neonatal ICU before moving to the paediatric wards. The valuable clinical lessons learnt in those early days have been etched in my memory.

A/Prof Loke Kah Yin

Head and Senior Consultant,
Division of Paediatric Endocrinology

As a strong advocate of breastfeeding, he was known for his memorable statement: "Cow milk is meant for cows and not for human babies." In 1974, he organised the Breastfeeding Mothers' Group and established a breast milk bank in Singapore. His fervent promotion of breastfeeding even earned him the moniker "Mr Breastfeeding".

E/Prof Wong's contributions to public education helped achieve extraordinary progress for Singapore's child health. In 1962, Singapore's infant mortality rate (IMR) was 31.2, exceeding that of developed countries like the USA, UK, Australia and New Zealand. By 1976, it had fallen to 11.8, lower than that of the four countries. The neonatal mortality rate was 8.4, also lower than that of the above countries. Today, Singapore's IMR is 1.8, and its resident life expectancy at birth reached a high of 83.9 years in 2020.

A Solid Foundation for Paediatrics

For his contributions and achievements, E/Prof Wong was accorded the highest honours, including the Most Outstanding Paediatrician in Asia (from the Association of Paediatric Societies of the South East Asian Region); Public Administration Gold Medal; Meritorious Service Medal; Guinness Award for Scientific Achievement; the inaugural National Science and Technology Award; and Emeritus Professorship from the National University of Singapore.

As the department head and director of the PGMS, E/Prof Wong laid the cornerstones for the rapid development of paediatric education in Singapore. As a doctor, he elevated the standards of child health and paediatric care in Singapore.

As we celebrate 60 years of child health, we also remember our Founding Professor's selfless dedication to laying the groundwork for paediatrics in Singapore. It is on this solid foundation that we can continue to advance paediatric education, research and clinical care.

One of the many prestigious awards conferred on E/Prof Wong Hock Boon includes the Meritorious Service Medal, or the Pingat Jasa Gemilang, by the then President of Singapore, Dr Benjamin Sheares, in 1975.

Source: The SGH Museum

> Prof Wong inspired many generations of paediatricians and they would attest to his dedication to his patients. His trainees were continuously challenged to do better, as he was always several steps ahead when it came to clinical acumen and diagnosis. There were many astonishing moments when he would come to a diagnosis through his keen observation. He confidently diagnosed Noonan syndrome and hypophosphatemic rickets at his first encounters with these patients during morning rounds. He would say, 'Don't forget to look at the mother of your patient.' Indeed, mothers' clinical features were telling. It was a lesson not to be forgotten.

Professor Lee Bee Wah

Adjunct Professor, Yong Loo Lin School of Medicine

OUR MILESTONES

1962

The University Department of Paediatrics is set up in the Mistri Wing, Singapore General Hospital (SGH). Emeritus Professor Wong Hock Boon is appointed the first Founding Professor of Paediatrics at the University of Singapore.

The West Wing of Mistri Wing with open-air enclosed verandahs where the University Department of Paediatrics is housed.

Source: The SGH Museum

- Southeast Asia's first Human Chromosome Laboratory is established.

1964

Glucose-6-phosphate dehydrogenase (G6PD) deficiency is identified as a leading and preventable cause for kernicterus in Singapore.

E/Prof Wong Hock Boon initiates cord blood screening for the deficiency and establishes a surveillance programme for kernicterus in affected newborns.

1965

The department's neonatal service grows into Singapore's first neonatal unit with dedicated full-time medical and nursing staff and two premature nurseries, each with 20 special-care cots.

1970

The Master of Medicine examinations start off with 3 specialties, one of which is Paediatrics.

1976

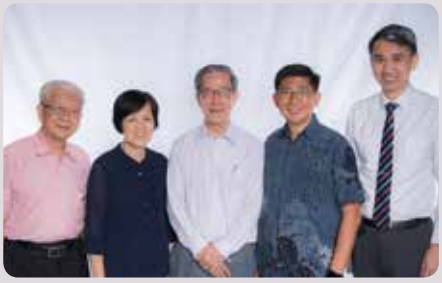
The printed Growth Charts for Singapore Children are published in collaboration with the World Health Organization (WHO) and the Ministry of Health (MOH), Singapore.

1983

Singapore's first successful paediatric bone marrow transplant by E/Prof Wong Hock Boon and A/Prof Quah Thuan Chong.

1985

The University Department of Paediatrics moves to the National University Hospital (NUH).



Our illustrious Heads of Departments after E/Prof Wong Hock Boon – (from left) Prof John Tay (1988–1995), Prof Low Poh Sim (1995–2002), Prof Quak Seng Hock (2002–2007), A/Prof Daniel Goh (2007–2017) and Prof Lee Yung Seng (2017–Current).

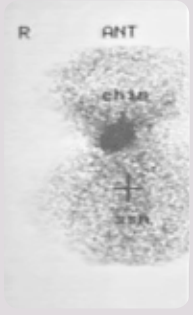
- Paediatric surgery services are established in NUH.

1985

Opened on 14 October, the Neonatal Ward is equipped with high technology equipment to ensure efficient care of babies. A total of ten cots are available.

Neonatal wards are equipped with personnel and equipment for special and intensive care.

- The Neonatal Unit begins cord blood congenital hypothyroidism screening. This enables the diagnosis and treatment of asymptomatic newborns within two weeks of life. As a result, intellectual disability are prevented in all of the cases and patients are able to complete secondary education. There is an incidence of 1 in 3,000 live births.



The screening enables doctors to identify newborns with high thyroid-stimulating hormone levels, which eventually reveal congenital hypothyroidism.

1986

The Department of Paediatrics begins its inpatient service with the opening of Wards 45 and 48.

The intensive care unit within Ward 45.

- The Paediatric Neuroscience Laboratory is established, allowing doctors to perform neurodiagnostic tests such as electroencephalography, nerve conduction studies and electromyography for infants and children.

- Nine children are spared the trauma of open-heart surgery when an alternative non-surgical technique is used to treat congenital valvar pulmonary stenosis. NUH is the first hospital in Singapore to introduce the technique of Percutaneous Transluminal Balloon Valvuloplasty.

1987

The Department of Paediatrics establishes the globin chain analysis for the diagnosis of beta-thalassemia, accomplishing the first prenatal diagnosis of a carrier.

1988

The Department of Paediatrics develops and offers the first gene screening for thalassemia in Southeast Asia.

1980s

The Department of Paediatrics is designated as WHO Collaborating Centre for Research & Training in Human Genetics and also as the Singapore Centre for the International Repository of Human Chromosomal Anomalies.

Signage outside the centre.

1987

First successful arterial switch operation in Singapore on the transposition of the great arteries in a two-week-old baby with a complicated congenital heart disease.

Shi Ming has her place in Singapore medical history as the first baby to successfully undergo an arterial switch operation.

1988

Together with NUH's Division of Human Genetics, the Department of Paediatrics is the first team in Singapore and the region to successfully apply the highly sophisticated technique of gene mapping of the prenatal diagnosis of Bart's hydrops – a condition which is fatal in-utero or shortly after birth.

- The Department of Paediatrics starts Singapore's first coordinated automated peritoneal dialysis programme for children who have developed end-stage kidney failure. It is a home-based programme where the young patient is connected to a dialysis machine for ten hours of treatment at night. This allows the child to lead a normal and active life, with minimal disruption.

  Singapore's first patient on home automated peritoneal dialysis is a two-year-old child who was placed on this pioneering method of home dialysis.

Patients or caregivers are trained by staff to perform the dialysis safely at home.

- The Paediatric Allergy and Immunology Laboratory is set up to address the lack of laboratories in Singapore that offer specialised tests for the evaluation of children with rare inborn errors of immunity or primary immunodeficiency.

  From its humble beginnings when only a handful of tests were offered, the lab now serves medical specialists in Singapore and the region, and engages in active research collaborations with clinicians and academics in various disciplines. The lab is currently a recognised entity with MOH, Singapore.

1989

The Paediatric Renal Replacement Programme (PRRP) is officially established to provide optimal and individualised treatment for paediatric kidney patients in Singapore.

Singapore's first paediatric living-related kidney transplant is successfully performed on a three-and-a-half-year-old child.

The transplant is performed by Sir Roy Calne, Visiting Professor in Surgery from NUS, together with the pioneering team of Emeritus Professor Prabhakaran Krishnan and Professor Abu Rauff. To ensure the success of the first kidney transplant in a young child, one of the leading experts of paediatric kidney transplant from the University of California at Los Angeles School of Medicine, Professor Stanley C. Jordan, is invited to Singapore to advise the team.

The Department of Paediatrics establishes molecular and prenatal diagnosis for alpha-thalassemia and for Duchenne Muscular Dystrophy using polymerase chain reaction (PCR) technology, a significant breakthrough for the department.

This new technology in gene mapping for both disorders is the first to be recorded in the country and Southeast Asia. This allows the department to offer screening in many other genetic diseases by PCR, namely Spinal Muscular Atrophy, haemophilia, marfans syndrome, G6PD deficiency and retinoblastoma.

1990

The Department of Neonatology is established with round-the-clock dedicated in-house medical support.

Formal opening of the Department of Neonatology by CEO Dr Judy Lim, flanked by its Chief, Prof Tan Kim Leong.

1990

The Department of Neonatology becomes the first to use high frequency oscillatory ventilation (HFOV) successfully in the ASEAN region. With this method, our doctors are in a better position to treat newborns with severe lung disease who, without HFOV, would either not have lived or have sustained severe lung injury.

1991

Singapore's first paediatric liver transplant is performed in NUH.

1994

The first deceased-donor kidney transplant is performed on a 10-year-old patient.

1995

First liver transplant using reduced graft where an adult liver is surgically reduced in size and transplanted into a child. 12-year-old Raziah becomes the first successful paediatric liver transplant patient in Singapore after a 12-hour operation.

With the successful operation, Raziah becomes the fifth liver transplant patient in Singapore.

1996

Singapore's first living-related liver transplant is successfully performed. 18-month-old Teo Wen Rui receives a liver graft from his mother, Madam Poh Siew Kuan.

Wen Rui celebrates his first birthday in 1997 and it is especially significant to him and his mother as it marks a new beginning, hope and life.

Newborn Hearing Screening by the Department of Neonatology began in 1991 but is formally established in NUH in 1995, paving the way for its establishment in the public sector in 2002 and nationally by 2004.

Significant hearing impairment is detected at the national rate of 4 per 1,000 live births with the majority diagnosed within three months of age and having interventions within six months of age, setting the stage for the prevention of severe speech delay.

This is an example of how a non-high-risk newborn with unilateral hearing impairment is identified, allowing early intervention and preservation of normal speech.

1996

The Department of Paediatrics performs NUH's first matched-unrelated donor marrow transplant.

1997

Southeast Asia's first 'split liver' transplant is successfully carried out. A split liver transplant involves one donor liver to be divided into two parts for transplant into two recipients. The recipients are 56-year-old Mr Hsu Toun Nam and 2-year-old Jessalyn Ong.

The PRRP attains national status. All children with end-stage kidney disease are referred to the PRRP for dialysis or transplant. Specialised paediatric dialysis nursing is established to manage unique problems present in children and adolescents with end-stage kidney disease.

2000

The first annual camp for kidney dialysis and transplant patients is held at Sentosa Island.

The camp allows patients to build strong bonds with their peers, which also help them better manage their condition.

2000

The Paediatric Intensive Care Unit (PICU) opens, comprising eight ICU and five high-dependency beds, specially designed to cater to patients with both medical and surgical problems. It offers state-of-the-art equipment, including special facilities for immunosuppressed patients.

The newly opened PICU is housed in Ward 46.

2001

The Department of Paediatric Surgery is established.

In 2002, the department comprises consultants, medical officers and a department secretary. E/Prof Prabhakaran, Dr Dale and Dr Mali remain in the team to date.

2001

NUH and SGH jointly perform the world's first successful cord blood transplant from an unrelated donor on 5-year-old Oh Tze Sun who was diagnosed with thalassemia major.

2002

Opening of the Children's Emergency.

The 24-hour facility is specially designed with child-friendly amenities and cheery murals to cater to young patients.

- The Shaw-NKF-NUH Children's Kidney Centre is officially opened. The PRRP is now housed in the centre, which is a one-stop facility providing haemodialysis treatment, automated dialysis training, consultation, counselling and therapy, catering to kidney patients.

Official opening of the Shaw-NKF-NUH Children's Kidney Centre in 2002.

- Founding of the Children's Asthma and Allergy Network "I CAN!" programme, which provides holistic care to children with asthma and/or allergies.

2002

Paediatric Inpatient Cancer Centre (PICC) funded by Children's Cancer Foundation is officially opened by Minister George Yeo.

The dedicated care facility for children with cancer, developed in 1999, offers effective delivery of simple and complex chemotherapy using protocol-based therapy and nurse-led central venous line care leading to significantly reduced line infections in children with cancer.

2003

The Child Development Unit (CDU) is one of two national centres established under the Child Development Programme (CDP) to serve children with developmental needs. The CDP is officially launched on 29 July 2003. The initial services are sited at Jurong Polyclinic.

- The Department of Paediatric Surgery is recognised as a training centre for Advanced Specialist Training (AST) in Paediatric Surgery.

- Launch of the Malaysia-Singapore Acute Lymphoblastic Leukaemia (Ma-Spore ALL) 2003 study collaboration with University Malaya Medical Centre.

2004

The opening of the Children's Blood and Cancer Centre allows paediatric patients to receive outpatient chemotherapy in NUH.

2008

In partnership with the VIVA Foundation, the VIVA-University Children's Cancer Centre (VUC3) is opened. Funded by Singapore Tote Board, it is a one-stop facility to care for young cancer patients.

The centre comprises an outpatient clinic and a day therapy centre for children to receive chemotherapy.

- Adolescent medicine services are established to address adolescent issues such as psychosocial problems, stress management, and obesity. It involves the coordination of services such as physiotherapy, occupational therapy, dietetics services, medical social services, art therapy, play therapy and volunteer teachers.

2009

CDU shifts from Jurong Polyclinic to Jurong Medical Centre. It is the first concept model of community-based specialist services under KTP-NUCMI, right-sited in the heartlands. Having the doctors, nurses, psychologists and other allied health professionals together in one clinic provides a one-stop location to cater to young children with developmental needs.

CDU offers multi-disciplinary service committed to providing holistic care for children with developmental, learning and behavioural difficulties.

2010

Performs Singapore's first double organ transplant (liver and kidney) on a 16-year-old patient. The surgery took 13 hours to complete.

- Launch of VIVA-Goh Foundation NUS Childhood Cancer Programme. Prof Dario Campana and Dr Elaine Coustan-Smith join the Department of Paediatrics as leaders of the childhood cancer programme.

The couple not only shares the same research interest but also the same mission of providing a bright future for children with cancer.

2011

The Department of Paediatric Surgery performs the first successful paediatric robotic surgery in Singapore. The benefits of robotic surgery for the patient are smaller wounds, less pain and a quicker recovery. For the surgeon, this new operative technique offers better visualisation through magnification and greater dexterity, which ultimately leads to better surgical outcomes.

- Our nurses care for the first baby on Extracorporeal Membrane Oxygenation (ECMO) in PICU.

2012

The first successful adoptive transfer of allogeneic natural killer (NK) cells helps bring an end-of-life patient into remission. It led to a series of allogeneic NK cell clinical trials which are ongoing.

- Ma-Spore ALL 2003 study is published in the Journal of Clinical Oncology showing successful personalised cancer biomarkers to reduce treatment intensity for children with early rapid response to ALL treatment.

- The paediatric bone marrow transplant centre becomes the first in Asia to be awarded the Foundation for the Accreditation of Cellular Therapy (FACT).

The team behind the paediatric bone marrow transplant centre that was awarded with FACT.

2012

Project Dreamcatchers exhibition is launched featuring artworks by youths living with chronic childhood illnesses to convey the message that childhood chronic illnesses are not disabling. It is part of the adolescent chronic illness peer support programme.

- The first Wong Hock Boon Paediatric Masterclass is launched.

The event continues our long tradition of excellent teaching and honours the legacy of our Founding Professor, E/Prof Wong Hock Boon. It has become a key platform for local and regional healthcare professionals to connect and share updates in the field of paediatrics.

A/Prof Daniel Goh giving an address at the inaugural Wong Hock Boon Masterclass.

2013

NUH is certified as the first baby-friendly hospital in Singapore by the WHO and United Nations Children's Fund.

2013

The Paediatric Outpatient Parenteral Antibiotic Therapy (OPAT) programme is established for the first time in Singapore which allows intravenous antibiotic treatment to be given to children as outpatients. Patients can continue to recover comfortably at home, attend school or go out with family and friends, even while on treatment.

Paediatric OPAT nurse Samantha Ang with a patient undergoing the treatment.

2014

The Paediatric Home Care Programme is launched to enable children with complex medical needs, such as those who are dependent on ventilators, to be seen by the doctor and nurse at home.

- CDU becomes the first Brazelton Touchpoints site in Asia.

Brazelton Touchpoints is an evidence-based programme established at the Boston Children's Hospital, Harvard Medical School. It applies knowledge of early childhood development to practice and policy, and focuses on building strong family-child relationships before birth through the earliest years, laying a vital foundation for children's early learning and healthy development. This programme has been offered as part of the NUS School of Continuing and Lifelong Education (SCALE) since 2020 and helps to build the professional capacity of early childhood professionals in child development knowledge and skills.

2014

Transplanted a hyper-reduced liver graft from a living donor to the youngest paediatric patient in Singapore.

2015

Performed Singapore's first paired kidney exchange transplant.

Ms Siti Rasyidah Lokman Hadan was on dialysis since she was 15 years old. Her 8-year wait ended in April 2015 when she became part of Singapore's first living paired kidney exchange transplant, performed at NUH.

- Family Based Therapy (FBT) is established for patients with anorexia nervosa. An evidenced-based model for the treatment of the eating disorder is developed and it results in shorter hospitalisation, faster and higher remission rates.

2016

The Division of Paediatric Psychological Services is officially set up within the department, with comprehensive psychological services that includes educational and clinical psychology, as well as art, play and child life therapy services.

The setting up of the new division synergises both psychology teams at the Kent Ridge campus and CDU, which leads the way for service expansion.

2017

The second CDU, the NUH Child Development Unit @ Keat Hong Community Club opens its doors to better serve young families and residents in the Southwestern area.

CDU@ Keat Hong is purpose-built as a novel concept of healthcare services sited in a community club and linked to nearby community services and facilities.

- The first neonatal nursing team in Singapore to be trained and credentialed to insert long venous lines.

The first batch of nurses to insert long venous lines for intravenous nutrition for pre-term newborns.

2018

Singapore's first ten cases of chimeric antigen receptor (CAR)-T cell therapy are successfully conducted for children and young adults with relapsed resistant B-acute lymphoblastic leukaemia.

2019

The world's first two cases of CAR-T cell therapy are successfully conducted for patients with relapsed resistant T cell ALL, including five-year-old British boy Oscar Saxelby-Lee.

2020

The Paediatric Liver Transplant programme by KTP-NUCMI and the National University Centre for Organ Transplantation (NUCOT) is recognised by the International Liver Transplant Society as the only paediatric programme in Singapore. The programme has sustained paediatric liver and kidney transplant numbers and outcomes despite the COVID-19 pandemic.

The multi-disciplinary liver transplant team, together with some of the NUH's first liver transplant patients in the 1990s.

Source: National University Centre for Organ Transplantation (NUCOT)

2021

NUH Children's Urgent Care Clinic @ Bukit Panjang is opened.

The walk-in clinic located within a mall provides acute care for minor injuries and ailments that are urgent but non-life-threatening.

Receives the Guinness World Record for the lowest birth weight recorded for a surviving infant.

Baby Kwek Yu Xuan was 212g at birth – about the weight of an apple. She was discharged at approximately 6.3kg after 13 months in the hospital.

2021

CDU, with a grant donation by the Lien Foundation, adopts artificial intelligence (AI) in child development work through development of a chatbot for child developmental resources and a language coaching curriculum (Project Chatterbot). This will be synergised with NUH's AI efforts through the OneNUHS app, with a vision of broader community adoption of this chatbot by parents and early childhood providers.

The first gene treatment of infantile spinal muscular atrophy in Singapore is performed on Devdan Devaraj, using intravenous Zolgensma infusion.

