



KK Women's and
Children's Hospital
SingHealth

KKH
160
Years

1858-2018
Celebrating Our Heritage,
Shaping The Future

IN THIS ISSUE

**KKH HIP
SURVEILLANCE
PROGRAMME
FOR CHILDREN
WITH LONG TERM
NEUROLOGICAL
CONDITIONS**

**KKH CELEBRATES
160 YEARS:
TRANSFORMING
CARE FOR WOMEN
AND CHILDREN**

SPECIAL DELIVERY

2018
ISSUE 03

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CONTENTS

News from Singapore's Academic Tertiary Hospital For Women And Children

08

KKH CELEBRATES 160 YEARS: TRANSFORMING CARE FOR WOMEN AND CHILDREN

KKH commemorated 160 years of heritage
and progress in transforming care for women
and children at the KKH 160th Anniversary
Dinner on 27 October 2018. Harnessing
clinical care, research and education, KKH
seeks to improve patients' lives today, and
redefine the possibilities of healthcare to
benefit future generations.



06

HONOURING A TRAILBLAZING NURSING LEADER

A visionary yet compassionate leader,
Ms Ng Gaik Nai, Chief Nurse, KKH,
has been awarded the 2018 President's
Award for Nurses in recognition of 30 years
of dedication towards an empowered
nursing workforce and multidisciplinary
collaborations for enhanced patient health.



10

FAMILY RESILIENCE KEY TO LIVING WITH EPILEPSY IN ADOLESCENCE

A KKH study has found that shared
family beliefs, family connectedness,
and effective communication which
supports collaborative problem-
solving treatment, are key family
processes which enable adolescents
to manage challenges associated
with epilepsy more effectively.



< 13

INTERCEPTIVE ORTHODONTICS FOR THE PAEDIATRIC PATIENT

While orthodontic treatment usually begins
when all the permanent teeth have erupted,
early referral may be beneficial for some
children, as certain conditions may be easier
to address while the child's permanent teeth
are developing and their jaw is still growing.

KKH Hip Surveillance Programme For Children With Long Term Neurological Conditions

By Dr Ng Zhi Min, Dr Yeo Tong Hong and A/Prof Arjandas Mahadev

Long term neurological conditions (LTNC) comprise a diverse set of conditions resulting from disease or injury of the nervous system which affects an individual for life. These can include acquired brain or spinal cord injuries, neurogenetic/chromosomal or metabolic disorders, and genetic, muscular and neurodegenerative conditions such as cerebral palsy, epilepsy and scoliosis.

Children with LTNC are often affected by secondary musculoskeletal problems¹ such as limb stiffness and weakness, spasticity, hypotonia, dystonia, pain and discomfort. The hip is a commonly reported site of pain²⁻⁴; 26 to 35 per cent of young patients with cerebral palsy are affected by hip displacement^{1,5-7} which can cause significant pain. Pain in the hip has also been associated with a lower health-related quality of life^{8,9}.

These problems and associated issues can lead to impaired posture and mobility, interfere with the patient's ability and tolerance for sitting and transfers, disrupt their sleeping and feeding patterns, affect their personal hygiene, and decrease participation in activities within the home and community, leading to a poor quality of life for both the child and caregiver.

KKH HIP SURVEILLANCE PROGRAMME

KK Women's and Children's Hospital (KKH) sees about 300 new cases of children with LTNC each year, and about 21.6 per cent of child patients with LTNC at KKH are found to experience hip displacement¹⁰. To optimise the standard of care and quality of life for these patients with a diverse range of conditions, the hospital has introduced a Hip Surveillance Programme for children with LTNC who experience impaired mobility and are at risk for hip displacement and associated complications.

Early identification of pain in the hip area is an essential part of the strategy for prevention of hip displacement and its sequelae, and hip surveillance is the process of identifying and monitoring the critical early indicators of progressive hip displacement.

The KKH Hip Surveillance Programme aims to:

1. Facilitate the timely identification of children with LTNC who are at risk of hip displacement and dislocation
2. Aid posture management
3. Improve quality of life, ease of care, comfort and sleep
4. Prevent functional musculoskeletal deformities
5. Minimise the need for invasive limb-salvage surgery

Children who are eligible for the KKH Hip Surveillance Programme include those with cerebral palsy and LTNC who are not able to sit independently by 18 months, not able to walk 10 steps independently by five years, and who exhibit abnormal and/or restricted hip abduction or symptoms upon examination. Such children can be at risk of hip displacement, and should undergo their first pelvic X-ray between 18 to 24 months, or at first clinical sign of hip problems.