TRANSFORMING CHILD HEALTH FOR THE FUTURE

2010

The Department of Paediatrics receives a generous donation of S$50 million from the Estate of Khoo Teck Puat and is renamed the Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI).

This meaningful gift enables the cluster to transform paediatric care and bring it to greater heights of excellence. This includes the development and expansion of programmes to bring about holistic care and funding for research grants to support studies in various disciplines and specialties.

Underscoring the commitment to better serve our patients and their families, the gift enables the establishment of an integrated paediatric outpatient facility with medical, diagnostic and rehabilitation services under one roof.

A bust of the late Tan Sri Khoo Teck Puat in the lobby of the KTP-NUCMI building as a symbol of gratitude towards the Estate of Khoo Teck Puat.

2016

Work commences on the new paediatric ambulatory centre at KTP-NUCMI.

The official work commencement ceremony for the outpatient facility was graced by the Trustees of the Estate of Khoo Teck Puat and the leadership of NUHS and KTP-NUCMI.

2019

The new KTP-NUCMI outpatient facility welcomes its first outpatients in January.

The 10-storey-high building reinforces holistic care in a child-friendly and family-centred environment. The completion of the building marks a significant milestone for paediatric care in Singapore. It has provided the impetus to continually transform paediatric medicine in the face of change and make a substantial difference to the lives of children.

The move to the new building started over a weekend. Our clinicians, nursing, allied health and admin staff undertook a massive task to move several clinics into the new building and unpack in time to open on a Monday.

2020

KTP-NUCMI is awarded three international awards for its outstanding health facility design – Best International Health Project 2020 (under 40,000sqm) at the International Design and Health Awards, 2020 International Interior Design Association Healthcare Design Award (Ambulatory – Paediatric) and an Honourable Mention (Architectural Design) at the Outstanding Property Award London 2019.

The child-centric and family-friendly environment features a 'playscape' design concept inspired by nature. Waiting time is translated into play time in the themed waiting areas as children interact and explore the theme-inspired features within the observatory vicinity of the parents.

The centre hopes to change the way paediatric care is delivered in Singapore, to elevate healthcare for children and adolescents, and to improve health outcomes for the future.

The centre focuses on creating a therapeutic environment that is child-centric and family-friendly. Its environment and vibrant, themed interiors serve to provide the child and family a holistic care experience.

A SIGNIFICANT CONTRIBUTION TO TRANSFORMING PAEDIATRIC CARE, EDUCATION AND RESEARCH

Advancing Paediatrics in KTP-NUCMI

The generous gift supports KTP-NUCMI's advancement of paediatric education, research and patient care, which has benefited many generations of children in Singapore and the region.

Clinical Programmes

- Allergy Management Centre
- Children, Adolescent and Family Support Services
- Growth and Nutrition Programme
- Learning and Behavioural Programme
- Paediatric Ethics and Advocacy Centre
- Paediatric Palliative Care Programme
- Rehabilitation Programme for Children with Special Physical Needs
- Sleep and Aerodigestive Centre
- Undiagnosed Case Clinic

Research Programmes

- Allergy Research Programme and the Development of the House Dust Mite Vaccine
- Assessment of Heart Health and the Development of the 'Lab on a Chip'
- Cancer Research Programme and the Detection of Early Relapse
- Children Development Issues in the Community
- Developing new Clinical Diagnostic Tools/Aids
- Health Outcomes Research
- Research in Obesity
- Research on the Immune System and its Effect on Transplants
- Study on Genes and its Effect on Response to Infection
- Studying Trends in Diseases

Outreach Programmes

- Global Aid Programme (GAP Fund) to help needy foreign patients
- Under Global Health Outreach, the gift had partially sponsored these projects in the past:
  - Retinablastoma Early Detection Programme in Mindanao, Philippines (2011 to 2017)
  - Project Sothea – Medical Students Outreach Programme in Cambodia (2013 to 2019)
  - Medical Symposium at Kunming, China (2014)

While good clinical care remains our focus, as paediatricians, we are constantly thinking of ways to take the fear and anxiety out of children when they come to the hospital. For some of our young warriors, the treatment process can be challenging in more ways than one. We try to ease the experience for them by creating a therapeutic and supportive environment that they can relate to. This explains the various nature-related themes in the building. To this end, we have also sought out like-minded collaborators with the aim of making an outpatient visit for little ones less intimidating and a more pleasant one.

A/Prof Daniel Goh

This project is one of the highlights of my career here. I worked with a team of dedicated building consultants, contractors and colleagues from various departments in NUH, including Operations Support Services, Facilities Development, Hospitality Services, Infection Control and KTP-NUCMI Operations team. Each individual played an important role as we worked closely to provide a child-and-family-friendly facility that was safe and functional and that gave all of us a great sense of purpose.

Dr Tyrone Goh

A/Prof Daniel Goh and Dr Tyrone Goh were the Project Owner and Project Director of the KTP-NUCMI Steering Committee and played an instrumental role in the planning and development of the building.

Chapter 2

our Inspirations

Featuring the uplifting journeys of some of our patients who have made tremendous progress in their recovery. Having triumphed over adversity, they are now leading meaningful and fulfilling lives. Their resilience and fortitude continue to inspire all at the Khoo Teck Puat – National University Children's Medical Institute. These stories, as well as countless others, will always remind us to do our best for our patients every day.

Dr Ashwin Singaram

Alexis Teo and her parents

Devdan Devaraj and his parents

Qistina Aisha and her family

Siblings Lim Si Jia and Lim Zhe Yu

Firdaus Mohd Abdullah with his family

Dr Mark Goh

FINDING EMPATHY, PAYING IT FORWARD

One year after a tracheostomy, Alexis Teo is healing well from bronchopulmonary dysplasia. Having received help and support along the way, her parents pay it forward by supporting other parents facing similar challenges.

Alexis Teo was born premature at 26 weeks of gestation at the National University Hospital (NUH). She developed bronchopulmonary dysplasia (BPD) – a condition where her under-developed lungs were damaged, and also chronic lung disease hence requiring assistance by way of a ventilator and supplemental oxygen.

Through the care of the neonatal team with careful breathing support, nutrition and nurturing, Alexis' condition stabilised. She was discharged in January 2021.

By then, she had spent a year in NUH – nine months in the neonatal intensive care unit (NICU) and three months in the paediatric intensive care unit (PICU). Those months were an emotional roller coaster ride for Alexis' parents, Justin Teo and Koay Yih Chwin.

First-time mother Yih Chwin doing kangaroo care of Alexis at five months and 11 days after birth.

Alexis' 100th day, the first time she was on continuous positive airway pressure support before her diagnosis of pulmonary hypertension.

Yih Chwin shares that "the worst period" for them was when Alexis' BPD was complicated by pulmonary hypertension, where the circulation in the lungs was under high pressure and, as a result, carried less oxygen.

"It was very scary, as I could see her lips turning blue when she wasn't getting enough oxygen," says Yih Chwin. "I would stay by her cot and stare at the saturation monitor because sometimes she might need a lot more oxygen in a matter of minutes."

The decision for a tracheostomy was also not easy for the parents. Although the procedure would help Alexis breathe better, it was nonetheless an invasive one performed on a baby. Moreover, Alexis would need long-term special care at home after the procedure, which would be challenging.

The alternative to a tracheostomy was to continue to have her on an endotraceal tube for an extended duration, with its possible complications and prolonged hospital stay, or a nasal cannula, which was uncomfortable and not the most optimal support for her under-developed lungs.

"It was very scary, as I could see her lips turning blue when she wasn't getting enough oxygen. I would stay by her cot and stare at the saturation monitor because sometimes she needed a lot of oxygen in a matter of minutes.

While the parents were exploring the various options and thinking long and hard about a tracheostomy, Associate Professor Zubair Amin, Head and Senior Consultant of the Department of Neonatology, supported them through the journey.

"He was very patient, letting us explore different options before we came to a decision," says Yih Chwin. "He didn't pressure us to decide within a certain timeframe."

A/Prof Zubair moderated the views of different consultants, clarified the couple's doubts and addressed their concerns. Justin and Yih Chwin found the family conferences with A/Prof Zubair, doctors, nurses and respiratory therapists extremely helpful. A/Prof Zubair even went the extra mile to join the parents in a teleconference with a BPD specialist in the United States.

"All these discussions helped us reach a conclusion and be more confident that the tracheostomy would be the best way forward," adds Justin.

PICU nurse playing with Alexis in Ward 46.

> We'd never met them, but they were really supportive. We found the most understanding and empathy in parents who had been in the same shoes.

The family after Alexis' tracheostomy surgery.

Also ever present for the family were the nursing teams at the ICUs. "The nurses did all the heavy lifting," Justin notes. From changing Alexis' diapers to feeding her, from constantly monitoring her condition to skilfully putting the nasal prongs on her, the nurses did everything right so that she would be comfortable.

Giving Back to A Supportive Community

Singapore sees fewer tracheostomy cases compared to other countries. Through social media, Justin and Yih Chwin got in touch with parents overseas whose children had undergone tracheostomy. They asked for advice and learnt from the experiences of these parents. "We'd never met them, but they were really supportive," comments Yih Chwin. "We found the most understanding and empathy in parents who had been in the same shoes."

They also joined a local chat group where parents with children who have had a tracheostomy for various reasons, shared their experiences and tips. When Alexis was first discharged, a Singaporean couple whom they knew through the chat group visited them. They gave the couple some

The first time Alexis was brought outside the ward to see the sunlight at nine months and 17 days old.

excess supplies and helped them set things up at home, even though they were still grieving for their son who had just passed away. This kind gesture deeply moved and inspired the family.

For all the help they received, Alexis' parents now pay it forward by sharing their experiences and advice with others in the chat group. They have also set up a social media account, where they post updates on Alexis' condition, so that other parents in need can easily get in touch with them.

Now two, Alexis is a cheerful and friendly toddler who waves and smiles to everyone, even strangers. She has learnt sign language to communicate with her parents. She can also breathe unsupported by the ventilator for most of her day.

Alexis has been hitting her milestones slowly and surely, from sitting to taking her first steps, and from babbling to identifying shapes. "Any kind of milestone, even the tiniest one, brings us so much happiness," says Justin.

"We hope Alexis will not need the ventilator and can be de-cannulated soon," he continues, referring to the removal of the tracheostomy tube.

When that happens, he adds, Alexis will be able to swallow better, and they look forward to the simple joy of enjoying a meal together as a family.

Alexis took her first steps at two years old.

> Any kind of milestone, even the tiniest one, brings us so much happiness. We hope Alexis will not need the ventilator and can be de-cannulated soon.

TOGETHER THROUGH IT ALL

Siblings Lim Zhe Yu and Lim Si Jia forge stronger bonds as they navigate the challenges of the same chronic condition.

Lim Zhe Yu, 24, and his sister Lim Si Jia, 22, were diagnosed with glycogen storage disease (GSD) when they were four and eight respectively. They are under Professor Quak Seng Hock's care at the National University Hospital (NUH). He is the Emeritus Consultant at the Division of Paediatric Gastroenterology, Nutrition, Hepatology and Liver Transplantation.

Children who are diagnosed with this rare genetic condition lack an enzyme that converts glycogen to glucose. Glycogen build-up can cause problems to the liver and other organs.

Zhe Yu received a liver transplant at 17 from a deceased donor, while Si Jia received hers at 16 from an altruistic donor. Her transplant made the news as her donor was the first in Singapore to donate part of his liver to a stranger.

Zhe Yu and Si Jia with their family, during their teenage years before the transplant.

"He is truly a kind and caring person who wanted to give back to society," says Si Jia.

"He was the one who inspired me the most, and I felt that gaining back my physical strength and getting discharged quickly was the best way to show my gratitude towards him," she adds. "The thought of being able to lead a healthy life from then on also motivated me to work on my recovery."

He was the one who inspired me the most, and I felt that gaining back my physical strength and getting discharged quickly was the best way to show my gratitude towards him. The thought of being able to lead a healthy life from then on also motivated me to work on my recovery.

Si Jia's doctors visited her post-transplant.

About two years after receiving a liver transplant, Lim Zhe Yu woke up one morning and noticed that the whites of his eyes looked yellow.

He suspected that the symptom was a sign of transplant rejection. His follow-up appointment at NUH confirmed his suspicion. He was immediately warded for anti-rejection treatment. Zhe Yu would go on to undergo treatment for another two rejections. But he has taken it in his stride.

Indeed, it has been challenging growing up with a medical condition, even after their transplants. The siblings recall missing out on their social lives because of their surgeries and post-transplant recovery. Zhe Yu repeated his courses for his first semester at Temasek Polytechnic and lost touch with the friends he had already made.

Si Jia spent several months convalescing at home after her transplant. When she started school again, she would return home immediately after school and could not hang out with her friends due to her low immunity. Eventually, she drifted apart from them.

> But we always tried to stay positive and tell each other that everything would be okay and won't be as dire as we imagine.

Back then, she was also the odd one out in school who wore a face mask to protect herself. "I could feel that all eyes were on me, though I understood that it was because people were curious," she mentions.

Strength Through Adversity

Sharing similar experiences and challenges, the siblings have been each other's pillar of support. When Zhe Yu was facing transplant rejections, Si Jia was anxious about her brother's condition. In addition to her concerns for her brother, she was also worried that the same might happen to her. "But we always tried to stay positive, telling each other that everything would be okay and won't be as dire as we imagine," she shares.

After their transplants, they watched each other's diet. Now, they constantly remind each other to take their medications. "We've been through a lot together, so we are close and support each other," says Si Jia. "And because of this journey, we have become more appreciative of our family, who will always be our main source of support."

They also have their doctor to thank for his relentless encouragement and dedication. Prof Quak's good-humoured manner often helped the siblings cope with the many hospital visits through the years. "Prof Quak makes things less serious and scary," Zhe Yu recalls. "When he's reminding us to take our medications, for example, he does it jokingly and lightens the mood."

Zhe Yu is now a motion graphics designer, while Si Jia is a therapy assistant at a community hospital.

Si Jia graduated with a Diploma in Health Management from Republic Polytechnic and plans to further her studies in occupational therapy. Being in and out of the hospital since young has inspired her to pursue a career in healthcare. "I've chosen to go into occupational therapy because I want to help people," she mentions.

Young children growing up with a chronic condition often face many ups and downs in their long patient journeys. According to the siblings, staying upbeat is vital. "Overcoming your condition is not easy, but remember that it will turn out okay," Si Jia maintains.

When they were younger, the siblings would find it "unfair" that they had GSD while their friends were "normal". But not anymore. "Suitable donors are hard to come by, and I constantly remind myself to be thankful for the opportunity to have a new life," says Zhe Yu.

"My experience has made me stronger, braver and grateful," Si Jia shares. "I don't blame others whenever my life gets tough now. I just try my best to overcome my problems."

"We can't choose what kind of life we are born into, but we sure can lead a different one," adds Zhe Yu.

Celebrating significant milestones together with their loved ones.

> Suitable donors are hard to come by, and I constantly remind myself to be thankful for the opportunity to have a new life.

A BLESSING IN DISGUISE

Inspired by his paediatrician at the National University Hospital, Dr Ashwin Singaram chose to pursue medicine to impact patients' lives.

When Ashwin Singaram was 15, he shadowed Associate Professor Daniel Goh at the National University Hospital (NUH) for an industrial attachment assignment from school.

A/Prof Goh is Senior Consultant at the Division of Paediatric Pulmonary Medicine and Sleep. He was also Ashwin's paediatrician, who had been treating the teen's asthma and allergic rhinitis since he was nine.

Young Ashwin followed the doctor around for a few days and saw how he interacted with his patients. "The moment his patients stepped into the consultation room, Prof was able to create a connection with them immediately and get them to open up," Ashwin says.

Ashwin and his brother, who was also under A/Prof Daniel's care.

"It was inspiring to see that he really cared and took the effort and time to find out more about his patients' lives, apart from their medical conditions," he adds. "The way he did that was pretty amazing, and I thought I wanted to emulate that in my life."

During Ashwin's consultations with A/Prof Goh, he recalls the doctor spending a good part of the time talking about school, hobbies and other topics with him.

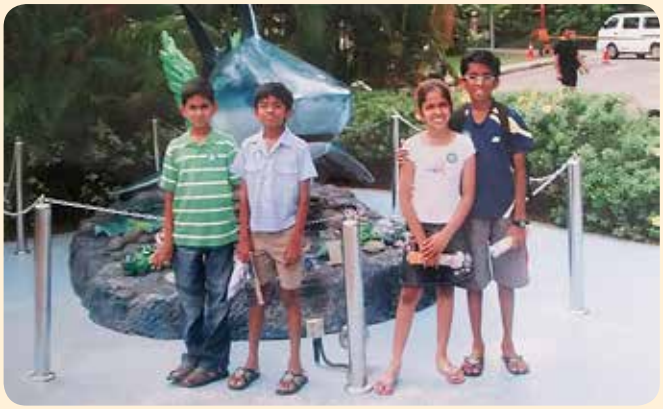
"I would look forward to my appointments, once every three to four months, to catch up with him," Ashwin shares. "I think it was because he didn't take himself too seriously and was always able to relate to what I was doing, no matter what stage of life I was in, whether primary or secondary school."

"My appointments didn't seem like consultations, and I always felt like I was talking to a peer even though he's much older than me," he continues.

Ashwin was under A/Prof Goh's care until he was 18. While his condition was generally moderate, it has improved much more after he became more compliant with taking his medications and taking responsibility for his own health.

"My condition was affecting my concentration in school and ability to focus on tasks," he explains. "I couldn't sleep well at night as the exacerbations always seem to be in the night."

He would be sneezing and coughing every few days, which also made it difficult for him to participate in sports. Not wanting to miss out on fun with his friends, he eventually heeded A/Prof Goh's advice on taking his medicines on schedule.



The proper management of his condition allowed him to actively participate in activities with friends and family.

> It was inspiring to see that he really cared and took the effort and time to find out more about his patients' lives apart from their medical conditions. The way he did that was pretty amazing, and I thought I wanted to emulate that in my life.

With appropriate management, his condition was well controlled and the symptoms became much milder. As he got older, he eventually outgrew his childhood asthma.

Ashwin has always appreciated the nurturing and family-like atmosphere at the paediatric clinic in NUH. "I didn't think of them as doctors or people who were looking after me, but as my family who cared about me," he explains. "The whole experience was never scary to me as a kid."

When Ashwin began to think about his future in earnest in junior college, he decided to pursue medicine and become a doctor.

"I'm thankful for my parents and Prof Goh for helping me see that my illness was something I could fight against, a challenge I could overcome," Ashwin says. "And from my experience of managing my illness, I have also found my calling, so it is a blessing in disguise."

He underwent various postings, one of which was as an Orthopaedic Surgery House Officer at Tan Tock Seng Hospital.

> If we take an extra minute to find out more about our patients, about what's bothering them or what's meaningful to them, and then tailor the treatment to what is beneficial to them, these little moments can make a positive impact on our patients. Compassion is what motivates us to do all that.

Ashwin was inspired to provide the same care he received to others. The first step was getting into medical school.

Ashwin graduated from the Lee Kong Chian School of Medicine at the Nanyang Technological University in 2021. The 26-year-old is now a junior doctor undergoing various postings. After much thought, Ashwin may consider specialising in Internal Medicine.

"Prof Goh inspired me the most in my choice to do medicine," he mentions. "I want to put people at ease too, so I try and put what I observed from him into practice."

Noting that while doctors go into medicine with good intentions, they may find it hard to see the bigger picture when they are "bogged down with a thousand different things to do".

"If we take an extra minute to find out more about our patients, about what's bothering them or what's meaningful to them, and then tailor the treatment to what is beneficial to them, these little moments can make a positive impact on our patients," he says. "Compassion is what motivates us to do all that."

THE GIFT OF A SECOND CHANCE

Given another shot at life with a kidney transplant at 20, Dr Mark Goh has found a sense of purpose.

Dr Mark Goh Sen Liang was diagnosed with nephrotic syndrome due to focal segmental glomerulosclerosis (FSGS) at 13 years old. FSGS is a rare condition where scar tissue grows on the kidneys and prevents them from filtering waste from the blood. Nephrotic syndrome results from severe leakage of protein in the urine, causing the body to swell.

The most challenging period was when he started peritoneal dialysis. The procedure helps remove waste products from his blood using a fluid that flows through a tube into his abdomen.

In junior college then, he would have dialysis at home for about 10 hours overnight. He would experience sharp pain during dialysis at the initial stage as his abdomen continually expanded and shrank over 10 to 12 cycles. "I remember holding my father's hand as I endured the pain," he says.

Over time, as he got used to dialysis, the process became more bearable. Then, at 20, he received a kidney transplant from his mother.

Mark's primary doctor at the National University Hospital (NUH) was Professor Yap Hui Kim, Head and Emeritus Consultant at the Division of Paediatric Nephrology, Dialysis and Renal Transplantation. "When I first met her, I thought she was quite stern," Mark shares. "Eventually, I came to realise that she's someone who gives you space to grow into a better version of yourself."

Giving Back, Creating Good

With Prof Yap's encouragement, Mark got more involved in the kidney patient community. He was roped in to lead and organise stay-in camps for young kidney patients who might have missed out on outdoor activities, where they could pick up social and leadership skills. "These opportunities helped me build up my self-confidence," Mark mentions. "I am the person I am today with much thanks to Prof Yap."

After Mark completed his undergraduate degree in physics, he applied to the Duke-NUS Medical School. "I volunteered a lot at the hospital, and the community has always been supportive," he comments. "I thought it'd be meaningful to give back to this community and help other patients overcome their difficulties."

To Mark, NUH feels like a second home. "I've known some of the doctors and nurses since I was 13," he shares. "Going for my appointments at NUH was like meeting my friends and family. It felt really nice, and it's not easy for an institution to achieve that."

"I thought it'd be meaningful to give back to this community and help other patients overcome their difficulties.

Having gone through the same journey, Mark was able to emotionally relate to the patients who attend the camps.

Being on the side that provides the care for patients, Mark has deepened his appreciation for his doctors.

Mark was able to see how the camps made a positive difference in patients' lives and he was happy to be a part of the journey.

> It felt like this was what I was meant to do, as I'd been through something similar and could share my experience.

After careful consideration, the 30-year-old has decided to join the Department of Paediatrics in NUH as a resident. He can certainly say that he has walked in the patients' shoes.

During a posting, he met with a patient who reminded him of his younger self. The patient, in junior college and planning for a transplant, was anxious and had many unanswered questions. "I could reassure him that things would be okay even 10 years from now," he mentions. "It felt like this was what I was meant to do, as I'd been through something similar and could share my experience."

Despite having received a kidney transplant, Mark says for transplant patients like him who have had chronic kidney issues, the meaning of recovery is relative. "Sometimes, things may still go wrong despite doing all we can," he adds. "So we have to accept that and be at peace with it."

Mark has been able to adopt such a stance with the support of his family and friends who have had similar experiences, many of whom are his fellow patient volunteers. "The community is very accepting, and we're open about sharing our struggles," he offers.

He adds that patients do not have to go through their challenges alone. "You can reach out to people who have gone through similar experiences, and they'll be happy to support you and let you know that life is worth living," he mentions.

Someone once told him that his life "won't be normal anymore" after his transplant. However, "normal" is simply a state of mind to Mark. "It's true that we have to do all these other things like taking our medications and going to our doctor's appointments," he says. "But I can work as a doctor and do what everybody else gets to do. For me, that's normal enough."

Given another opportunity at life, he says that he tries to be more intentional in his work and interactions with his family or others. "Even with our best intentions, we often fall short of what we are supposed to do. But I want to live life well, so that when I look back, it would be time well spent," he remarks.

GAINING STRENGTH FROM HIS CANCER JOURNEY

Firdaus Mohd Abdullah overcame childhood leukaemia and now lives a purpose-driven life helping others.

Walking home from religious school one weekend, then 11-year-old Firdaus Mohd Abdullah felt dizzy and weak. "My home was only two kilometres away, but I felt like I had completed a marathon," he recalls.

When he reached home, he had noticed red spots on his feet. He did not know then that these blood spots, which were just pinhead-sized, were due to a low platelet count.

Soon after that, Firdaus was diagnosed with acute lymphoblastic leukaemia, the most common type of cancer in children, and had to be admitted to the National University Hospital (NUH). "My parents were shocked," says Firdaus. "My mother bawled her eyes out, and my father asked everyone he knew to pray for me."

At NUH, Associate Professor Allen Yeoh, Head and Senior Consultant at the Division of Paediatric Haematology and Oncology, oversaw his care. Affable and fluent in Bahasa Melayu, A/Prof Yeoh reassured Firdaus' distraught parents that there was hope for cure. It was particularly challenging for his parents as Firdaus was their only child and cost was a worry.

His encounter with the late Mr S.R. Nathan and Taufik Batisah during his days of recovery.

Now 30 years old, Firdaus recalls many fond memories during the care. Intrathecal chemotherapy, where chemotherapy is injected into the lower part of the spine, was particularly scary to him. Once, he experienced a sharp "electrical shock" during the procedure when the needle touched a nerve. Thereafter, he refused to let any other doctors carry out the procedure apart from A/Prof Yeoh. The doctor obliged. Even when he was away, he returned to the hospital for Firdaus' procedure, putting young Firdaus' mind at rest.

> From that episode, I learnt that there's only so much you can be sad and depressed about, and you've got to pull yourself out of it after some time.

Firdaus' treatment lasted two years from 2003 to 2005. Having to go through such an ordeal, he was depressed, helpless and a little defiant. He had a lot of medications to take and instructions to follow, one of which was to drink a lot of water. He was feeling rebellious and did not do as he was told, despite the repeated advice.

A/Prof Yeoh sat him down and told him flatly that he needed to drink. Firdaus thought deeply about it. Instead of going against the doctor, Firdaus decided to fight this cancer with the team. "From that episode, I learnt that there's only so much you can be sad and depressed about, and you've got to pull yourself out of it after some time," he says.

"I knew what cancer was and that it could be like a death sentence for some," Firdaus comments. While he had occasional emotional and wilful moments, he eventually came to his senses and set his mind on one thing – to get better so that he could support his parents who were already in their silver years.

Thankful for his parents' strength, resilience and constant presence, Firdaus shares: "There was never a time when they were upset with me for my emotional outbursts, which were a side effect of the medicine I had been taking."

He participated in Camp Sunshine, co-hosted by Club Rainbow (Singapore) and Children's Cancer Foundation, as the Goldfish Mascot, in 2004.

> No words can express my gratitude to the NUH team. I'll always be grateful and indebted to their love and friendship, and there will always be a part of them in me.

He also found comfort in the care he received at NUH. "All the doctors, nurses and medical social workers were very warm," he says. "They never treated me like I was a patient." Ward 47, where he stayed during his inpatient treatment, felt like home.

"No words can express my gratitude to the NUH team," adds Firdaus. "I'll always be grateful and indebted to their love and friendship, and there will always be a part of them in me."

Social workers from the Children's Cancer Foundation (CCF), on the other hand, arranged for home tutors to help him catch up on schoolwork. Firdaus also found support in other cancer patients through CCF. They would dance together for hours to express their feelings. Harnessing everyone's support, Firdaus has emerged stronger in his fight against cancer.

A New Meaning in Life

His cancer journey gave him a sense of clarity to live with purpose and help others. "I saw that life is short," he comments.

He became actively involved in student unions and dance societies in secondary school and Ngee Ann Polytechnic, where he pursued a Diploma in Early Childhood Education. After his National Service, he taught in a preschool for four years. Then, hoping to serve more in need, he joined the Muslim Kidney Action Association (MKAC), a non-profit social service organisation that helps chronically ill Muslims.

These days, Firdaus keeps busy as a new father to a baby boy while serving as MKAC's executive manager. He also volunteers at various Muslim organisations, including a mosque where he is a board member.

On a recent pilgrimage, Firdaus was climbing up to the Cave of Hira with his spiritual teacher. It was a tough climb, and he felt tired and breathless. His legs were giving way and he wanted to give up. "But I thought to myself: I survived cancer and came out of it stronger, so I can do this," he affirms. "No matter where I am in my life, my journey as a cancer patient gives me strength to move on."

THE GIFT OF HOPE

Devdan Devaraj, who has Type 2 Spinal Muscular Atrophy, was successfully treated with gene therapy and can now stand and walk with support.

When Devdan Devaraj was one month old, he was diagnosed with Spinal Muscular Atrophy (SMA), a rare genetic condition that affects his nerves and muscles.

If left untreated, SMA could cause Devdan's muscles to weaken over time. Breathing and swallowing difficulties, among other problems, could also develop. He could even face total immobility during his teens.

With help from a successful public fundraising campaign, Devdan received Zolgensma, a one-time gene therapy treatment.

Zolgensma costs S$2.9 million and has been dubbed 'the most expensive drug in the world'. Even though Devdan was diagnosed early, and his parents, Dave and Shu Wen Devaraj, knew about it, the drug had never been a viable option for them. "We thought it would be impossible to pay that amount," says Shu Wen.

Devdan's symptoms began to show at seven months, confirming Type 2 SMA. He would fall backwards when he was seated and could not bear any weight on his legs.

His doctors, Associate Professor Stacey Tay, Senior Consultant, and Dr Furene Wang, Consultant, at the Division of Paediatric Neurology, helped him get special access to risdiplam, an oral drug for SMA not yet approved in Singapore, based on compassionate use.

Compassionate use refers to using a new, unapproved drug when no other treatments are available. Risdiplam was delivered one year later. "When we received risdiplam, I cried," recalls Shu Wen. "That was the first time we felt hopeful after almost two years of waiting."

Devdan spent the night at the hospital before the treatment.

"When we received risdiplam, I cried. That was the first time we felt hopeful after almost two years of waiting.

Devdan had recurrent visits to the clinic for his physiotherapy sessions.

Devdan saw some improvements within two months of using risdiplam. But his parents knew that the best long-term treatment would still be Zolgensma.

For the gene therapy to be effective, Devdan had to get Zolgensma before he turned two. As his second birthday drew near, a friend suggested to Shu Wen to crowdfund the cost of the therapy. "If we didn't try fundraising at all and missed the two-year mark, we would regret it for life," Shu Wen mentions.

Thus began their whirlwind campaign on the Ray of Hope platform. In just 10 days, the campaign raised almost S$2.9 million, covering the cost of Zolgensma, from nearly 30,000 Singaporean and overseas donors.

> We felt hopeless at one point too. But like how the doctors were always encouraging us, I'd say to them that medicine is ever improving, and there's always hope.

A/Prof Stacey Tay had taken over Devdan's care by this time as Dr Wang was away.

Experienced with the Zolgensma treatment, A/Prof Tay gave the parents the reassurance they needed during those stressful moments. "She knew the answer to every question we asked and acted really fast to acquire the drug," says Shu Wen. "We knew we were in safe hands."

The parents were constantly updated on the progress of acquiring Zolgensma, which was imported under the Health Sciences Authority's Special Access Route. "Their support helped us get through the period when we had so much anxiety," says Shu Wen.

Charting New Ground

After the treatment, Devdan has been reaching his developmental milestones steadily. "On the day of the Zolgensma infusion, we were very emotional and also very scared," Shu Wen recalls. "The reality didn't sink in until a few weeks later when Devdan started to show good progress."

A pacer was provided temporarily for Devdan to practise his walk daily.

Devdan showed good progress and is able to stand with support. The smile on his face says it all!

Devdan is now able to walk and stand with support. He can even ride a tricycle. His hands tremor much less, and he is a bundle of energy.

"We are really contented with his improvement because he is now totally different from how he was previously," Shu Wen comments. "He is much more independent, and we hope he can go to a usual preschool like other children."

Adding that the experience has shown them the abundance of humanity in the world, Shu Wen says they now set aside an amount every month for donations. "A lot of people did that for us, so we want to pay it forward," she continues. "Sometimes, I think of the help we have received and I get overwhelmed, so the way for me to release that is to give back as much as we can."

Parents of children with special needs may bottle up their worries and anxieties, like Shu Wen once did. "It is important for us to reach out to people who can help, be it social workers, fellow parents who have had the same experiences, or organisations offering support," she shares.

When parents with similar challenges reach out to them now, Devdan's parents will lend a listening ear and share their experiences. "We felt hopeless at one point too," Shu Wen says. "But like how the doctors were always encouraging us, I'd say to them that medicine is ever progressing, and there's always hope."

POWERED BY POSITIVITY

Thirteen-year-old Qistina Aisha may have been born with a heart condition but a fortifying dose of optimism and pragmatism is what keeps her going strong.

After Qistina Aisha had her first open-heart surgery, her mother, Anwin Samsudi, asked her surgeon, Dr Sriram Shankar*, what the three-year-old should avoid doing.

Dr Shankar's reply, still vivid in Anwin's mind now, was, "You mean to tell me she went through 103 days in the neonatal intensive care unit (NICU) and three surgeries, for her not to be able to do something?"

"He meant that it was up to her what she wanted to do after the surgery," Anwin explains. "Her condition would not limit her."

Aisha was born with a potentially lethal congenital heart defect known as pulmonary atresia, where the primary problem is a major abnormality in the blood vessel connecting the heart to the lung. This usually results in what was once classically described as a critically ill 'blue baby' as blood pumped by the heart to the lung to receive oxygen is unable to go through the usual pathway.

Two shunts were inserted into her heart when she was three months and twelve months old to help blood flow to her lungs. Then, at three years old, she had her first open-heart surgery, whereby her under-developed pulmonary artery was replaced with an artificial valve.

After her first open-heart surgery, Aisha also underwent several angioplasty procedures whereby the blood vessels supplying blood to her lungs were enlarged to ensure continued blood flow as she got older and bigger. In November 2021, she went through another open-heart surgery, performed by Assistant Professor Winn Maung Maung Aye, Consultant at the Department of Cardiac, Thoracic and Vascular Surgery, National University Heart Centre, together with Associate Professor Laszlo Kiraly, Head of Division and Senior Consultant, and Dr Senthil Kumar, Consultant, from the same department.

Aisha was admitted for her first open-heart surgery in 2012.

All smiles and ready to head home after the surgery.

> When we first found out about her condition, we were anxious and worried because we were not sure how serious it was or whether the defect was repairable.

At six years old, Aisha participated in the SG50 Jubilee Big Walk.

Aisha is Anwin and Ashiq Osman's second child. "When we first found out about her condition, we were anxious and worried because we were not sure how serious it was or whether the defect was repairable," recalls Anwin.

"But we've been blessed with a brave child, who was not fussy or difficult when she needed to go through all these procedures," she continues. "So, mommy and daddy had to be cool about it too."

Even after her first open-heart procedure, the then three-year-old took just a week to get back to her usual self. "She told our relatives who visited her, 'I'm sick, I've got something here, and I'm getting better,'" she adds.

**Dr Sriram Shankar was a visiting consultant at the National University Hospital at the time.*

A Heartening Outcome

The parents were intentional about not letting Aisha's condition be the centre of their family life. After coming to terms with the diagnosis, they simply viewed the condition as something they had to deal with and discussed it as a matter of fact. "We're not into the drama," Anwin quips.

"As a parent, I want my children to understand that this is just like going to the dentist," she says. "You need to go to the dentist, so you'll go to the dentist, and that's that."

"We didn't want her to feel any different about herself because of her condition," adds Ashiq. "The surgeons and the cardiologist told us that she could do things like other kids, so that reassured us too."

Aisha's parents adopted a level-headed approach about their daughter's condition and were also glad that the doctors shared a similar approach. "It has always been a positive experience," says Ashiq. "The doctors reassured us with information and were open about what to expect, which made it easier for us and alleviated some of our fears."

At the National University Hospital, Aisha has come under the care of several doctors in addition to the cardiac surgeons. Dr Yvonne Ng, Senior Consultant of the Department of Neonatology oversaw her care when she was in the NICU and when she came back to the hospital for outpatient visits. Dr Terence Lim, Senior Consultant at the Division of Paediatric Cardiology, has been her primary doctor charting her progress and assessing her medical needs from birth.

Preparing for her first angioplasty procedure in 2018.

> Never give up and just know that the pain will go away eventually. There's a lot of support from the nurses and doctors, so you're in good hands.

Aisha getting discharged from her second open-heart surgery in 2021.

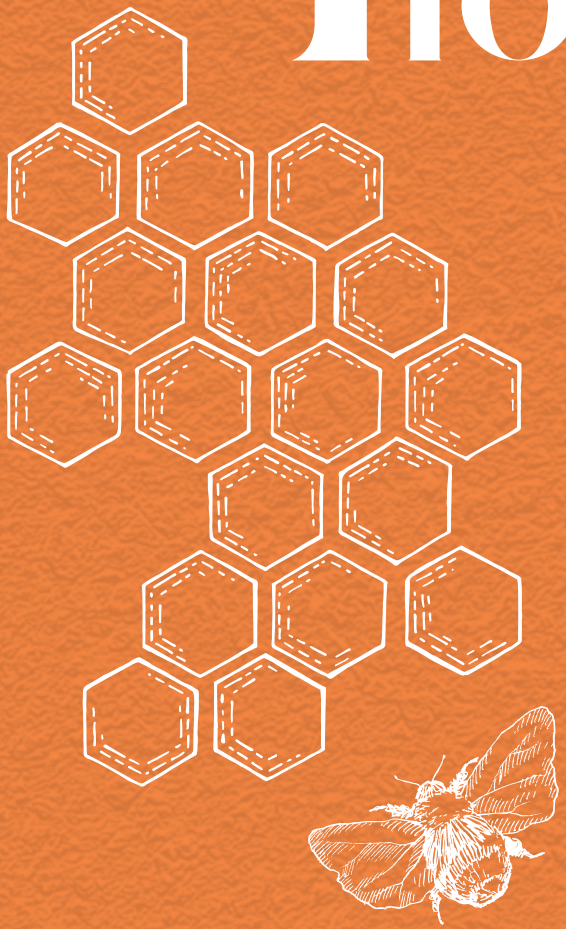
When Anwin was pregnant with her third child, she was initially worried that he would have the same condition as Aisha. Thankfully, that was not the case. Dr Lim went further to reassure her that should that ever happen, the medical team would be ready for it. "I felt grateful to hear that," Anwin shares.

Aisha, now 13, is enjoying her physical education lessons and Girl Guides in secondary school. "Never give up and just know that the pain will go away eventually," she says confidently when asked if she had any advice for children facing medical challenges. "There's a lot of support from the nurses and doctors, so you're in good hands."

"It has been a blessing for us to connect with a team of doctors who have been optimistic, positive and pragmatic, and whom I would say are Singapore's finest," Anwin adds.

Chapter 3

our Pioneers



Behind each patient's journey stands the individuals who have made clinical care, research and education their life's work. This chapter honours our early trailblazers who have left a mark in medical history.

Through their contributions, these illustrious pioneers laid strong foundations and set the precedence for the future generation to continue providing excellent paediatric care in Singapore and the region.

Message from

DR DALE LINCOLN LOH

Head and Senior Consultant,
Department of Paediatric Surgery

> The success of our programmes is testament to the strong bonds forged across the departments within KTP-NUCMI, namely the Departments of Paediatrics, Paediatric Surgery and Neonatology.

It is with great pride that I reflect on 60 years of serving the young of Singapore. The University Department of Paediatric Surgery was first established at the Singapore General Hospital in 1981 under the leadership of Dr V T Joseph. With the opening of the National University Hospital (NUH) in 1985, the department set roots at the Kent Ridge Campus. The paediatric surgical service at the NUH was helmed by the eminent Emeritus Professor Prabhakaran Krishnan and eventually evolved into a full-fledged department in 2001.

Over the years, the Department of Paediatric Surgery has grown from strength to strength, growing our team, services and surgical care. We have journeyed with our patients from a tender young age till they have blossomed to adults.

Under the capable leadership of E/Prof Prabhakaran and close collaboration with pioneers of the Department of Paediatrics, the national paediatric liver and kidney transplant programmes we established have flourished here in Singapore and regional countries such as Indonesia and Myanmar. This has contributed to the Khoo Teck Puat – National University Children's Medical Institute's (KTP-NUCMI) role as an important neonatal, paediatric and paediatric surgical centre in Southeast Asia.

As we set our eyes on the future, we will focus on enhancing our surgical services to better care for children in need, particularly those with bladder and bowel incontinence issues. Working together with the paediatric neurosurgical services and the Department of Obstetrics and Gynaecology, we will also look into developing foetal therapies or procedures to overcome neurosurgical problems. These are some of the key plans that will put us in good stead to better care for the next generation.