HIP SURVEILLANCE SCHEDULE

INITIATION AND FREQUENCY

Under the Hip Surveillance Programme schedule (Figure 1), hip surveillance for the child with LTNC is recommended to be initiated by two years, and maintained until the child is 16 years old, which is usually when children reach skeletal maturity. As hip displacement is related to gross motor function, surveillance frequency

increases with increasing GMFCS level as defined by the five-level Gross Motor Function Classification System (GMFCS)^{1,5-7}:

- | | |
|------------------|---|
| GMFCS I | Walks without limitation |
| GMFCS II | Walks with limitation |
| GMFCS III | Walks using a hand-held mobility device |
| GMFCS IV | Self-mobility with limitation; may use powered mobility |
| GMFCS V | Transported in a manual wheelchair |

CLINICAL ASSESSMENT

Hip surveillance for children with LTNC requires both clinical and radiological review. Regular clinical assessment includes asking the child's caregiver about hip pain during movement, after prolonged activity or while performing perineal care. It also involves review of growth parameters, feeding history and sleep history. Special attention should be paid to sitting and standing postures.

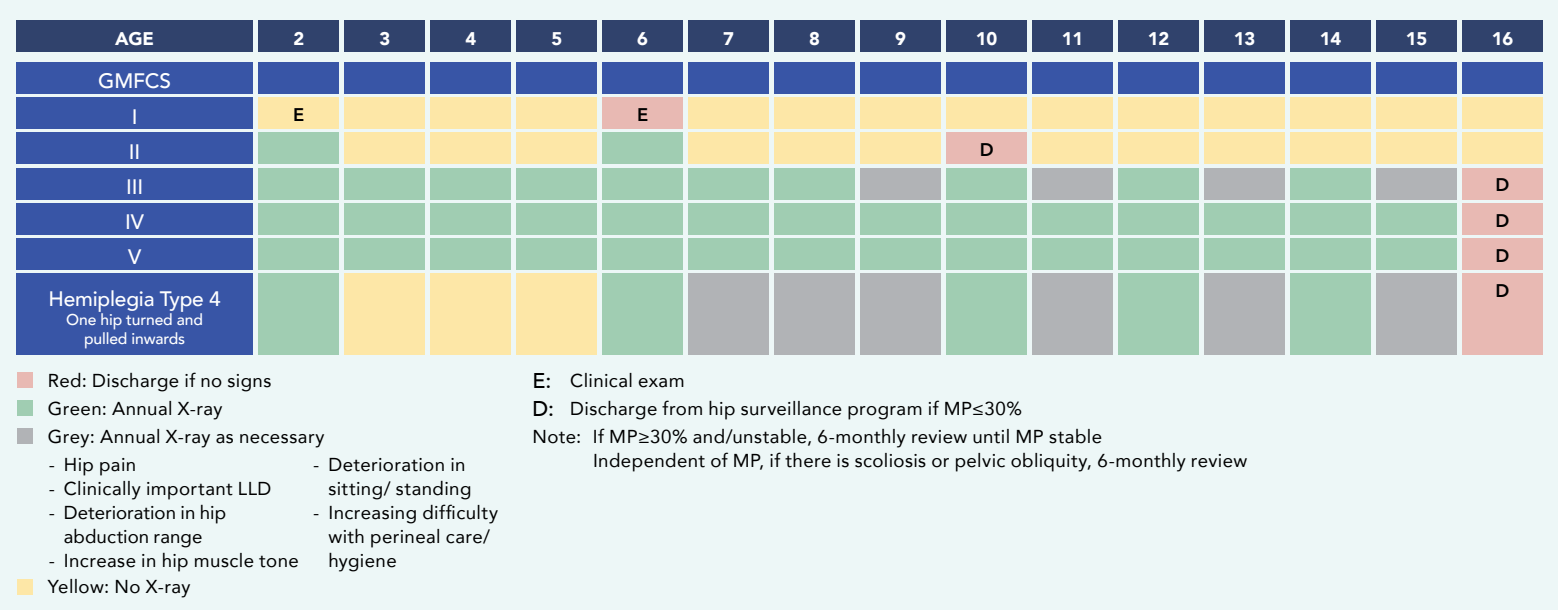
In addition, a focused examination looking for limb length discrepancy (LLD), pelvic obliquity, scoliosis and range of motion of the hip (limited abduction) will allow the physician to detect associated musculoskeletal conditions in children with LTNC. As the expression of pain in children with LTNC may be very varied, great care should be taken to look for pain during the process of clinical examination.