The success of our programmes is testament to the strong bonds forged across the departments within KTP-NUCMI, namely the Departments of Paediatrics, Paediatric Surgery and Neonatology. I am confident that as we ride on the shoulders of our pioneering giants, our committed staff and future leaders will rise to meet new challenges with the same fervour and rigour that have driven us to elevate child health. Congratulations to all our colleagues in KTP-NUCMI, and here's to another 60 years and beyond!

Message from

ASSOCIATE PROFESSOR ZUBAIR AMIN

Head and Senior Consultant,
Department of Neonatology

> As the adage goes, "If you want to go fast, go alone. If you want to go far, go together." I am thankful for every single individual who has journeyed together and contributed to the department, bringing it to where it is today.

Our beloved Khoo Teck Puat – National University Children's Medical Institute is celebrating 60 years of providing care for the young. We certainly have much to be grateful for as we commemorate the successes of the three departments – Neonatology, Paediatrics and Paediatric Surgery.

Led by the late Professor Tan Kim Leong, the Department of Neonatology was established in the National University Hospital (NUH) in 1990. Through the years, the department has flourished, which would not have been possible without the solid foundation set by our illustrious pioneers: Emeritus Professor Wong Hock Boon, Professor Tan Kim Leong, Associate Professor Roy Joseph and Associate Professor Lee Jiun.

Through their profound leadership and key clinical contributions, vulnerable newborns were given a second chance to live. The tenacity and resilience of our leaders in overcoming challenges are embedded in our hearts and minds and inspire us to strive further for our patients.

They are some of the youngest and smallest in the hospital but these mighty heroes possess immense courage and will to live. We have achieved many firsts including caring for the world's smallest surviving baby. We have accompanied parents on journeys fraught with highs and lows, celebrated their joys and shared their griefs. The impact of care we deliver goes beyond treatment; it allows our families to celebrate many birthdays together.

Our newly revamped neonatal intensive care unit has enabled us to offer better, family-focused care. We continue to push boundaries and work with key partners to bring neonatal care to greater heights and give our little ones the best start they can have. It is only through our people that we can make that difference.

As the adage goes, "If you want to go fast, go alone. If you want to go far, go together." I am thankful for every single individual who has journeyed together and contributed to the department, bringing it to where it is today. I am confident that our esteemed clinicians, nurses and allied health professionals working with the families of our patients and larger community have put us in good stead to take on the next 60 years and beyond.

Message from

MS KATHERINE LEONG

Assistant Director of Nursing (KTP-NUCMI)

> The next generation of paediatric nursing leaders must continue to be that illuminating light that guides and leads. Beyond serving in the hospital, it is envisaged that the role of paediatric nurses will continue to evolve to meet the needs of a dynamic population...

It is with great honour and pride that I share this message to mark this momentous occasion for the Khoo Teck Puat – National University Children's Medical Institute. From the pioneering years to the present, we have undoubtedly made waves in the history of paediatrics.

I take this opportunity to express my deepest gratitude and appreciation to the paediatric nursing pioneers, namely my predecessor Ms Tay Kim Ngah, Senior Nurse Manager Auyong Wai Meng and Senior Nurse Manager Lim Luen Ying. Through their dedication, steadfast courage and resilience, the seeds of excellence and dedication were planted deeply in paediatric nursing.

Their legacy and leadership have touched lives as they strived to provide the best care and treatment to patients and families in the humblest of settings. This is the essence of why we do what we do. It is the beacon that guides and inspires all of us. Be it braving the frontlines or working ceaselessly behind the scenes, doctors, nurses, allied health professionals, and operations and administrative teams have always come together as one family to achieve the goal – providing the utmost care for our young patients and journeying with their families.

The next generation of paediatric nursing leaders must continue to be that illuminating light that guides and leads. Beyond serving in the hospital, it is envisaged that the role of paediatric nurses will continue to evolve to meet the needs of a dynamic population – be it the push for advanced practice nurses to take on a bigger role in the diagnosis and treatment of patients or venturing into the community to collaborate with partners. The road ahead is certainly paved with opportunities and growth.

This commemorative book is time and history immortalised for us as one cluster to remember where we came from and where we will steer towards in the future, inspired by our past stories and successes.

I wish everyone continued success in all things that is of Heart, Humanity and Health!

Message from

MS SARAH HO-LIM

Assistant Director of Nursing (Neonatology)

> At the heart of what we do is still passion and a desire to help our patients get better. Yet, it is also about uplifting our colleagues and enabling them to grow from strength to strength.

As the Khoo Teck Puat – National University Children's Medical Institute celebrates 60 years of child health, it is indeed a proud moment for every healthcare team working here at the National University Hospital (NUH). We have overcome many major hurdles and created beautiful memories working together, despite the adversities these past years. What makes us a strong and cohesive team stems from the commitment and love for our patients.

Our journeys here are also life lessons built upon by generations of nurses who have come through our doors. I am proud to witness the amazing stories, especially those of our neonatal nursing pioneers such as Senior Staff Nurse Pick Gate, who has committed her nursing career towards developing the newborn hearing programme and nurturing young nurses to be competent in this field. She is one of many of our well-respected seniors who have seen the Department of Neonatology through its many phases of growth.

As healthcare evolves and technology advances, our nurses will have to continuously challenge ourselves to adapt, upskill and be future-ready. The spirit of learning is fundamental to nursing and will be even more crucial to the next generation of nursing leaders, who will be taking on increasingly complex medical challenges in the coming years.

At the heart of what we do is still passion and a desire to help our patients get better. Yet, it is also about uplifting our colleagues and enabling them to grow from strength to strength. That is the essence of our department, amplifying our vision for Incredible Care, for our people and our patients.

This commemorative book celebrates who we are, how far we have come and our hopes for the future. My hope for the team is for each individual to blossom and foster a tight-knit community to elevate the level of care and journey alongside the families whose stories we share close to our hearts.

BREAKING THE MOULD

As the only paediatric oncologist back in the day, Associate Professor Quah Thuan Chong established the foundation in finding the cure for childhood cancer.

> I first started my 'affiliation' with the University Department of Paediatrics as a house officer in 1976. I've been growing and 'maturing' in the department since. Looking back, it's God's blessing to be privileged to work in the wonderful department, with plenty of outstanding colleagues, both old and young. Most of us love what we do, and we are surrounded by like-minded people, who work very hard, love and give their best to the kids under their care. What else can I ask for? Thank God for His blessings.

A/Prof Quah was inspired by the children and colleagues he got to know during his housemanship and decided to spend the rest of his life caring for children.

When doctors at the National University Hospital (NUH) need a consult about rarer cancers and complex cases, the person they turn to is Associate Professor Quah Thuan Chong, Emeritus Consultant at the Division of Paediatric Haematology and Oncology.

A/Prof Quah is among that special breed of haematologist-oncologists who possess deep knowledge of many conditions and analytical skills to provide balanced views on how to individualise patient care. As one of Singapore's few cancers specialists then, he did not have a team to consult and had to wear multiple hats in determining the best treatment for the patients.

He graduated with a Bachelor of Medicine and Bachelor of Surgery (Singapore) in 1976 and Master of Medicine in Paediatrics in 1980. Having practised paediatrics for almost half a century, he has shaped the practice of paediatric haematology-oncology and bone marrow transplantation (BMT) in Singapore and beyond.

During a time when chemotherapy regimens hailed from the West, A/Prof Quah recognised the need to contextualise therapy to cater to epidemiological, socio-cultural and economic differences. He thus designed and pioneered the acute lymphoblastic leukaemia (ALL) protocol at NUH, which improved the cure rate of childhood ALL in Singapore from 30% to 62%. He also developed the therapeutic protocol for acute myeloid leukaemia (AML).

He pioneered thalassaemia genetics research and developed clinical approaches to benign and non-benign conditions, including haemangioma, vascular malformations and Langerhans cell histiocytosis. He spent a 10-month sabbatical

in Israel and Australia in 1986 and 1990 respectively, updating himself on the practice in advanced centres. In 1983, together with the late Emeritus Professor Wong Hock Boon and Visiting Professor Simon Slavin, he performed the first BMT in Singapore.

Continuing the nurturing tradition of the department, A/Prof Quah aspires to instil a thirst for learning in his students and younger doctors both locally and beyond the shores of Singapore. True to form, he pioneered the Clinical Fellowship Programme in Paediatric Oncology in 2000 which benefited numerous clinical fellows from the ASEAN region and beyond. Not one to rest on his laurels, he also developed a two-year programme to complement the clinical fellowship that has become the second paediatric sub-specialty diploma endorsed by the College of Paediatrics and Child Health, Academy of Medicine Singapore. His other significant contribution to the oncology field is the annual Paediatric Oncology Forum, which he created in 2003 with Associate Professor Allen Yeoh. Attended by doctors from the region including Malaysia, Philippines, Indonesia, Vietnam, India and Sri Lanka, these annual gatherings have helped raise the standards of paediatric cancer care in Asia. It has also earned him the respect of clinicians locally and regionally. Testament to his impeccable clinical acumen, he has also been invited to many of these countries to help establish clinical programmes and improve cancer care in the region. His many contributions earned him the National Outstanding Clinician Mentor Award in the National Medical Excellence Awards in 2013.

A Mentor and A Friend

Big-hearted, gentle and sincere, A/Prof Quah epitomises the practice of whole-patient care in a family-focused manner. He believes in not only healing his patients, but also caring for them and comforting their families too. That was why he pioneered patient-centred care through team-based practice delivered by a collaborative team of doctors, nursing and allied health practitioners.

A/Prof Quah lives by the motto of always doing his best for others. He recognises human limitations and treats everyone and every adversity with equanimity. When discerning apprentices model his ways, they gain a more fulfilling practice. He will always be a master clinician, tender-hearted doctor, wise teacher and approachable friend.

A/Prof Quah giving a lecture at the Joint Singapore Paediatric Congress & Asia Pacific Academy of Pediatric Allergy, Respirology & Immunology Meeting in 2008.

STRENGTH IN KINDNESS

Beneath Professor Low Poh Sim's gentle demeanour is a powerful trailblazer who has built a firm foundation for paediatric and paediatric neurology services.

Soon after completing her paediatric training in 1977 with her mentor, the late Emeritus Professor Wong Hock Boon, Professor Low Poh Sim began her journey in paediatric neurology as a distinct sub-specialty under Professor Chan Kim Yong to meet the pressing needs of the department. As sub-specialties were not common in Singapore back then, she gained clinical experience through her fellowship at the Royal Hospital for Sick Children, Edinburgh, a leading centre for paediatric neurology, in 1982.

Prof Low assumed the leadership role as Head of Department of Paediatrics, National University of Singapore (NUS) and National University Hospital (NUH), from 1995 to 2002. From 2008 to 2012, she was Cluster Chair for the University Children's Medical Institute (now known as Khoo Teck Puat – National University Children's Medical Institute). Today, she is an Emeritus Consultant at the Division of Paediatric Neurology. Her leadership and astute decisions have ensured the continued development of paediatrics in general and paediatric neurology as a sub-specialty.

Leading with Foresight

Prof Low's responsibility went beyond clinical service, encompassing research, teaching and mentoring of students and staff. In 1986, she developed the Paediatric Neuroscience Laboratory at NUH to perform neurodiagnostic tests for affected infants and children. She is also one of the pioneers who set up the Neurogenetic Laboratory at the NUS Department of Paediatrics, alongside Associate Professor Lai Poh San, Associate Professor Nilmani Saha and Professor John Tay.

Prof Low alongside her mentor and role model, E/Prof Wong Hock Boon.

Prof Low has nurtured and mentored countless paediatricians, many of whom are now established leaders in the profession. She mentored Associate Professor Stacey Tay as the latter worked on genetics of paediatric neuromuscular conditions and mitochondrial disorders.

In the 1990s, she mentored Dr Brenda Wong and Associate Professor Ong Hian Tat as they expanded the scope of paediatric neurology services to include child development and behavioural disorders. This led to the establishment of multi-disciplinary integrated clinics such as the paediatric rehabilitation and spina bifida clinics. These services served as a foundation for comprehensive and integrated care for children with neurological disabilities.

As the Head of Department, she ensured that the team was appreciated and recognised for their work. This gave them the motivation to grow and develop in their careers, which eventually brought about great outcomes for the department.

> I greatly cherish this department where I spent my entire 48 years of working life. It is not the brick and mortar, but the department's culture and the people (colleagues, friends, students and patients) who share common goals and aspirations that make this place very special. This place has nurtured me in my career and has shaped me as an individual. I am proud to be part of this marvellous team.

Prof Low is renowned both regionally and internationally, not only for her clinical expertise but also for pioneering integrated paediatric neurological services. She was instrumental in setting up NUH's paediatric electroencephalography monitoring unit in 2000. The unit enables the diagnosis of unusual events and spells reported in paediatric patients and the pre-surgical evaluation of potential paediatric epilepsy candidates.

In 2001, she directed the Child Development Programme at NUH, which received funding under the Ministry of Health's Health Services Development Programme. The Child Development Unit at NUH was officially launched in 2003 to cater to children with developmental and behavioural needs.

Prof Low has served with distinction and commitment beyond the call of duty in her entire career. For her immense contribution to nurturing the next generation of paediatricians, she received the National Outstanding Clinician Mentor Award in the National Medical Excellence Awards in 2009 and the Lee Foundation NHG–NUHS Lifetime Achievement Award in 2014.

GOING BEYOND HEALING

Driven by a single-minded passion to enable chronic kidney patients to lead fulfilling lives, Professor Yap Hui Kim has dedicated her career to the advancement of paediatric nephrology.

As an aspiring doctor in the early 1980s, Professor Yap Hui Kim saw how devastating kidney failure was for children and their families. Dialysis was not available to young children because no doctors or nurses in Singapore were trained for it. Kidney failure in children then was almost akin to a death sentence.

Determined to change that bleak reality, Prof Yap trained in paediatric nephrology for two years at the University of California, Los Angeles, before returning to Singapore to bravely take on the seemingly insurmountable challenge of starting a paediatric dialysis programme from scratch.

Clinical challenges and lack of funding and support – these were the many trials that Prof Yap had to overcome. Yet, her unwavering determination to enable better lives for her patients also brought out the innovative visionary in her. Together with a dedicated paediatric dialysis nurse, she adapted machines and successfully performed both peritoneal dialysis and haemodialysis on her first few patients. She rallied her patients and their families to tell their stories to the public and actively canvassed funds to propel the programme.

Since then, the programme has evolved into the national Paediatric Renal Replacement Programme (PRRP), with dedicated inpatient and outpatient dialysis services. The high transplant survival rates are comparable to leading paediatric kidney centres internationally. At the centre of it is Prof Yap, the Emeritus Consultant who continues to head the Division of Paediatric Nephrology, Dialysis and Renal Transplantation at the National University Hospital (NUH) and relentlessly find new ways to help her patients.

Gifting A New Lease of Life

Prof Yap strongly advocates that treating children with chronic conditions goes beyond prescribing medication – it is to enable them to lead quality lives and fulfil their dreams.

This ethos has guided her belief in kidney transplantation as the treatment of choice for children with end-stage kidney failure. Prof Yap performed the first living-donor paediatric kidney transplant in Singapore on a three-year-old child in 1989. Since then, her vision has led to many more milestones, including the establishment of the Shaw-NKF-NUH Children's Kidney Centre (CKC) in 2002 in NUH, a dedicated centre aimed at the holistic care of children with chronic kidney conditions.

One of CKC's achievements is a medically supervised annual camp that enables patients to forge close bonds, support one another and empower themselves to achieve their aspirations. Older patients now return to run the camp alongside the doctors and nurses – something that Prof Yap is extremely proud of.

To realise her aspirations for her patients, Prof Yap is also pushing boundaries through translational research and nurturing the next generation of paediatricians.

A pioneer in paediatric nephrology research, particularly in childhood glomerulonephritis, Prof Yap has published more than 100 full papers with over 500 citations. She serves on several national and international scientific advisory boards and is often invited as a guest lecturer on international platforms. The internationally regarded professor became the first female and Asian President of the International Pediatric Nephrology Association (IPNA) in 2019. CKC is also recognised by IPNA as one of the leading training centres for paediatric kidney doctors in Asia, attracting paediatric nephrologists to train in NUH. Playing a larger role in growing renal expertise in the region, Prof Yap also leads overseas missions to develop dialysis and transplant programmes. That she still finds time to guide students and junior clinicians is testament to her extraordinary commitment towards mentorship.

With more than two decades of visionary contributions, she has earned multiple accolades, including the notable National Outstanding Clinician Award at the 2008 National Medical Excellence Award, the Outstanding Asian Paediatrician Award 2012 from the Asian-Pacific Paediatric Association and the Lee Foundation NHG-NUHS Lifetime Achievement Award in 2013.

> The future of dialysis and transplantation is exciting, and I hope to see a future where artificial organs can be prescribed to patients, removing the need for donors.

Specialised paediatric dialysis nurses play a vital role in the PRRP. Nurses Foong Pei Pei and Wendy Lim (standing far left and right respectively) had to adapt from adult dialysis to cater to the needs of their paediatric patients.

Prof Yap (middle row, second from the left) as a trainee in Paediatrics. She enjoyed working in the department alongside supportive colleagues who were ever ready to lend a helping hand when in need.

Source: The SGH Museum

Often asked about the secret to her success and motivation, Prof Yap always says: "Passion. You must see the patient as the centre of why you are here."

A FATHERLY VETERAN

Professor Quak Seng Hock has played a pivotal role in building up paediatric gastroenterology and hepatology services in Singapore and will always be known as the 'Ah Chek' who leads and guides with humility.

Professor Quak Seng Hock was walking through a busy paediatric ward round one day when he unexpectedly stopped in front of a child. He then said to the medical officer, "Please do a blood culture and cover with intravenous antibiotics." When the blood culture did indeed grow a bacterium, *Salmonella paratyphi*, the medical officer was astounded. "How did Prof identify the child with febrile gastroenteritis out of so many children?" he wondered aloud to a registrar, whose response was, "That's the eye of a professor."

This is just one of many anecdotes illustrating Prof Quak's inspiring clinical astuteness. He is not only highly respected as a wise clinician, but also a passionate educator and influential mentor. He served as the Head of Department of Paediatrics from 2002 to 2007 at the National University Hospital (NUH) and was Head of Division of Paediatric Gastroenterology, Nutrition, Hepatology and Liver Transplantation for over two and a half decades. Today he is an Emeritus Consultant of the division.

Prof Quak finds it the most rewarding when seeing his patients recover from their ailments.

Setting A Firm Foundation

Prof Quak graduated from the University of Singapore in 1976 and trained in general paediatrics under the late Emeritus Professor Wong Hock Boon. After completing his Master of Medicine (Paediatrics) in Singapore, he furthered his training in paediatric gastroenterology and hepatology at the Hospital for Sick Children in Birmingham in the United Kingdom (UK). Prof Quak was a member of the then British Paediatric Association in the UK (now known as the Royal College of Paediatrics and Child Health), as well as the Founding President of the College of Paediatrics and Child Health in Singapore when it was established in 2004.

At NUH, Prof Quak established the paediatric gastroenterology and hepatology division in 1985 and developed its full set of services. The inception of the division has helped further the development of the sub-specialty in Singapore. As a pioneer in this field, he achieved major milestones in Singapore and Southeast Asia. These milestones included pioneering paediatric gastrointestinal endoscopy services, paediatric gastrointestinal motility services and the paediatric liver transplantation programme.

From the first successful paediatric liver transplant in 1995 in Singapore, Prof Quak and the team have established a paediatric liver transplantation programme with outcomes comparable to leading paediatric liver transplantation centres in the world. The programme remains the largest in the region to date. An advocate of knowledge sharing, Prof Quak is also active in helping overseas gastroenterologists set up liver transplantation programmes in the region, such as Indonesia.

Liver transplant is a resource- and labour-intensive procedure. Often, it is the only treatment option available for children with end-stage liver disease. After transplant, these children have a new lease of life and many of them grow to become useful members of society.

Prof Quak is described by his mentees to be a man of a few words but those words were always meaningful and helpful to them.

Testament to Prof Quak's vast knowledge in the field, he has served in various national advisory committees including appointments in the Academy of Medicine and the Ministry of Health, and contributed his expertise to both local and international professional bodies. In addition, he drives training programmes for paediatric gastroenterologists and hepatologists locally and regionally and firmly believes in building up expertise to care for children with liver conditions beyond Singapore. Ever the committed teacher, he trained and mentored countless medical students and junior doctors to develop their clinical skills, knowledge and professionalism. In fact, he has been an examiner for the postgraduate degree in Paediatric Medicine and Family Medicine for the past 20 years.