RADIOLOGICAL ASSESSMENT

Radiological assessment involves taking regular antero-posterior (AP) pelvic radiographs with the legs in neutral abduction and adduction to measure migration percentage (MP) of the hip bones^{11,12}.

Continued from page 3...

Figure 1. KKH Hip Surveillance Schedule



MP is a radiographic measure of the amount of ossified femoral head that is not covered by the ossified acetabular roof, and plays a key role in providing an indication of the risk of hip displacement, as well as the recommended clinical and/or rehabilitative management.

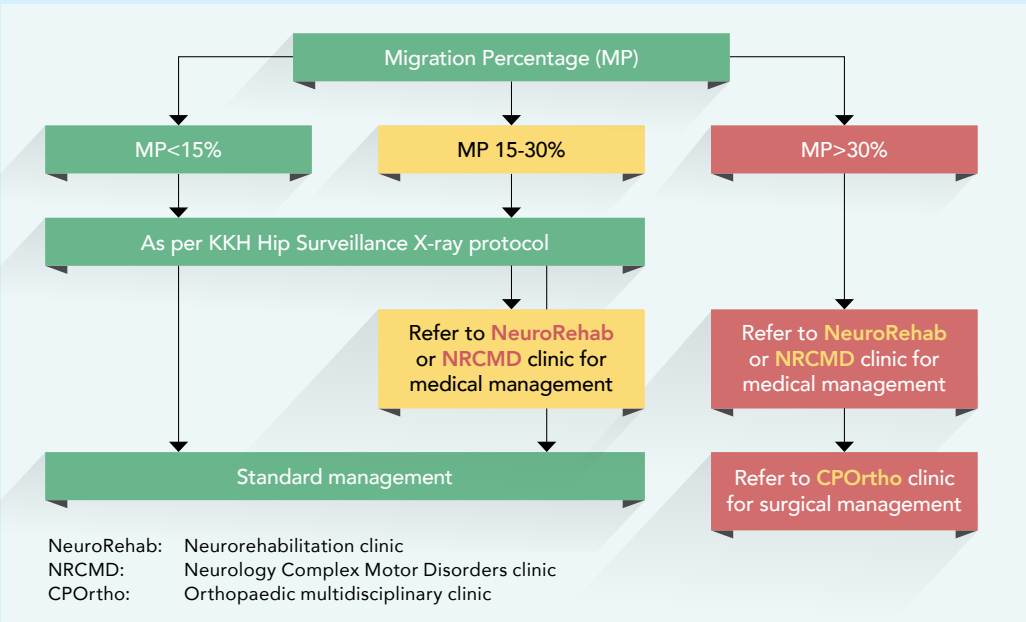
A hip is considered ‘at risk’ of displacement when its MP is greater than 30 per cent. Conversely, the frequency of radiological assessment may be reduced when the MP is less than 30 per cent and has remained stable (less than 10 per cent deviation over a 12-month period) over two years.

MANAGEMENT AND INTERVENTION

Hip surveillance and management requires a multi-disciplinary approach. Various care teams are involved, including the primary care provider, neurologist and neurorehabilitation physician, orthopaedic surgeon, therapist, orthotist and dietician. With early recognition and regular monitoring, at-risk patients can be identified early and their caregivers given advice on 24-hour postural management, nutrition and equipment.

The assessment and management protocol for patients with LTNC is informed by the patient’s hip MP measurement. Where a child with LTNC has a hip MP greater than 30 per cent, they will be referred to the KKH Paediatric Integrated Neurorehabilitation Service (PINS) for family-centred inter-disciplinary management. At PINS, the child and their caregivers will receive closer monitoring and given advice as well as appropriate intervention to delay the progression of hip displacement. If surgical intervention is indicated, post-operative rehabilitation is pre-planned and coordinated.

Figure 2. Management Based On Hip Migration Percentage (MP)



RECOMMENDATIONS FOR HEALTHCARE PROVIDERS

- Regular clinical and radiographic hip assessment should be conducted for children with LTNC, especially those with gross motor function levels GMFCS III-V. Refer to Figure 1 for the recommended surveillance schedule.
- Patients should be referred to KKH PINS if any of the following symptoms present:
 - A hip MP of more than 30 per cent
 - Limited range of motion in hip abduction less than 30 degrees when measured with the hips at zero degree flexion and knees extended
 - Presence of pain on clinical examination
 - Any other clinical concern that is felt to be related to the hip

CASE STUDY: HIP SURVEILLANCE FOR CHILD WITH SPASTIC QUADRIPLEGIC CEREBRAL PALSY

Hip surveillance was commenced for a child with spastic quadriplegic cerebral palsy with GMFCS IV, at the age of two years (Figure 4A). He subsequently developed left hip displacement, and the hip MP continued to progress despite medical management of spasticity (Figure 4B).

At four years, the child underwent surgical release of the left hip adductor and an iliopsoas tenotomy to facilitate repositioning of the left femoral head (Figure 4C). Post-operatively, a SWASH brace (standing, walking and sitting hip orthosis) was prescribed to maintain the position of the femoral head. At seven years, the child's left hip remained enlocated and he remained symptom-free (Figure 4D).



Figure 4A. Hip condition at 2 years, MP <30%



Figure 4B. Hip condition at 3 years, MP 40%

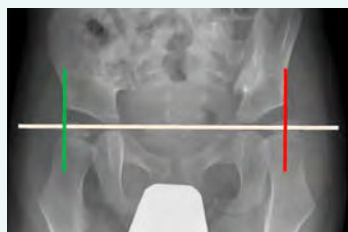


Figure 4C. Hip condition at 4 years, MP 50%



Figure 4D. Hip condition at 7 years, MP <10%

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The co-authors of this article gratefully acknowledge the support and involvement of the following KKH colleagues in the KKH Hip Surveillance Programme: Associate Professor Derrick Chan, Head and Senior Consultant; Associate Professor Choong Chew Thye, Senior Consultant; and Dr Lim Kim Whee, Consultant, Neurology Service; Dr Ehab Shaban Mahmoud Hamouda, Consultant, Department of Diagnostic and Interventional Imaging; Ms Tan Ling Ying, Neurology Specialty Nurse, and the Physiotherapy Department.



Dr Ng Zhi Min, Consultant, Neurology Service, KK Women's and Children's Hospital

Awarded the SingHealth Health Manpower Developmental Programme fellowship award in 2015, Dr Ng Zhi Min underwent training in paediatric rehabilitation with Harvard Medical School as a clinical fellow at Spaulding Rehabilitation Hospital in Boston, Massachusetts, USA. Dr Ng has a special interest in paediatric neurorehabilitation.



Dr Yeo Tong Hong, Consultant, Neurology Service, KK Women's and Children's Hospital

Dr Yeo Tong Hong completed his postgraduate Basic Specialist Training at Children's Hospital for Wales, Cardiff, and Higher Specialist Training at Southampton Children's Hospital, Southampton, before joining the Neurology Service at KKH in December 2016. Dr Yeo's special interests in paediatric neurology include complex motor disorders, movement disorders, neuromodulation, and neurovascular disorders.



Associate Professor Arjandas S/O Mahadev, Head and Senior Consultant, Department of Orthopaedic Surgery, KK Women's and Children's Hospital

Associate Professor Arjandas S/O Mahadev's main interest lies in the management of paediatric foot and ankle, and hip conditions. A/Prof Mahadev completed his fellowship in paediatric orthopaedic at Children's Hospital, San Diego, and is a corresponding member of the Paediatric Orthopaedic Society of North America. A/Prof Mahadev also has a special interest in orthopaedic complications of spastic cerebral palsy, and volunteers with the Cerebral Palsy Alliance Singapore.



Honouring A Trailblazing Nursing Leader

A visionary yet compassionate leader, Ms Ng Gaik Nai, Chief Nurse, KK Women's and Children's Hospital (KKH) has dedicated more than 30 years to transformations leading to an empowered nursing workforce; pursuing critical developments in nursing practice and education, and championing multidisciplinary collaborations for enhanced patient health and outcomes. For her significant contributions to Singapore, Ms Ng has been awarded the 2018 President's Award for Nurses – the highest accolade for the nursing profession in Singapore.

Currently holding dual appointments as Chief Nurse, KKH and Deputy Group Chief Nurse, SingHealth, Ms Ng was amongst six recipients of the President's Award for Nurses conferred by President Halimah Yacob at the Istana in July 2018. This national accolade has been awarded to just 67 recipients since its establishment in 2000.

A strong advocate of life-long progress and education, over the course of her career, Ms Ng has led the development of numerous critical changes in nursing practices, policies and procedures to drive the delivery of safe, efficient and integrated care for patients and their families. She also serves on the National Quality Council national advisory panel for the Ministry of Health to facilitate cross-institutional sharing and improvement in healthcare delivery.

"Nurses need to use our heads, hearts and hands to constantly care for the sick, to lead in clinical nursing practices, and to work as a multidisciplinary team to drive transformational

change for better health outcomes for our patients," shares Ms Ng. "Our patients come to us with full trust and we must provide care that is as good as the care that we or our loved ones would like to receive."