Beyond his clinical and academic commitments, Prof Quak has been an active researcher and has contributed to clinical trials on Hepatitis B vaccination and liver transplantation. He has also reviewed and published in international, regional and local medical journals.

For his extensive contributions, the eminent professor received the National Outstanding Clinician Mentor Award at the 2014 National Medical Excellence Awards.

The distinguished clinician and mentor has certainly paved the way for future paediatricians to follow in his footsteps. Fondly regarded for his congeniality and fatherliness, he remains the approachable advisor to colleagues and juniors alike who have gained insights from his wise words on everything, from career development to emotional well-being. Popularly known as 'Ah Chek' (Hokkien for 'uncle'), he has also won over the tummies of many in the department – his much-acclaimed Penang laksa is a sought-after delight for social gatherings.

IN GOOD HANDS

Regarded as the pioneer of paediatric liver transplantation in Singapore, Emeritus Professor Prabhakaran Krishnan has had an illustrious career with many firsts in paediatric surgery.

Emeritus Professor Prabhakaran Krishnan's skilled hands have given countless children a new lease of life. The prominent surgeon's vision in enabling children with chronic liver and kidney conditions to lead quality lives with organ transplantation has shaped a crucial aspect of the paediatric surgery landscape in Singapore.

Harnessing Success

In 1975, E/Prof Prabhakaran obtained his Bachelor of Medicine and Bachelor of Surgery from the University of Singapore. He received training in general surgery from 1976 to 1979 and paediatric surgery from 1979 to 1983 at the National University of Singapore (NUS). In 1979, he obtained his Fellowship of the Royal Colleges of Surgeons (Glasgow and Edinburgh) and Master of Medicine (Surgery). He furthered his sub-specialty training overseas at the Royal Children's Hospital in Australia and subsequently in the United Kingdom and the United States.

In 1985, E/Prof Prabhakaran established and headed the paediatric surgical service in the National University Hospital (NUH) and later established a dedicated Department of Paediatric Surgery in 2001.

From 2004 to 2016, E/Prof Prabhakaran was Director of the Paediatric Organ Transplantation programme at NUH. From 2017 to 2021, he was Surgical Director of Paediatric Transplantation at the National University Centre for Organ Transplantation (NUCOT).

Today, he is an Emeritus Consultant of the Department of Paediatric Surgery at NUH and Emeritus Professor of the Department of Surgery at the Yong Loo Lin School of Medicine, NUS.

E/Prof Prabhakaran led the team that performed Indonesia's first paediatric liver transplant in Central Java, Indonesia.

Architect of Hope

One of E/Prof Prabhakaran's pioneering work was in canine and porcine models of liver transplantation. His innovation not only led to the first human liver transplantation programme in Singapore but also culminated in the first successful paediatric kidney transplant in 1989 and the first successful paediatric liver transplant in 1995.

He has played an instrumental role in establishing the national paediatric kidney and liver transplantation programmes in Singapore, with outcomes comparable to leading centres in the world. In 2010, he led the NUH team in successfully performing Southeast Asia's first combined liver and kidney transplant in a paediatric patient.

E/Prof Prabhakaran's distinct surgical dexterity goes beyond transplantation. His surgical ability extends even to complex paediatric surgical cases and his reputation goes beyond Singapore.

E/Prof Prabhakaran sharing his vast knowledge with surgeons in Yangon's Children Hospital, Myanmar.

> The most memorable event in my paediatric surgical career was setting up the Department of Paediatric Surgery at the National University Hospital in 2001 and going on to helm the department for the next 15 years.

Beyond organ transplantation programmes, E/Prof Prabhakaran is an all-rounder paediatric surgeon who also contributes his expertise to efforts such as the Spina Bifida Clinic.

A strong advocate of mentoring clinicians locally and in the region, he has trained surgeons in developing countries in Asia, directed multi-disciplinary teams to venture overseas to establish transplantation programmes in various countries. These include the paediatric kidney transplantation programme in Yangon Children's Hospital in Myanmar and paediatric liver transplantation programme in Cipto Mangunkusumo Hospital in Jakarta, to name a few.

A passionate teacher keen to impart his knowledge, he has published in high-impact journals regionally and internationally. He has also served as a peer reviewer for international journals and takes a keen research interest in paediatric organ transplantation, paediatric urology and biliary atresia. The opinion leader has also been invited to lecture at international meetings and hospitals overseas.

For his significant achievements, he was one of two recipients of the prestigious National Outstanding Clinician Award at the 2012 National Medical Excellence Award.

Having handed the reins of leadership in 2016, E/Prof Prabhakaran continues to impart his knowledge and skills to the next generation of paediatric surgeons and general surgeons in Singapore and ASEAN countries. Technical advances may change the field of paediatric surgery but it will always be rooted in the solid foundation that he has built.

A HEART FOR THE YOUNG

Professor Tan Kim Leong championed better healthcare for newborns, which took him beyond the hospital into the community.

In the early post-independence period of the late 1960s to 1970s, at least 5% of the approximately 30,000 babies born annually at the Kandang Kerbau Hospital (KKH) had low birth weight. These babies often suffered from conditions such as prematurity, respiratory distress, congenital malformations, asphyxia neonatorum, severe neonatal jaundice and neonatal infections.

If not for one paediatrician, such newborns then would have faced higher risks of severe illness and death.

Professor Tan Kim Leong graduated from the University of Singapore in 1962 and was awarded the Membership of the Royal Colleges of Physicians (MRCP) in 1966. He joined the University Department of Paediatrics as a lecturer in 1968. In the same year, he was tasked with setting up the neonatal unit at KKH. He eventually went on to lead the Department of Neonatology at the National University Hospital (NUH) from 1985 to 1997.

Prof Tan together with his team of doctors and nurses, including second-generation neonatologist A/Prof Roy Joseph.

Prof Tan is a pioneering giant who improved the lives of countless of babies through his research and clinical efforts.

A Lasting Impact

As head of the neonatal unit at KKH then, Prof Tan initiated Singapore's first structured programme for the inpatient and outpatient care of both healthy and ill newborns in 1968. Thanks to the infrastructure, processes and standards that were set in place, newborn mortality and morbidity decreased drastically over the ensuing decade.

Prof Tan was known to be a tireless advocate for vulnerable newborns, pushing the envelope for better quality care that would make a lasting impact. By the early 1980s, he established an intensive care service for newborns. With a larger medical staff and the necessary equipment for intensive care, from ventilators to bedside blood gas and electrolyte analysers, the intensive care service reduced neonatal mortality rates from 16 through 10 to 5 per 1,000 live births over the next two decades. Between the mid and late 80s, he introduced surfactant therapy for babies with respiratory distress syndrome and high frequency

The 'double blue light' phototherapy unit designed by Prof Tan enabled even severe jaundice to be controlled without the need for an exchange transfusion.

oscillatory ventilation (HFOV) for newborns with very severe lung disease, who would otherwise have sustained severe lung injury or not have lived. The department in NUH was the first to use HFOV successfully in ASEAN.

Prof Tan's relentless passion also extended to the realm of translational research. His research proved that a high dose of light energy could effectively reduce the bilirubin level of newborns with jaundice when it was severe or even when the cause was due to a rapid breakdown of red blood cells. He developed a simpler and cheaper way of administering phototherapy to newborns using commonly available fluorescent tube lights, which has become accessible in almost every care facility worldwide. Newborns with high bilirubin would thus no longer be required to undergo the highly invasive and resource-intensive exchange transfusion therapy by the early 1980s. Prof Tan's innovation also contributed to the near elimination of kernicterus, a type of brain damage, in Singapore.

As an educator, Prof Tan taught and mentored most of Singapore's second-generation neonatologists. He impressed upon them the importance of clinical acumen and scientific curiosity, in addition to values like responsibility, perseverance, collegiality and empathy. Among the pioneers of paediatrics in Singapore, he was the inaugural Chairman of the Chapter of Paediatrics and Child Health (now the College of Paediatrics and Child Health) of the Academy of Medicine when it first started in 1989. A distinguished lecturer at international and local conferences, Prof Tan had the honour of speaking twice at the notable Haridas Memorial Lectures in 1972 and 1977 and the Benjamin Sheares Lecture in 1976.

Despite having his hands full with his responsibilities, the needs of children and the community remained close to his heart. He managed to carve out time to volunteer at the Kim Seng Community Centre night clinic from 1981 to 2003 and served as a member of the Children's Aid Society for 10 years from 1981 to 1991 – a commitment that exemplified his extraordinary dedication.

Prof Tan retired from the National University of Singapore in 1999 and passed away in 2015 at the age of 78. His devotion to the youngest of patients propelled him to make an indelible impact, and he is counted among the early trailblazers whose contributions have made great strides in child health.

Celebrating the first birthday for the Early Starters – a support group for neonates.

Prof Tan with paediatric surgeon E/Prof Prabhakaran Krishnan, with whom he shared a cordial and collaborative relationship.

A QUIET ADVOCATE

As a passionate champion of ethics and a discerning leader and mentor, Associate Professor Roy Joseph combines authority and humility with a grace that has shaped his ethos.

Associate Professor Roy Joseph is a thinker and innovator who has made remarkable contributions that have shaped the Department of Neonatology at the National University Hospital (NUH). He was appointed in 1979 as a faculty member in the then University Department of Paediatrics and assisted Professor Tan Kim Leong, the head of the Neonatal Unit, at Kandang Kerbau Hospital. In 1985, A/Prof Joseph moved to NUH and headed the Department of Neonatology from 1997 to 2005. Having handed the reins of leadership to the next generation, he is now an Emeritus Consultant of the department.

As a leader, A/Prof Joseph was known to be principled yet kind. He advocated 'ground empowerment' and firmly believed that "the stronger the base, the more effective the team". He encouraged a culture of trust and accountability among clinicians and nurses in the department, thus instilling in them the values of a future leader.

A/Prof Joseph believes that the desired outcome of neonatal care should always be a healthy infant and happy parents.

With this same spirit, he mentored and nurtured countless clinicians in his role as a training supervisor for the neonatology sub-specialty appointed by the Ministry of Health (MOH) from 1999 to 2016 and as the department's postgraduate and undergraduate training director.

As an astute clinician and researcher, A/Prof Joseph introduced key interventions to the neonatal practice to enable better care for newborns. He pioneered the introduction of transcutaneous screening for severe jaundice in Singapore that greatly impacted the care of infants with neonatal jaundice. Within NUH, he refined the newborn screening programme for glucose-6-phosphate dehydrogenase (G6PD) deficiency and introduced screening for infants with congenital hypothyroidism, hearing impairment and inborn errors of metabolism, which enabled early diagnosis and treatment.

Testament to his keen clinical acumen, A/Prof Joseph also contributed to the development of national recommendations and guidelines on newborn care, having served in several MOH advisory and expert committees on areas such as neonatal intensive care and newborn screening.

Always ahead of his time, A/Prof Joseph has been advocating conversations about death in his practice and espouses that "the outcome of death is not equal to failure of care."

In 2018, he led a team comprising clinicians from various hospitals and health institutions to come up with Singapore's first set of guidelines to address the complex needs of vulnerable or dying babies. He emphasises the importance of identifying the beginning of death and the futility of continuing with interventions that are not enabling the goals

In my journey, Christian Medical College (CMC) showed what ministering to the sick means. My parents toiled, Rachel (my wife) and the children encourage. The late Dr Malati Jadhav and Emeritus Professor Wong Hock Boon mentored. The cry for care and compassion from babies and their parents ensure I remain grounded. The juniors energise, seniors shape and the Lord Jesus pilots.

Medical staff of the Department of Neonatology in the early years.

of care. "If you want to be a good doctor, you need to learn to handle death," he affirms. This is particularly poignant given that A/Prof Joseph began his medical career while grieving the passing of his father.

A Moral Cause

A/Prof Joseph is known to be a champion of ethics since the early days of his career, inculcating in his team the need to be conscious of the ethical basis for every intervention and imparting key ethical values through his teachings. In 2014, he introduced Ethics and Professionalism as a core elective of the residency programme in NUH to instil in young clinicians the importance of adopting an ethical mindset to clinical practice. Testament to his passion, A/Prof Joseph assumed several key positions including the chairmanship of the hospital's Bioethics Committee in 2008 and that of the National Medical Ethics Committee in 2009. He also spearheaded the establishment of the Paediatric Ethics and Advocacy Centre (PEACe) at the Khoo Teck Puat – National University Children's Medical Institute in 2014, the first of its kind in Asia, to continue to drive clinical and academic awareness of ethics in paediatrics.

When asked what motivates his tireless passion and keeps him going, A/Prof Joseph once said, "What we need to do is relatively speaking 'very little'. And when that little is done at the right time, it makes a world of difference."

BRIDGING SCIENCE AND MEDICINE

Taking her passion for research in allergy and immunology from bench to bedside has moulded Professor Lee Bee Wah to be the well-respected clinician-scientist in her field.

Professor Lee Bee Wah did not intend to take up paediatric allergy, if not for the late Emeritus Professor Wong Hock Boon who persuaded her to do so. Back then, paediatric allergy and immunology was not a recognised clinical sub-specialty in Singapore. Having completed her Bachelor of Medicine and Bachelor of Surgery from the University of Singapore in 1978 and the Master of Medicine (Paediatrics) in 1981, Prof Lee eventually went to Boston Children's Hospital, Harvard Medical School, to undergo sub-specialty training from 1986 to 1988. The experience kindled a new-found passion, which led to her becoming one of the key pioneers to establish this field in Singapore.

When she returned to the National University of Singapore (NUS), Prof Lee delved straight into research to deepen the understanding of the roots of allergic and immune disorders in children. She joined the Department of Paediatrics, National University Hospital (NUH) till 2000 and remains an adjunct professor and visiting consultant of the Khoo Teck Puat – National University Children's Medical Institute.

Transforming Care with Research

Prof Lee is a passionate advocate of research being the cornerstone of sound clinical reasoning and diagnosis. Together with Professor Yap Hui Kim, a paediatrics nephrology pioneer at NUH, they spearheaded the setup of the first clinical immunology laboratory in Singapore in 1988. The laboratory's focus was the clinical diagnosis of children with primary immunodeficiency disorders and other allergic and immunological disorders.

I am grateful to my NUS and NUH family of clinicians, scientists and graduate students, whose talent and drive provided the impetus for us to develop and excel. Academia is a never-ending journey. My dream is to see Paediatric Allergy and Clinical Immunology recognised as a sub-specialty in Singapore, as we strive to improve our standards of clinical practice and research for the greater good of our patients and their families.

It paved the way for the department to serve children from Singapore and the region. Leveraging the laboratory's capabilities, Prof Lee went on to establish paediatric allergy services at NUH to provide allergy diagnostics for children.

Prof Lee's research prowess is reflected in her many contributions, which include establishing the high prevalence of allergic diseases (asthma, allergic rhinitis and eczema) in Singapore as part of the International Study of Allergy and Asthma in Children. Her research also proved that asthma morbidity in children is considerable and the second leading cause of hospitalisation in the 1990s in Singapore. She identified the house dust mite *Blomia tropicalis* as a key allergen in the home, leading to its inclusion as a standard allergen in clinical aeroallergen panels in the region. She also elucidated the allergen proteins responsible for unique food allergies in this region, such as bird's nest and galacto-oligosaccharide allergies. Not only have these findings broadened the knowledge in this field, they have also translated into better outcomes for children with allergies and helped build up the paediatric allergy services in NUH.

The avid researcher has published more than 200 full scientific papers in peer-reviewed scientific journals. Having amassed an extensive body of work, she is recognised locally and internationally. She has been invited to the editorial board of allergy journals and reviews articles for top allergy journals, including *Clinical Experimental Allergy and Allergy*. She was President of the Asia Pacific Academy of Pediatric Allergy, Respirology and Immunology (APAPARI) from 2006 to 2008, and President of the Allergy and Clinical Immunology Society (Singapore) from 2012 to 2013. She was also a member of the Board of Directors of the World Allergy Organization (WAO).

For tirelessly advancing paediatric allergy and immunology, Prof Lee has received international recognition for her exceptional contributions. She was awarded the Outstanding Clinician Award by WAO in 2011 and conferred the Distinguished International Fellow title by the American College of Allergy, Asthma and Immunology in 2012.

Prof Lee and her team in the laboratory.

Prof Lee believes that her work forms the foundation for greater things to come as medicine evolves. She wants to inculcate her love of research in the younger generation and has mentored countless junior doctors and researchers who are now independent researchers and specialist clinicians.

It can be said that Prof Lee has honed the art of being both an astute clinician and a skilled scientist – pushing the boundaries of research in pursuit of new breakthroughs, delivering exceptional care and a better quality of life for young patients, as well as elevating the field of paediatric allergy and immunology. Truly she is enjoying the best of both worlds.

A RESOURCEFUL RESEARCHER

Associate Professor Nilmani Saha, the department's first research scientist, was known to think out of the box when the odds were against him.

Imagine using 'zi char' cardboard boxes with self-made paper partitions for storing lab samples, reheating expensive agarose gels used for reading DNA patterns to repurpose as new gels for analysis, and working with only one laboratory technician to personally process thousands of blood samples for research as a principal investigator.

These were the rough-and-ready conditions that Associate Professor Nilmani Saha had to adapt to in the 1970s and 1980s. Yet, they did not deter him from making an impact and authoring more than 200 research publications. Among his many interesting papers were 'Blood Groups and Serum Cholesterol' and 'Origin of the Koreans: A Population Genetic Study'.

Cultivating Creativity

A/Prof Saha's illustrious career spanned continents. Having graduated with a Bachelor of Science and Bachelor of Medicine and Bachelor of Surgery, he went on to obtain a series of qualifications including Doctor of Medicine, Doctor of Philosophy and Doctor of Science, and established himself as a highly respected human geneticist. He taught at various colleges in India before joining the University of Singapore as a lecturer in the Department of Physiology in 1966 and began his research on haemoglobinopathies and red cell G6PD deficiency.

His subsequent work in human genetics research took him around the world, such as to the University of Khartoum in Sudan and the University of Umea in Sweden. At the Institute of Human Genetics, Hamburg, he focused on genetic marker association in multifactorial diseases such as pulmonary tuberculosis. Eventually he returned in 1988 to join the Department of Paediatrics as its first research scientist. His work to evaluate the nutrition of our various ethnic populations and the genetics studies of lipids and heart diseases helped establish how much genes contributed to heart disease risk.

A/Prof Saha (third from left), together with his team in the laboratory in 1993.

When A/Prof Saha retired in 1995, he left behind precious blood samples he had painstakingly collected over the years. In the 1970s and 1980s, while it was common for researchers to work alone or with a couple of collaborators, population genetics research demanded extensive collaborations. Bucking the trend, A/Prof Saha forged many local and international partnerships, which he dubbed his 'blood relationships', to obtain the necessary samples. Today, the department's researchers are still using them – a testament to the legacy that he has left behind.

> I will always remember the unwavering support shown by our leaders and research team. They were like my family away from home. I will always be grateful for the opportunities and encouragement to pursue our research interests.

A MEANINGFUL CONVERSION

A research stint involving fungal spores kickstarted Ms Siti Dahlia's career with the paediatric department for over 30 years and she has not looked back since.

When Ms Siti Dahlia joined the National University of Singapore, she did not anticipate that her career path would be steered towards healthcare.

Ms Siti graduated from Education for Health, Warwick, United Kingdom with diplomas in allergy in practice and spirometry. She eventually joined the Department of Paediatrics at the National University Hospital (NUH) in 1989 and started out participating in field trips for research studies. Her role entailed working closely with lecturers and doctors in the laboratory to observe and identify the types of fungal spores and pollen particles. The outcomes of this project, considerably the first of its kind, led to published research articles in journals. The findings helped clinicians at NUH and other healthcare institutions who specialise in allergies better understand how outdoor airborne spores and pollen particles affect allergy patients.

When the project was completed in 1995, Ms Siti joined the then-paediatric respiratory and allergy team as the first medical technologist to support the various diagnostics services, including the lung function lab service. Over more than 30 years, Ms Siti gained considerable expertise in diagnostic testing for children with respiratory conditions. These included skin prick tests for children with allergies and sweat testing for chronic pulmonary conditions. Not one to shy from learning, she trained overseas to master advanced spirometry equipment and

actively participated in various allergy research projects. Testament to her capabilities, the assistant technician rose through the ranks to oversee the management of the lung function lab and training of new medical technologists.

It did not come as a surprise then that she would play an integral role in designing and establishing the pulmonary function lab at the Khoo Teck Puat – National University Children's Medical Institute, the new outpatient ambulatory building. Her years of experience and interactions with patients and their families contributed to the setting up of a larger, dedicated facility with advanced diagnostic equipment to better serve patients – an achievement that Ms Siti has been extremely proud of.

When Ms Siti retired in 2021, the department bade farewell to their team member who had seen the progression of the paediatric cluster and even watched young clinicians become heads of department. Even now, what Ms Siti cherishes most are the close bonds she has built with her colleagues, patients and their families. When she recalls the smiles on her patients' faces after their recovery, her heart is filled with pride and joy.

> I am grateful to my supportive colleagues who have been my second family and thankful for the doctors who provided me with guidance and encouragement to grow as an individual.

NURSING A PASSION

Ms Tay Kim Ngah's love for science ignited a purposeful career that has made a mark in paediatric nursing.

Since young, Ms Tay Kim Ngah has had a keen interest in science, which prompted her to consider the nursing profession when she completed her education. She started out as a clinic assistant at a private eye clinic and subsequently at a private paediatric clinic in Malaysia. Although these experiences were brief, they spurred her to take up a three-year general nursing course in Singapore.

Upon completion of her course in 1985, Ms Tay first joined the paediatric wards at the Singapore General Hospital and subsequently joined the National University Hospital (NUH) in 1986. She rose through the ranks to become Assistant Director of Nursing in the Department of Paediatrics and also led the nursing unit of the paediatric cluster from 2012 to 2017.

Throughout her career, Ms Tay was instrumental in shaping paediatric nursing to align with the department's growing needs, such as developing paediatric specialty nurses. She spearheaded many key initiatives, including NUH's first paediatric nursing standard of practices and strategic pandemic plans. She was also involved in the genesis of Singapore's first Master of Nursing (Paediatric) Programme.

Knowledge Is Key

Ms Tay is a firm believer that knowledge and continuous learning are fundamental to providing the best care to patients. She actively encouraged her nurses to upskill and would identify courses to further develop their capabilities in areas

like communication, quality improvement and leadership. Recognising early on the changing demands of healthcare, she had the foresight to train paediatric advanced practice nurses (APN) to help co-manage children with complex conditions. APNs would take on a more enhanced role of care to include patient counselling and education, interpreting diagnostic test results, performing medical procedures and coaching nurses. She envisaged that they would also play an active role in research to push for better outcomes.

When asked what fuelled her energy and pursuit for excellence, Ms Tay shared that her nursing team, who was like family to her and shared her tears and joys, kept her going strong for over 30 years. She retired from nursing in 2017 but her young patients remain close to her heart. "It gives me no greater joy than to see them well and paying us a visit after their discharge. It is the best gift that money cannot buy!" she shares.

> Nursing is an adventure. We meet many people and encounter many unpredictable situations. There are elements of joy, excitement, occasional sadness and bumps along the way. These people are like teachers and friends. They teach us new life lessons and shape us into better people. So enjoy the journey!

A CRITICAL ROLE

Ms Lim Luen Ying is a veteran of critical care nursing, having looked after both adult and paediatric patients for over 30 years.

Prior to joining paediatrics, Ms Lim Luen Ying served in the National University Hospital's Cardiothoracic Intensive Care Unit (CTICU) and the Adult Medical and Surgical Intensive Care Unit for a decade. In 1998, she joined the Paediatric Intensive Care Unit (PICU).

Back then, PICU had only six open beds and two small rooms to accommodate cot beds. Ms Lim was heavily involved in its renovations, which led to a larger and more child-friendly space with 13 beds and enhanced facilities. It received positive feedback from patients and families, and welcomed visits from other hospitals who wanted to learn its novel design concepts. PICU has since undergone subsequent transformation, which Ms Lim, who is the current senior nurse manager, also actively contributed to.

Empowering the Competent Nurse

Ms Lim emphasises the need for PICU nurses to be constantly updated with the latest protocols and focuses her efforts on enhancing their competencies. In the early days, all paediatric cardiac patients had to be stabilised in CTICU before transferring to PICU. Ms Lim leveraged her CTICU experience and trained PICU nurses to manage open-heart paediatric patients in PICU immediately after their surgeries.

Recognising the need for a formal training programme, Ms Lim initiated an in-house Paediatric Critical Care Nursing Course and developed the curriculum in 2006, training PICU nurses in advanced nursing skills for managing complex and more critically ill cases. The course received accreditation from the American Nurses Credentialing Centre in 2014 and is still running today.

Indeed, Ms Lim's nursing journey is very much intertwined with the development of PICU. Having seen its transformation, much akin to a child growing up, Ms Lim remains strongly dedicated to the unit. She often shares that the close-knit relationship between nurses and doctors is what motivates her, and she enjoys the challenges faced in the fast-paced PICU environment. In spite of her seniority, she believes that one must advance with the times and embrace new technologies. Junior nurses in turn benefit from her immense knowledge and experience as she continues to groom them to be future leaders.

Perhaps the best affirmation Ms Lim has gotten is when her patients, who have grown up, approach her on the streets like old friends, thanking her for caring for them, even years after their recovery.

> From just 8 beds in the 90s to the current facility with 18 single-bedder rooms – I'm happy to witness how PICU has grown through the years. With enhanced facilities, advanced technology and more specialised training, we can now better care for our critically ill paediatric patients.

MENTORING FROM THE HEART

Ms Auyong Wai Meng has seen the 'ins and outs' of paediatric services, having served in both paediatric wards and the clinics.

At a tender age, Ms Auyong Wai Meng's curiosity in nursing was piqued when she observed the nurses at the hospital where her father was admitted. In the 1970s, she embarked on her nurse training at the Singapore General Hospital and decided that it was the profession for her.

Shortly after the National University Hospital opened its doors, Ms Auyong joined as a Nurse Manager in 1986 and oversaw the nurses in Ward 45, together with two other nurse managers. Back then when paediatric intensive care was still developing, she was one of few leaders tasked to train nurses to provide specialised care for young patients.

Taking on New Challenges

In 1997, Ms Auyong ventured to outpatient services to lead the Children's Specialist Clinic. Through the years, she played a pivotal role in key milestones of paediatric outpatient services, including the setting up of the Children's Evening Clinic. She was also one of the key nursing leaders who contributed significantly during the planning of the new Khoo Teck Puat – National University Children's Medical Institute specialist ambulatory centre and orchestrated the relocation of several children's clinics to the new building.

Ms Auyong's penchant to nurture is reflected in her commitment towards nurturing and guiding paediatric specialty nurses in their course of setting up different specialty services alongside clinicians. She played an active role in setting up key specialty services, such as outpatient parenteral antimicrobial therapy and paediatric allergy day therapy. Beyond paediatrics, Ms Auyong was the chairperson of the Specialist Outpatient Centres Code Blue Committee for a decade. Under her leadership, structured training was implemented and encompassed outpatient nurses' resuscitative skills and knowledge of handling medical emergencies and emergency response training for all ancillary and allied health staff.

> "In the twinkling of an eye, 50 years have passed since I joined nursing. Nursing has moulded me to become a leader who is able to care and serve others. Nursing is not just a job. It requires commitment and passion and ultimately is very rewarding. My journey has been very fulfilling.

Seeing her staff succeed in their careers gives Ms Auyong great satisfaction. One of her most significant 'success stories' was when Ms Tay Kim Ngah, whom she mentored, became the paediatric cluster's Assistant Director of Nursing. The eminent senior nurse manager moved on from paediatrics in 2021 but her heart to mentor remains deeply embedded as she continues to serve in other roles within the hospital.

CARING BY TEACHING

Ms Laura Tan believes that the role of nurses extends beyond the bedside as they journey with their patients and families on the road to recovery.

Ms Laura Tan began as a student nurse in the Mistri Wing of University Department of Paediatrics at the Singapore General Hospital. In 1986, she moved with the department to the National University Hospital and served in Ward 45, which housed the Paediatric Intensive Care Unit. Her career took a different direction when she accepted a challenge that led to many fulfilling years of teaching.

Classroom of Care

When paediatric sub-specialty services were being established, Ms Laura was asked to develop paediatric oncology nursing in 1988. Under the guidance of Associate Professor Allen Yeoh and Associate Professor Quah Thuan Chong, she formed the pioneering team and was instrumental in establishing key nursing protocols and training.

One significant contribution was the implementation of a strict protocol for the care of indwelling catheters used for long-term intravenous chemotherapy. Given the high incidence of device infections when they were first used, Ms Laura instituted that only trained nurses could access these lines and she continually upskilled the ward nurses, which led to a significant drop in infections. Realising that other hospitals could benefit from this knowledge, Ms Laura shared the findings with her local and regional counterparts.

> Doctors like Associate Professors Quah and Allen and Dr Tan Poh Lin were the gentle giants who were always there for me in times of need. The nurses I worked with were inspiring 'carers' at heart and always ever ready to encourage our patients in their journeys.

As a senior nurse educator, Ms Laura finds great meaning training and nurturing younger nurses. She spearheaded a three-month Paediatric Oncology Nursing Course in 2007, which received accreditation from the Singapore Nursing Board and the American Nurses Credentialing Centre. Assigned by the then Assistant Director of Nursing for paediatrics, Ms Tay Kim Ngah, she guided the nurses to develop the Advanced Paediatric Nursing Course in 2015.

Today, Ms Laura has assumed a new role as a senior patient coordinator. Nonetheless, the essence of her work remains. She educates patients and makes home visits to support parents in areas such as equipment training when patients are discharged. Often she is the pillar of strength for parents caring for their sick children.

Many nurses have come under the tutelage of Ms Laura, and her contributions have raised the level of paediatric nursing education. Even now, she constantly shares her experiences and patient stories in hopes that these would encourage and empower the new generation of nurses to go the extra mile.

A SENSIBLE PROPOSITION

Mdm Ng Pick Gate possesses a distinctive skill that has helped many newborns get a sound start in life.

In the past 21 years, over 65,000 newborns have been screened for hearing loss at the National University Hospital (NUH) by Mdm Ng Pick Gate. According to data gathered across three public hospitals between 2002 and 2004, about 4 in 1,000 babies are diagnosed with permanent childhood hearing impairment at birth and are at risk of speech, language and intellectual delays. Routine hearing screenings help detect abnormalities early, leading to prompt intervention that can alleviate the developmental impact, allowing these babies the opportunity to be integrated into mainstream schools.

Mdm Ng, who is currently a Senior Staff Nurse at the Department of Neonatology, spent the first eight years of her career in United Kingdom before joining NUH's Ear, Nose and Throat department where she developed her interest in audiometry. Determined to further her skills, she pursued relevant certifications in paediatric audiometry and tympanometry. In 1991, Mdm Ng transferred to the Department of Neonatology to support the department's research on newborn hearing.

The Nurse Who Listens

Back in the mid-1990s, babies were screened with the distraction method using a reactometer. Mdm Ng was part of the clinical team that introduced the Universal Newborn Hearing Screening (UNHS) programme, which adopted this initial method. The team eventually switched to the more reliable screening method of using otoacoustic emissions in 1999. Led by the late Professor Tan Kim Leong, Associate Professor Roy Joseph and Dr Lee Le Ye, clinicians at the Department of Neonatology, the UNHS programme was formally established in NUH in 1995, and nationally by 2004. Since its implementation, the team of clinicians and nurses from neonatal intensive care unit (NICU) and nurseries has maintained a screening rate of 99.8%

of all newborns in NUH, a testament to Mdm Ng's dedication to the programme.

Till today, she continues to train generations of nurses in the NICU and nurseries to conduct the tests. She is also often invited to deliver lectures to medical, nursing and audiology students.

Ever empathetic to anxious parents, Mdm Ng believes timely information and counselling are integral to the delivery of good care. Parents have often returned to share happy stories of their children speaking well and eventually integrating into mainstream schools following early intervention.

Mdm Ng has turned her interest in audiometry and her fervent desire to help people into a lifelong career caring for the smallest of patients – a journey that's certainly music to her ears.

> I wanted to have a meaningful career that would impact the lives of others. Knowing that my personal care, touch, time and voice can make a positive difference to patients and help them tide through their most vulnerable moments makes nursing one of the most rewarding careers.

Chapter 4

our Future

The paediatric healthcare landscape is ever-evolving. It is imperative for us to move forward in leaps and bounds in our services and programmes to meet the growing health needs of the young.

Looking into the future, Khoo Teck Puat – National University Children's Medical Institute strives to continue the legacy of advancing child health and eventually maternal wellness through progressive clinical care, research and education.

HEALTHY START TO A HEALTHIER LIFE

Singaporeans are living longer, with a life expectancy among the world's highest at 81.4 years for males and 85.7 years for females (2019). However, they are also spending about 10 years of their lives in ill health with chronic conditions like obesity, diabetes, hypertension, coronary heart disease and stroke. More Singaporeans have also reported deteriorating mental health.

Many non-communicable diseases have their origins in early childhood, and the intrauterine and immediate postnatal periods. To enable Singaporeans to live healthier longer, the National University Centre for Women and Children (NUWoC) was instituted. NUWoC integrates the Department of Obstetrics & Gynaecology (O&G) and Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) as a cluster centre. Its mission is to empower women, children and their families in leading healthier lives; its vision, to be the centre of excellence in women and children's health so that every person can achieve their fullest human potential. KTP-NUCMI maintains its name and identity as the paediatric cluster in NUH.

Synergising Care for Women and Children

NUWoC aims to deliver the life-course continuum of care for Singapore's women and children, particularly in the western region. It focuses on the right-siting of appropriate services in the community and builds complementary services based on the National University Health System's (NUHS) strengths and centres of excellence. NUH provides tertiary and complex multidisciplinary care for women and children; Ng Teng Fong General Hospital and Alexandra Hospital provide acute, secondary and step-down care; Jurong Medical Centre provides satellite outpatient services in child development, obstetrics and gynaecology. In addition, a network of children's urgent care clinics provides acute but non-emergency paediatric care.

With the National University Polyclinics (NUP) and NUHS Regional Health System (RHS), NUWoC provides primary care, preventive screening, health promotion, disease prevention and community support for women and children. It will also include services for high-risk pregnancies, medical genetics, fetal therapy, complex neonatal care, fertility preservation, adolescent girls' health and reproductive ageing.

A highlight is the First 1,000 Days Programme in partnership with the RHS Office, NUP, NUHS Psychiatry and the Centre for Holistic Initiatives for Learning and Development (CHILD) at the NUS Yong Loo Lin School of Medicine. It leverages the local Growing Up in Singapore Towards Healthy Outcomes (GUSTO) study's translational research findings to enhance the socio-emotional, cognitive and health outcomes for women and children.

> At NUWoC, the mother-child dyad will be the focus of care. Its formation will remove barriers and synergise efforts by O&G and KTP-NUCMI to integrate services from pre-conception to childhood. It will also provide the impetus to develop primary care services and preventive maternal and child health interventions across the NUHS cluster."

Prof Lee Yung Seng

Head, Khoo Teck Puat – National University Children's Medical Institute

HOPE FOR CHILDHOOD CANCER PATIENTS

Acute lymphoblastic leukaemia (ALL) is the most common type of cancer in children, and in fact accounts for more than half the cases at the VIVA-University Children's Cancer Centre. The Division of Paediatric Haematology and Oncology has thus heavily focused on improving ALL management over the last 30 years through the Leukaemia Programme.

The established protocols and guidelines for managing ALL have been traditionally designed for the West. In order to maximise outcomes based on local needs, the Leukaemia Programme focuses on developing treatments tailored for the Southeast Asian region. The team has collaborated with the Children's Cancer Foundation, VIVA Foundation and Goh Foundation for funding and invaluable support. It has also formed the Malaysia-Singapore Acute Lymphoblastic Leukaemia (Ma-Spore ALL) Study Group with Professor Tan Ah Moy's team at KK Women's and Children's Hospital, and Professor Lin Hai Peng and Professor Hany Ariffin at the University of Malaya. These collaborations have helped transform care for ALL paediatric patients in Singapore and Malaysia by improving medical care, facilities and research.

In Search for Cure

Associate Professor Quah Thuan Chong and Associate Professor Allen Yeoh, clinicians at the Division of Paediatric Haematology and Oncology, have astutely recognised early on that appropriate risk stratification is a critical aspect of ALL therapy for the region. In 2003, the Ma-Spore 2003 ALL protocol was launched with the treatment mantra of "patient first, leukaemia second". The team prioritised patients' safety with treatment that first carefully destroyed leukaemia cells without risking too much toxic effect, then intensifying treatment later if required.

The follow-up Ma-Spore 2010 study focused on delivering further appropriate risk-directed therapy. Incorporating a high-risk gene into the initial risk stratification, the team found that increasing treatment intensity for these high-risk patients reduced the five-year cumulative incidence of relapse from 30% to 13% and improved the five-year overall survival rate from 69% to 91%. Several small but clinically important adjustments made to the protocol also substantially reduced infectious toxicity while maintaining equivalent outcomes.

A/Prof Yeoh and his team play an integral role in developing more cost-effective treatments for children with childhood cancer.

A/Prof Yeoh believes in working closely with the patient and his caregivers to ensure that the child is able to return home safely to the arms of his family.

Treatment programmes for acute myeloid leukaemia (AML) were also developed. Although rarer, AML has a poorer prognosis in general and thus, improvements to therapies were urgently needed. The first Ma-Spore AML study protocol was implemented in 2006. Subsequently, the division established a partnership with St. Jude Children's Research Hospital in the United States using the St. Jude AML08 protocol, which improved cure rates from 50-60% to 70-80%.

More than 1,000 children have benefited from these studies. Through the Ma-Spore collaborative network, leukaemia care and childhood cancer therapy on the whole have been elevated. In 2020 and beyond, the genomic profile of the patient and their leukaemia can now be precisely identified. The programme looks forward to providing targeted and personalised therapy for each patient in the future. It will also integrate advanced cellular therapy to offer cures for previously incurable cancers.

> As we move towards future lines of therapies, it becomes even more imperative to tailor these treatments to local and regional profiles, to maximise cure and minimise toxicity. The next generation of leukaemia treatment will be very exciting indeed, and I am looking forward to see our programme advance ALL and AML therapy in our region!

Dr Shawn Lee

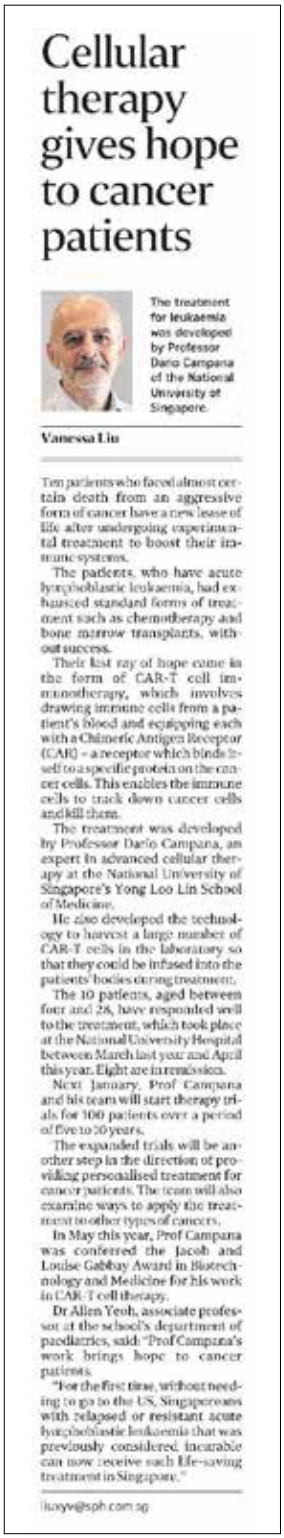
Consultant, Division of Paediatric Haematology and Oncology

A CHANCE AT LIFE

More than 10 years ago, children with leukaemia that did not respond to chemotherapy had few or no other treatment options and faced imminent death. At the turn of the century, scientists began researching alternative ways to fight cancer. Among them was Professor Dario Campana from St. Jude Children's Research Hospital in the United States at the time. He sought to harness the power of the immune system by developing chimeric antigen receptor (CAR)-T cells. Since then, CAR-T cell therapy has revolutionised immunotherapy and the treatment of B-acute lymphoblastic leukaemia (B-ALL), the most common childhood cancer worldwide.

Prof Campana first established the advanced cellular therapy programme in 2011 when he moved to Singapore to join the Department of Paediatrics in NUS Yong Loo Lin School of Medicine. From multiple early-phase clinical trials involving natural killer cells to the more recently ALaCART and CARTALL clinical trials in 2021, the team is well-recognised as an established cellular therapy unit locally and beyond. Together with the clinical team led by Associate Professor Allen Yeoh, Head and Senior Consultant of the Division of Paediatric Haematology and Oncology, the team has gained considerable clinical experience as the first group to launch paediatric CAR-T cell therapy clinical trials in Singapore and the region.

(clockwise from left) The CAR-T team - principal research scientist, Dr Elaine Coustan-Smith, Dr Bernice Oh, Dr Esther Chan from the National University Cancer Institute and A/Prof Allen Yeoh.



Cellular therapy gives hope to cancer patients

The treatment for leukaemia was developed by Professor Dario Campana of the National University of Singapore.

Vanessa Liu

Ten patients who faced almost certain death from an aggressive form of cancer have a new lease of life after undergoing experimental treatment to boost their immune systems.

The patients, who have acute lymphoblastic leukaemia, had exhausted standard forms of treatment such as chemotherapy and bone marrow transplants, without success.

Their last ray of hope came in the form of CAR-T cell immunotherapy, which involves drawing immune cells from a patient's blood and equipping each with a Chimeric Antigen Receptor (CAR) – a receptor which binds itself to a specific protein on the cancer cells. This enables the immune cells to track down cancer cells and kill them.

The treatment was developed by Professor Dario Campana, an expert in advanced cellular therapy at the National University of Singapore's Yong Loo Lin School of Medicine.

He also developed the technology to harvest a large number of CAR-T cells in the laboratory so that they could be infused into the patients' bodies during treatment.

The 10 patients, aged between four and 28, have responded well to the treatment, which took place at the National University Hospital between March last year and April this year. Eight are in remission.

Next January, Prof Campana and his team will start therapy trials for 100 patients over a period of five to 10 years.

The expanded trials will be another step in the direction of providing personalised treatment for cancer patients. The team will also examine ways to apply the treatment to other types of cancers.

In May this year, Prof Campana was conferred the Jacob and Louise Gabbay Award in Biotechnology and Medicine for his work in CAR-T cell therapy.

Dr Allen Yeoh, associate professor at the school's department of paediatrics, said: "Prof Campana's work brings hope to cancer patients.

"For the first time, without needing to go to the US, Singaporeans with relapsed or resistant acute lymphoblastic leukaemia that was previously considered incurable can now receive such life-saving treatment in Singapore."

liuyv@sph.com.sg

Source: The Straits Times, Page B3, 1 August 2019

Standing on the shoulders of giants, I have witnessed how the advent of CAR-T cell therapy has truly changed the way we treat relapsed, refractory ALL. Children who never stood a chance previously are now living their lives to the fullest and realising their dreams cancer free.

Dr Bernice Oh

Consultant, Division of Paediatric Haematology and Oncology

CAR-T cell products are manufactured on-site at the National University of Singapore, in a cell processing facility that received the Good Manufacturing Practice (GMP) certification from Singapore's Health Sciences Authority (HSA). From advanced cellular engineering technologies to state-of-the-art cell processing and manufacturing of a CAR-T cell product that can be safely infused into patients, our programme has seamlessly integrated cutting-edge research into clinical care, providing hope to children with difficult-to-treat leukaemias.

In recognition of his work as one of the pioneers and world experts in CAR-T cell therapy, Prof Campana was awarded the prestigious Jacob and Louise Gabbay Award in Biotechnology and Medicine in 2019 and the Singapore President's Technology Award in 2020. He continues to lead the team in pushing boundaries for patients with otherwise incurable cancers.

The programme will continue to optimise CAR-T cell therapy treatment strategies, to further improve on the quality of manufactured CAR-T cell products and widen access to cures for more children in Singapore and the region. The team envisions to expand its horizons to other childhood cancers such as lymphomas and neuroblastoma. They hope that cellular therapy will allow the team to make quantum leaps in providing effective and safe treatment to improve outcomes for children and their families in the future.

A Story of Rekindled Hope

Oscar Saxelby-Lee, a young British boy with a different form of ALL known as T-ALL had failed to respond to treatment, including stem cell transplant in the United Kingdom. Prof Campana and the team had recently developed a unique form of CAR-T cell therapy known as the anti-CD7 PEBL CAR-T cells specifically for T-ALL. The team worked hard to manufacture the CAR-T cells, which were then infused into Oscar on Christmas Eve of 2019. Most remarkably, this led to a complete elimination of Oscar's leukaemia cells. Today, Oscar's story of courage and hope continues to be shared worldwide, drawing patients searching for cures through cutting-edge cell therapy to Singapore.

Online feature on Oscar Saxelby-Lee's recovery on Channel News Asia.

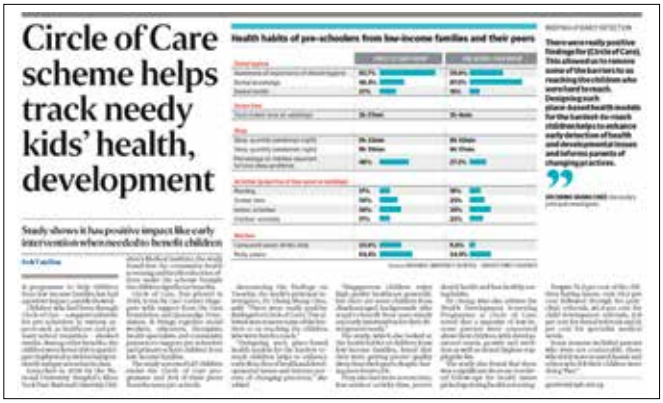
PROVIDING AID TO THE DISADVANTAGED

Launched in 2013, Circle of Care (CoC) is Singapore's first holistic care and education model for childcare and preschool developed by the Lien Foundation and Care Corner Singapore. It provides integrated childcare services to children, particularly those from disadvantaged families.

CoC combines social work, learning support, health services and parental involvement using an ecological model. Social workers, educational therapists, teachers and principals – professionals who usually work apart – come together as a multidisciplinary team in preschools. Working hand in glove with parents and the community, they weave a stronger support system around each at-risk child.

In 2017, Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI) stepped in as a key partner through Dr Chong Shang Chee, Head and Senior Consultant at the Division of Developmental and Behavioural Paediatrics. Together with her team, Dr Chong developed a pilot health and development screening programme (HDSP), supported by the Singapore Population Health Improvement Centre (SPHERiC), to improve access to early intervention and reduce barriers to health services for children from low-income families, overall improving their quality of life.

The pilot revealed the needs of these disadvantaged families and its findings were presented at the Ministry of Health (MOH) Workplan Seminar 2021. MOH and relevant partners were informed on the plan for an integrated and place-based paediatric health redesign, with the potential of health-social-education partnerships, resulting in a higher reach of children with complex needs.



Circle of Care scheme helps track needy kids' health, development

Study shows it has positive impact like early intervention when needed to benefit children

Health habits of pre-schoolers from low-income families and their peers

Source: The Straits Times, Page B4, 25 February 2021.

Feature on Singapore Tonight, Channel News Asia, 23 February 2021.

Interview on Hello Singapore, Channel 8, with Dr Chong Shang Chee, NUH and Zoeleen Leow, Circle of Care, 23 February 2021.

As a paediatrician, I hope that social determinants of health, health access and inequalities can be informed and addressed for children who are disadvantaged. Community initiatives, like HEADS-UPP, are programmes precisely established to address these gaps.

Dr Chong Shang Chee

Head and Senior Consultant, Division of Developmental and Behavioural Paediatrics.

Expanding the Circle of Care

As part of the work at the MOH's Child and Maternal Health and Well-being taskforce, the National University Health System (NUHS) is now interested in expanding the model within the western cluster and as its community paediatrics initiative.

The next phase proposal, renamed Health and Development Support in Preschool Partnerships (HEADS-UPP), not only involves enhanced child screening and maternal mental health screening but also new partnerships with the Health Promotion Board and the National Library Board. It will also adopt a chatbot designed by the NUH Child Development Unit as a novel way of delivering health education to parents and community providers under the established OneNUHS App. It plans to cover 500 to 700 children from low-income families in the western zone of Singapore and involve anchor-operator preschools such as the Ministry of Education and PAP Community Foundation (PCF) Sparkletots kindergartens.

Dr Sze Woon Li, senior resident of NUH Department of Paediatrics, giving Muhamad Rokhairunnas a check at the PCF Sparkletots Preschool in Taman Jurong on Monday. With them is the five-year-old's mother Noryah Selamat.

Care for at-risk children to include health screenings

NUH doctors, nurses join Circle of Care to provide medical, developmental care for kids

Sandra Davie
Senior Education Correspondent

The Circle of Care programme, piloted five years ago at two pre-schools, has shown how early and holistic intervention can change the outcomes for children from disadvantaged homes.

The scheme, which has since been extended to 30 pre-schools, brings together teachers, social workers and education therapists to identify the root causes of a child's difficulties and provide help on different fronts. It has resulted in higher school attendance rates and has seen the children improve their reading and numeracy skills.

Now, doctors and nurses from the National University Hospital (NUH) have joined the team of experts providing care for the children. They conduct medical screening for children at the pre-schools, which includes checking their vision and hearing, and whether they have proper nutrition.

The doctors and nurses also look out for developmental delays, be it in language or motor skills.

They also check on the social and emotional health of the children – like whether a child suffers anxiety and is able to pay attention. If a child is found with any concerns, the doctors discuss it with the parents who attend the screening and refer the child to specialists at NUH.

To date, 121 children from five pre-schools have been through the health checks and 60 of them have been referred to specialists for various health and developmental issues, including asthma, hearing difficulties, hyperactivity and lag in literacy development. Social workers will help families apply for subsidies to defray the costs.

Philanthropic group Lien Foundation and welfare organisation Care Corner, which piloted the programme, said the health services component is important for at-risk children.

Other than early identification of children with health and developmental needs, healthy habits are also built as the doctors and parents discuss and exchange information on the development of the child.

NUH doctors who use the Brazelton Touchpoints approach developed by Harvard Medical School view the parents as experts on their children and work hand in hand with them.

Lien Foundation chief executive Lee Poh Wah said that by sending doctors and nurses to the pre-schools, NUH bridges the physical and psychological barriers that families at risk may have towards seeking professional help, and improves access to early intervention.

He said: "When children spend their early years in an unstable and chaotic environment, they are subject to intense, chronic stress that could seriously disrupt their physical, cognitive and emotional development, as well as cause behavioural issues."

Paediatrician Chong Shang Chee, head of NUH child development unit, said: "Good physical health and healthy social-emotional development are the foundations and building blocks in which cognitive skills develop.

"Research is robust around the role of early intervention in children with development or health issues – in reducing further down the pernicious of later-onset health problems or learning delays."

Madam Noryati Selamat, 43, who accompanied her five-year-old son Muhamad Rokhairunnas for his medical screening at the PCF Sparkletots Preschool in Taman Jurong, said the doctor had highlighted some possible issues that called for further checks.

Said the housewife: "I told the doctor about some of the things that have been worrying me. My boy is hyperactive. We discussed it, and she gave me good advice on how to help my son, such as cutting down on the time he watches television.

"It was very useful advice."

sandra@sph.com.sg

Source: The Straits Times, Page B4, 2 June 2017

$13m to expand Circle of Care for disadvantaged kids

Scheme which builds support systems for them will include more schools and areas

Fabian Koh

A scheme to build strong support systems around disadvantaged children will get a boost of nearly $13 million and expand to more areas in the next five years.

Launched in 2013 by Lien Foundation and Care Corner Singapore, the Circle of Life scheme gathers the likes of educators, social workers and health professionals to support underprivileged children in partner schools.

The injection of funds will be made up of $10 million from Lien Foundation, $750,000 from Care Corner and $2 million from new partner Quantedge Foundation. This will double the scheme's current investment of $6.14 million.

Mr Yap Poh Kheng, chief executive of Care Corner, also announced yesterday that the scheme will grow from the current 10 pre-schools and two primary schools, to 30 pre-schools and seven primary schools by 2023.

The schools will be grouped into three clusters – Queenstown, Taman Jurong and Woodlands – identified based on the number of rental flats and low-income families in the area, said Lien Foundation chief executive Lee Poh Wah.

At least 10 per cent of each cohort at pre-schools under the scheme come from low-income families. Mr Lee said this proportion is as high as 50 per cent at some pre-schools, a "staggering" figure.

The National University Hospital (NUH) has been roped in to address the health development aspects of children at risk.

Dr Chong Shang Chee, head of the Child Development Unit in the Development and Behavioural Paediatrics division of NUH, said it has identified some health issues that need to be addressed as a priority, such as poor dietary habits.

30
Number of pre-schools under the Circle of Life Scheme, up from 10.

7
Number of primary schools under the scheme, up from two.

A team has started conducting health and development screening at pre-schools in the scheme, and there will be a structured way to identify children who need further attention, said Dr Chong.

"We hope to get them to healthcare providers in a faster way, by having the social workers help them get appointments, such as at polyclinics or other specialist clinics if necessary," she added.

Ms Tan Lee Jee, assistant CEO of pre-school services at PAP Community Foundation (PCF), which runs more than 350 pre-schools, said the scheme helps not only the children, but also helps teachers cope with challenges such as supporting parents or working with social workers. PCF has four pre-schools under the scheme, with eight more expected to be added by 2021.

The expansion of the Circle of Care scheme follows the Government's renewed commitment to tackle social inequality.

Mr Lee said there is no national consensus so far on how best to level the education playing field.

He said: "Right now, our education system encourages people to compete and win. I think we need to change that. There needs to be a genuine emphasis on developing every child, whatever their ability, to their full human potential."

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Source: The Straits Times, 24 May 2018.

CONTINUOUS MATERNAL AND CHILD SUPPORT

Research has shown that experiences in the first 1,000 days of one's life, particularly those in the womb, affect a child's development. Negative experiences, such as biological and psychosocial risks that a mother is exposed to during her pregnancy, can impact the foetus' growth and brain development with profound consequences over its life course.

Child outcomes are also influenced by other factors, including experiences, nutrition from birth till three years of age and structural factors such as poverty. Hence, interventions such as the National University Hospital (NUH) KidSTART Merged Home Visitation Programme are needed to address children's circumstances holistically.

A Positive Start

Launched in March 2021, NUH KidSTART aims to shape and advance child health for the future by integrating clinical care across multiple departments, research and education. Through the programme, children from disadvantaged backgrounds are enabled with improved health, education and social equity for a better start in life.

NUH KidSTART is a collaboration between NUH and the Early Childhood Development Agency (ECDA). Within NUH, it is a partnership between the Department of Obstetrics & Gynaecology and Khoo Teck Puat – National University Children's Medical Institute (KTP-NUCMI). It also involves the Women's Emotional Health Service (WEHS) and the Department of Dietetics. The multidisciplinary team, comprising obstetricians, paediatricians, nurses, care coordinators, dietitians and medical social workers, support vulnerable families and help them navigate the healthcare system.

Support begins for mothers at the earliest antenatal stage possible. In NUH, care coordinators or nurses accompany pregnant mothers for their antenatal appointments and visit them at home to understand their families and home environments. The child development consultant, WEHS team, paediatrician or nurse are consulted where needed. Home visits or teleconsultations continue until the infants are 12 weeks old.

The ECDA-led team then takes over to drive the continuity of care. The programme supports parents in building positive and nurturing relationships with their children. It also encourages them to provide a safe and secure home environment for their children's holistic development. A paediatrician, medical social worker and care coordinator continue their support after the transition.

As of April 2022, the programme has supported 60 mothers and seen the birth of 42 babies. The team has carried out a total of 260 home visits and 77 teleconsultations.

NUH KidSTART has since been expanded to provide support to more low-income families. It will continue to connect vulnerable children and families to the appropriate agencies and bridge their access to health, education and social systems.

> I envision that the KidSTART programme will continue to impact and empower families in Singapore to enable children to have the best possible beginning to their lives, and grow together with our team. I also hope that our team continues to flourish, with the core team setting a solid foundation for future generations to build on.

Dr Chiong Yee Keow
Head of Programme in NUH

POSTGRADUATE EDUCATION IN PAEDIATRICS

While formal paediatric training began in 1962 at the University Department of Paediatrics, it was only in 1970 that the first local Master of Medicine (MMed) in Paediatrics was established along with the School of Postgraduate Medical Studies. This then became a conjoined qualification with the Membership of the Royal College of Physicians (MRCP), United Kingdom (UK) and the Membership of the Royal College of Paediatrics and Child Health (MRCPCH), UK in 1997 and 2000 respectively.

Over the years, the programme has been refined from an apprenticeship-based model to a rigorous, formal one including lectures and weekly case presentations. This is complemented by clinical on-the-job training in a broad range of paediatric sub-specialties, including renal replacement therapy and liver transplantation. Up till 2009, the programme comprised a two-year Basic Specialist Training and three-year Advanced Specialist Training. A formal Exit Examination was introduced in 2005 as a requirement for specialist certification as general paediatricians.

Nurturing the Next Generation

The department's training programme shifted to a more competency-based framework when Singapore's postgraduate medical training transitioned to the United States-based Accreditation Council for Graduate Medical Education-International training system in 2010. This change enabled the department to appoint faculty with ring-fenced time for postgraduate training, supported by two dedicated programme coordinators. The department was able to marry the strengths of a UK-style training programme that emphasised clinical skills, with that from the US which required a more formal, explicit documented approach to training.

Formal subspecialty training has also progressed with the recognition for accreditation by the Singapore Medical Council including neonatology, cardiology, gastroenterology and hepatology, haematology and oncology, intensive care, and nephrology. As population health needs evolve, the programme will continue to transform so that paediatricians can better anticipate the demands of child health.

Besides paediatric training, the department's researchers have also mentored science graduate students for their Master of Science and Doctor of Philosophy (PhD) candidatures, with an annual average of three research graduate students being conferred their higher degrees. The number of paediatricians who pursue their clinician scientist training and graduate with PhDs is also increasing.

Our department's commitment to push the frontiers of education stems from the nurturing culture that our founding father, Emeritus Professor Wong Hock Boon, has instilled. Today, our role as one of the key institutions for paediatric medical education in Singapore is interlinked with our commitment as Khoo Teck Puat – National University Children's Medical Institute of NUH to further advance clinical care and research for paediatrics.

> Having the privilege to train and mentor the next generation of doctors has been a fulfilling experience. I hope that our trainees continue to be proud torchbearers and role-models for the next generation of students and doctors.

Associate Professor Marion Aw

Director of Postgraduate Education, Department of Paediatrics

BRINGING CARE HOME

How can we improve the medical care and quality of life for children who are homebound with complex medical needs? That was the question in mind when the National University Hospital (NUH) Paediatric Home Care Programme was established in 2014 by Dr Thong Wen Yi, Senior Consultant at the Division of Paediatric Critical Care and Ms Elaine Hor, a paediatric advanced practice nurse.

The children under the programme are one of the most vulnerable groups in the community. They have complex medical needs and are dependent on life-supporting medical equipment such as home ventilators, oxygen concentrators, feeding pumps and suction machines and often require regular medical reviews. Given the complicated equipment set up, it is undoubtedly challenging and risky for their parents to bring them out of the house to the hospital for outpatient reviews.

The NUH Paediatric Home Care Programme was thus established, with funding from the Ministry of Health (MOH), to ensure these children receive regular medical support in the comfort of their own homes. During the visits, the care team, led by a paediatrician and a nurse clinician, identifies and addresses outstanding medical issues early to prevent clinical deterioration and hospitalisation. The team also carries out blood investigations, reviews home ventilation, helps acquire the necessary equipment and consumables and provides caregiver training.

Beyond addressing the clinical needs, the team works closely with the parents, who more than often, are

Ms Vivian Goh's condition, spinal muscular atrophy type 2, has kept her bed-bound and she had to shuttle between home and hospital for years. However, early medical intervention has helped her to sidestep lengthy hospital stays and allowed her to go on her first social outing in 18 years in April. The most recent outing on June 15 was a ride on the Singapore Flyer with her mother Ivy Yong. ST PHOTO: KEVIN LIM

Strong enough to venture out after 18 years

Home-care scheme keeps patient in better health and lets her enjoy life outside home

Samantha Boh

For close to two decades, Ms Vivian Goh, 37, lived her life in her three-room flat in Bedok, and her second home, the hospital.

A neuromuscular disease confined her to her bed, and complications left her hospitalised for months at a time. "Even during Chinese New Year and Christmas, she was in hospital. We were at home very little," said her mother, Madam Ivy Yong, 63, a housewife who rarely leaves her side.

But since Ms Goh joined the National University Hospital (NUH) Paediatric Home Care Programme in 2014, she has not been hospitalised once.

She has even been out and about.

In April, her first social outing in 18 years was to Madame Tussauds Singapore to see the wax figure of her idol, celebrity Andy Lau.

Madam Yong credits her daughter's better health to visits by a home-care team, who are able to identify problems early and nip them in the bud.

Ms Goh's condition, spinal muscular atrophy type 2, causes her muscles to waste away because the nerves controlling them do not work properly.

She is bed-bound, and unable to sit up or move her head, which faces right permanently. In addition, she cannot swallow well, making her prone to chest infections.

Early intervention at the first hint of an infection helps her to sidestep lengthy hospital stays.

The programme, which was started in April 2014, has helped 41 patients so far. Twenty of them are still getting regular home check-ups by a doctor and nurse team, who check the patients' vital signs and blood oxygen levels, for instance.

NUH is the second hospital to set up a children's home-care programme, after KK Women's and Children's Hospital. KKH's programme, where nurses make home-care visits and patients get medical checks at a multidisciplinary clinic, has helped more than 1,700 patients since 2001.

The NUH programme focuses on children with complex medical needs, who need oxygen or a ventilator to help them breathe, for example, and are mostly 18 years old or younger. Some, like Ms Goh, stay on it because they suffer from congenital conditions that are managed by paediatricians.

The effort is funded by the Ministry of Health and donations, and patients get subsidies based on their household per capita monthly income.

Dr Thong Wen Yi, 37, who heads the NUH programme, said its aim is to take medical reviews and outpatient clinic services to patients' homes because for many of them, making a trip to the hospital is challenging and risky.

Ms Goh, for one, no longer needs outpatient appointments, which used to be a requirement every one to three months.

Dr Thong added: "We also hope that we identify the medical problem early... and prevent any acute medical issues that would result in... hospitalisation."

There has been some early success. An audit of 18 patients found that the programme reduced the average number of days each patient spent warded in the hospital by nine days, over a year. Six in 10, in fact, were not admitted at all. Patients also saved up to $21,000 a year.

NUH's home-care team, comprising Dr Thong and Ms Elaine Hor, 39, an advanced practice nurse, also train caregivers, teaching them procedures such as how to suction phlegm from the mouth and nose, and provide emotional support.

Parents can also call a hotline manned by Ms Hor for medical advice. Said Ms Hor: "What I enjoy is the rapport established with the families... it is a journey with the family, through which you get to know them very well."

In fact, it was the pair who encouraged Ms Goh to venture out of the home when they noticed that she had become stronger. Her ticket to Madame Tussauds Singapore was their Christmas present to her.

This started the ball rolling.

She went on to visit another museum, and on June 15, she enjoyed a complimentary ride on the Singapore Flyer.

Although she was lying down and could not lift her head, her eyes shone as she exclaimed at all the sights around her, and instructed her mother to take lots of photos.

Said Dr Thong: "I cannot explain my joy when I saw the photo (of her on the flyer)."

Ms Goh, who has never been to school and was taught by her mother and aunt to read and write, said in Mandarin: "I still have other places I want to go to: Gardens by the Bay, S.E.A Aquarium and the Trick Eye Museum.

"I am already so old, if I don't go out now, then when?"

Madam Yong, a single parent, said her daughter used to be very conscious of people looking at her.

"There was once a mother who said to her child, 'don't be naughty or you will become like her'," she said. "But I tell her not to pay heed to what other people think."

Ms Goh showed signs of developmental problems at seven months of age. Her condition has deteriorated gradually throughout her life, and now, she can drink milk only through a feeding tube. Phlegm has to be suctioned from her mouth and nose daily, and she is hooked up to an oxygen tank.

But she remains chatty and cheerful, finding joy in the things around her, such as an impressive Barbie doll collection bought by friends, which she has displayed around her home, and a newly acquired snow globe from her trip to the Singapore Flyer, which has pride of place on the bed. She is also buoyed by the help she receives all around, from churches, charities and NUH, to friends and loved ones.

She keeps in touch with friends through the Internet and spends her day playing games on Facebook, using software that allows her to move the mouse with her gaze. She also watches local, Taiwanese and Hong Kong dramas.

Asked how she stays cheerful, Ms Goh says it is thanks to her always-smiling mother.

"She is my idol," she said.

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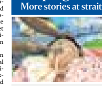
Helping hand
More stories at straitstimes.com



VIDEO
Vivian Goh receives regular home visits for her medical needs
str.sg/4EPu

Being able to stay home a blessing

Dr Thong Wen Yi checking Syifaa Taufan's condition, with the assistance of advanced practice nurse Elaine Hor, as Syifaa's mother Sofa Muhamad looks on. ST PHOTO: ONG WEE JIN

Every day little Syifaa Taufan wakes up in her own bed is a good day.

Never mind that she is hooked up to a ventilator and oxygen concentrator to help her breathe, and has three other machines to feed her milk, remove phlegm and monitor her blood oxygen levels.

Less than a year ago, the two-year-old, who suffers from a congenital neuromuscular disease, was barely home for a month at a time.

Her father, Mr Taufan Rayis Mochamad, 35, estimates that his little girl has spent nine months of her short life in hospital, mainly in the intensive care unit. But the last seven months have been free of all that, a "good step forward", Mr Taufan tells The Sunday Times.

Syifaa's breathing is weak and she finds it difficult to swallow. Phlegm can end up in her lungs, putting her at risk of chest infections. It was her recurring bouts of pneumonia that kept landing her in intensive care.

Her parents eventually decided to have a tracheotomy performed, where a tube was placed into her windpipe through an incision in her neck. This made it easier for her to breathe and for her parents to remove phlegm from her airways. She has not been hospitalised since she was discharged last December.

But getting to that point was an arduous journey filled with arguments with doctors and nurses, and denial, Mr Taufan admitted.

"At first, I did not believe (that my daughter was sick)... there were no problems when she was in my wife's womb," said Mr Taufan, who works in a shipping firm.

He described his early meetings with the medical team as "wars" where he would go against their advice, even taking Syifaa home when she was still unstable.

"I was hard-headed," admits the father of three other daughters. "My other daughters were well, why should she be unwell?"

Twice, the family backed out of the tracheotomy, and twice, Syifaa was in critical condition.

Last September, when Syifaa's lungs collapsed, they finally agreed to the procedure. "We nearly lost her," Mr Taufan said.

And that was the turning point.

While initially worried about maintaining the tracheotomy, Madam Sofa Muhamad, 31, Syifaa's mother and main caregiver, now confidently suctions mucus from the tracheostomy tube every three to four hours, and cleans and changes the tube's dressing.

The housewife also feeds Syifaa milk through a gastric tube and helps to stretch her arms and legs.

Syifaa is visited every one to two months by Dr Thong Wen Yi, 37, who heads the National University Hospital (NUH) Paediatric Home Care Programme, and Ms Elaine Hor, 39, an advanced practice nurse.

They check her vital signs and how well she is breathing, and test her phlegm for viruses or bacteria, among other things. They have been supporting the family for two years.

Because of the home-care help, Syifaa has outpatient appointments at the hospital only once every two months, compared with two to three times a month in the past.

The experience also made Mr Taufan determined to do his bit for very sick children.

Six months ago, he started volunteering at Star Pals (Paediatric Advance Life Support), where he ferries children with complex medical needs to their medical appointments once or twice a month.

"After all, the patient's parents are in the same boat as me. How they feel is how I feel," he said, adding that he is also grateful to a Star Pals nurse who makes regular visits to Syifaa. The family has received much help from NUH and Star Pals, through subsidies and even some free medical equipment.

For Syifaa's family, the little girl has never been considered anything but a blessing. Though they still hope for a miracle cure, Syifaa's family has accepted her condition.

That includes her three big sisters, Sameera, 10, Haifa, nine, and Hilwa, five, who say Syifaa is the "most special" sister. They spend time caressing her, playing with her and talking to her.

"They will notice when she is unwell or if something is wrong with her," said Madam Sofa. Mr Taufan added: "I asked (my two elder daughters) what they want to be in future and they said they want to be doctors. They want to cure Syifaa."

Samantha Boh

VIDEO
Home-based care helps two-year-old Syifaa.
http://str.sg/4EW4

Source: The Sunday Times, Page A8, 25 June 2017.

> Stepping into the future, the NUH Paediatric Home Care Programme hopes to explore respite care options for these children with special needs and facilitate their integration into community.

Dr Thong Wen Yi
Head, NUH Paediatric Home Care Programme

primary caregivers for their children around the clock. It is a collaborative journey and one where the care team forges close bonds with the families to empower them and enable these children to have a better quality of life.

The programme has consistently helped reduce hospitalisation episodes, length of stay and visits to the Children's Emergency. Since October 2021, it has become a mainstream medical service approved by MOH. The programme will continue to serve these children and their families in the community, ensuring they receive the medical care they need and bringing positive impact to their quality of life.

A Helping Hand

Every year, about 10 premature infants born in NUH require home support with medical equipment for 6 to 12 months after they are discharged from the hospital. As there was no loan library for these equipment, their parents had to purchase or rent the equipment at substantial costs or borrow it from other parents who had the equipment. These parents also faced additional challenges such as the limited quantity of such equipment and the need to be properly trained in order to operate the equipment.

Spurred by the challenges faced by these families, the Department of Neonatology initiated the Home Equipment Loan Programme (HELP) in 2021 to help families who could not afford the medical equipment critical to their babies' needs for home treatment. Supported by seed funding from the NUH Productivity and Innovation Fund, HELP has also benefited from the generosity of donors including grateful families of former patients. To date, HELP has acquired six ventilators and other ancillary equipment which are loaned for free for the entire duration of the babies' need.

> We hope this unique programme will ignite others to do more for the patients and families and take up paths less taken.

A/Prof Zubair Amin

Head, Department of Neonatology, on the HELP programme

Babies that have benefitted from the programme, Kwek Yu Xuan (left) Alexis Teo (right).

Loaning the necessary equipment such as ventilators and monitors has helped ease the financial burden of costly equipment and long hospital stays in the neonatal intensive care unit. Furthermore, the models loaned are the same as those used in the hospital, enabling the medical and nursing staff to train the parents comprehensively and prepare them better to care for their babies at home. One family who received HELP's assistance was that of Kwek Yu Xuan who made the headlines as the world's lightest baby. The Kweks obtained an oxygen concentrator, home ventilator, oxygen saturation monitor and other ancillary equipment for her care at home.

Since its inception, the programme has benefited 15 families, easing the transition from intensive care to the home. The programme continues to grow the library to support more families, a testament to the department's commitment to delivering family-centred care and giving our youngest patients a good head start in life.

UPSKILLING FOR THE FUTURE

To meet the changing needs, expectations and demands of child and youth healthcare, the Department of Paediatrics has developed Continuing Education and Training (CET) programmes to support the lifelong learning of practitioners keen to reskill and upskill.

Graduate Diploma in Child and Adolescent Health (GDCAH)

With primary care delivery evolving to emphasise family-focused and community-based practices, there is a need to support the CET of physicians practising in primary healthcare who are keen to upskill in the management of child and youth health.

Offered as part of the NUS School of Continuing and Lifelong Education (NUS-SCALE) and supported by Singapore SkillsFuture, the inaugural GDCAH was launched on 6 August 2022. Designed to meet the practice needs of primary care physicians, the programme incorporates the three core elements of primary care – comprehensive care, continuity of care and coordination of care. The GDACH course comprises two stackable graduate certificates, namely the Graduate Certificate in Child Health and the Graduate Certificate in Child Development and Adolescent Health.

> As clinicians standing at the intersection of clinical practice and medical education, we remind ourselves that good continuing education is necessary to support best clinical practice.

A/Prof Tan Poh Lin
Programme Director

Early Childhood Development: The Touchpoints Approach

Also offered as part of NUS-SCALE and supported by Singapore SkillsFuture, the Brazelton Touchpoints Individual Level Training course was launched in October 2020 to support the CET of early childhood educators. Taught by an inter-professional team comprising developmental paediatricians, specialist nurses and social workers, this course highlights the key role of inter-professional education and collaboration in supporting early childhood development.

Brazelton Touchpoints is an established evidence-based programme in the United States that focuses on building strong family-child relationships before birth through the earliest years, which are vital for children's early learning and healthy development.

The three-day course comprises interactive sessions and scenario-based group work, followed by a four-month mentorship. It equips professionals with the knowledge and skills for strengthening parent-child bonds and their partnerships with families.

Intensive Paediatric Revision Course for Master of Medicine (MMed) in Family Medicine

As a part of the department's efforts to support family practice specialists' professional development, the department has offered an intensive revision course for physicians preparing for MMed (Family Medicine) since 2004. Held over four Saturday afternoons, it prepares physicians for the paediatric component of the clinical examinations. In 2020, the course moved online due to COVID-19, serving the largest cohort of 84 learners since its inception.

Lifelong Learning

Educators who can intentionally and mindfully step into the learners' shoes with humility, open-mindedness, and courage are those who truly practise 'learner- or student-centred' education. In today's ever-changing world, this is perhaps a preferred way to stay relevant as educators who are vested in the lifelong learning of the self and others.

HONOURING THEIR SERVICE AND DEDICATION

For their significant contributions and dedicated service to the profession, healthcare professionals within Khoo Teck Puat – National University Children's Medical Institute have been conferred prestigious national and international awards, acknowledging their transformational impact on child health in Singapore and beyond.

Associate Professor Marion Aw	2001: Singapore Youth Award, Science and Technology 2008: Excellent Service Award (Star) by SPRING Singapore
Professor Dario Campana	2020: President's Technology Award
Dr Chan Poh Chong	2003: National Day Commendation Award for SARS 2006: Excellent Service Award (Silver) by SPRING Singapore
Dr Chong Shang Chee	2021: Friends of the Ministry of Social and Family Development Award
Associate Professor Daniel Goh	2018: Outstanding Asian Paediatrician Award by Asia Pacific Pediatric Association 2018: Public Administration Medal (Bronze) 2022: National Outstanding Clinician Mentor Award, National Medical Excellence Awards
Ms Rohana Ismail	2009: Efficiency Medal, National Day Awards
Associate Professor Roy Joseph	2004: The First Dr Malati Jadhav Oration and Gold Medal 2017: Public Service Medal
Dr Kao Pao Tang	2007: Excellent Service Award (Gold) by SPRING Singapore 2008: Excellent Service Award (Star) by SPRING Singapore
Emeritus Professor Prabhakaran Krishnan	2012: National Outstanding Clinician Award, National Medical Excellence Awards
Associate Professor Lai Poh San	1998: Singapore Youth Award, Science and Technology
Ms Katherine Leong	2021: President's Award for Nurses
Associate Professor Loke Kah Yin	2000: Singapore Youth Award, Science and Technology
Professor Low Poh Sim	2009: National Outstanding Clinician Mentor Award, National Medical Excellence Awards
Associate Professor Quah Thuan Chong	2013: National Outstanding Clinician Mentor Award, National Medical Excellence Awards
Professor Quak Seng Hock	2008: Excellent Service Award (Gold) by SPRING Singapore 2014: National Outstanding Clinician Mentor Award, National Medical Excellence Awards 2018: Outstanding Asian Paediatrician Award by Asia Pacific Pediatric Association
Professor Quek Swee Chye	2008: Excellent Service Award (Gold) by SPRING Singapore 2013: National Outstanding Clinical Quality Activist Award, National Medical Excellence Awards 2022: Public Administration Medal (Silver)
Associate Professor Tan Poh Lin	2006: Excellent Service Award (Silver) by SPRING Singapore 2007: Excellent Service Award (Silver) by SPRING Singapore
Professor Yap Hui Kim	2008: Excellent Service Award (Star) by SPRING Singapore 2008: National Outstanding Clinician Award, National Medical Excellence Awards 2012: Outstanding Asian Paediatrician Award by Asia Pacific Pediatric Association 2015: International Woman of the Year by the American Women's Association of Singapore
Associate Professor Allen Yeoh	2002: Singapore Youth Award, Science and Technology 2014: National Outstanding Clinician Scientist Award, National Medical Excellence Awards

BEYOND THE CALL OF DUTY

Driven by our vision and mission, our distinguished clinicians go the extra mile to not only care for the young within Khoo Teck Puat – National University Children's Medical Institute but also to support like-minded local and international organisations in their programmes and efforts to improve child health for the better.

Associate Professor Marion Aw	2015 – 2017: President, College of Paediatrics and Child Health, Academy of Medicine, Singapore
Associate Professor Daniel Goh	2004 – 2011: President, Singapore Paediatric Society 2001 – 2014: President, ASEAN Paediatric Federation
Professor Hugo Van Bever	2019 – 2021: President, Asia Pacific Academy of Pediatric Allergy, Respirology and Immunology (APAPARI)
Professor Lee Yung Seng	2020 – Current: President, Asia Pacific Paediatric Endocrine Society 2021 – Current: President, College of Paediatrics and Child Health, Academy of Medicine, Singapore
Professor Quak Seng Hock	1998 – 2002: President, Singapore Paediatric Society 2001 – 2004: Chair, Chapter of Paediatrics and Child Health, Academy of Medicine 2001 – 2004: President, Asian Pan-Pacific Society for Pediatric Gastroenterology, Hepatology and Nutrition
Professor Yap Hui Kim	2019 – Current: President, International Pediatric Nephrology Association

Chapter 5

our Family

CELEBRATING OUR PEOPLE... 60 YEARS OF GROWING WITH YOU

"It Takes A Village To Raise A Child"

Here at Khoo Teck Puat – National University Children's Medical Institute, we are committed to journeying with our patients and their families, providing quality, holistic care while pushing the boundaries of medicine for the advancement of child health.

From our frontline staff – our clinicians, nurses, pharmacists, allied health professionals and ancillary staff, to the people behind the scenes – our operations and administrative staff, researchers and laboratory technicians, we work collaboratively in a microcosm of the healthcare institution at large, with one focus on what matters most: caring for the future of tomorrow.

We pay tribute to our people, who serve tirelessly with dedication and tenacity in the face of an evolving healthcare landscape and changing norms. The African proverb, 'It takes a village to raise a child', resonates with us, bringing us together as a community to serve with purpose every day. Every individual has shaped who we are and our strength is our passion to serve. Thank you for delivering Incredible Care and bringing hope to the lives of our little (and not so little) ones and their families.

PARTNERS IN CARE...











 Photos were taken before COVID-19 or with compliance to prevailing COVID-19 guidelines

WORKING HAND IN HAND WITH FAMILIES












SERVING WITH STEADFAST PURPOSE









Photos were taken before COVID-19 or with compliance to prevailing COVID-19 guidelines











PAEDIATRIC
EXERCISE

HARNESSING A COLLECTIVE STRENGTH


















Photos were taken before COVID-19 or with compliance to prevailing COVID-19 guidelines


Ward 9B

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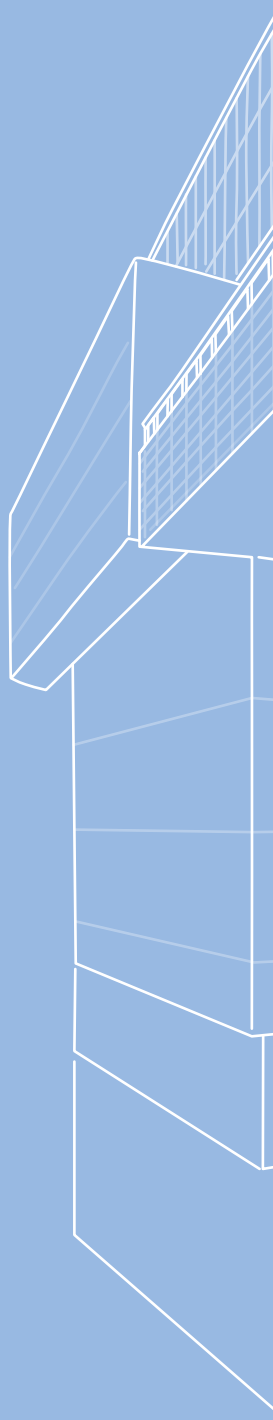

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