EMPOWERING NURSES TO LEAD

In 2011, then a Deputy Director of Nursing overseeing the paediatric wards at KKH, Ms Ng led a team of nursing leaders to develop and implement Singapore's first Paediatric Resident Nurse Programme. This pioneering work upskills Resident Nurses to perform comprehensive patient assessment, plan medical treatment and initiate investigations, and triage patients for appropriate treatment. Resident Nurse Programmes in obstetrics and gynaecology, and neonatology soon followed.

The Resident Nurse Programme has since laid the foundations for the development of several education initiatives, such as the Advanced Clinical Education (ACE) Clinical

Instructors Programme and ACE Immersion Programme, which enable nurses with an Advanced Diploma in Nursing to enrol in a specialisation programme to prepare them to practice to the full extent of their training.

Ms Ng also mooted the establishment of a dedicated Obstetrics Monitoring Unit in 2017, to enable closer monitoring for pregnant patients with high-risk and complex pregnancy conditions, or those scheduled to undergo induction of labour.

EMBRACING TECHNOLOGY TO ENHANCE CARE

As Chair of the Singapore Nurses Association Nursing Informatics Chapter, Ms Ng leads efforts to build the capacity and capability of competency in Information Technology (IT) among nurses, and support the development of nursing informatics in Singapore.

In 2009, Ms Ng played a pivotal role in KKH's efforts to harness IT to enhance



Ms Ng Gaik Nai, Chief Nurse, KKH and President Halimah Yacob (centre), with Minister for Health Mr Gan Kim Yong (far left), Ms Tan Soh Chin, Chief Nursing Officer, Ministry of Health (far right), and fellow recipients of the 2018 President's Award for Nurses.

patient care and healthcare efficiency, serving as the nursing lead in the DigiMed workgroup. The team successfully implemented an electronic medical records system in KKH and across SingHealth, as well as automated the medication dispensing process to enhance medication safety in KKH.

Anticipating the benefits of integrating IT into healthcare, Ms Ng established the Nursing Informatics Unit at KKH in the same year to pursue ongoing enhancements to care processes through IT, and to provide training and support to nurses.

BRINGING CARE INTO THE COMMUNITY

Recognising the need of vulnerable patients for specialised care beyond an acute hospital, Ms Ng worked closely with a multidisciplinary team of KKH nurses, clinicians and medical social workers to create an inpatient paediatric facility at St. Andrew's Community Hospital in 2015. Today, with training and support from KKH, the facility enables children requiring specialised paediatric care and who are technologically dependent, to receive continual and specialised care in a community hospital setting.

To equip caregivers with the essential knowledge and skills to care for an infant safely, Ms Ng and her nursing leaders

"Nurses need to use our heads, hearts and hands to constantly care for the sick, to lead in clinical nursing practices, and to work as a multidisciplinary team to drive transformational change for better health outcomes for our patients."

Ms Ng Gaik Nai
Chief Nurse
KKH

collaborated with the Prime Minister's Office, National Population and Talent Division, and SEED Institute to develop a Basic Infant Care Training for Caregivers programme in 2017. Conducted in a community setting, the programme has proven invaluable in enhancing caregivers' understanding and practice of safety and hygiene when caring for infants.

NURTURING A FUTURE GENERATION

A keen advocate for talent management and development, Ms Ng has played a key role in redefining and developing the talent management plan for nurses. In 2017, under her leadership, the SingHealth Nursing Talent Review Board was established and a job rotation framework was introduced at KKH for newly joined nurses, to provide a greater breadth of experience in the various nursing disciplines available to the nurses prior to specialisation.

Ms Ng also serves as Chair of the SingHealth College of Clinical Nursing (CCN), overseeing all nursing education and training initiatives across SingHealth. Working closely with nursing teams, CCN aims to review and develop undergraduate, post-graduate, continual education and global nursing programmes, as well as collaborate with other disciplines to promote inter-professional education and inter-collaborative practice, and to shape the clinical education landscape for nurses in SingHealth and beyond.

"I believe that people are our greatest asset and we need to provide opportunities to develop them to their fullest potential, so that they can be better leaders than us," says Ms Ng. "I am honoured to have the role of guiding and equipping our nurses with the necessary knowledge and skills to continually grow their capacity and capabilities, towards providing the best care to our patients."

KKH Celebrates of Transforming Care for

On 27 October 2018, KK Women's and Children's Hospital (KKH) commemorated 160 years of heritage and progress in transforming care for women and children at the KKH 160th Anniversary Dinner, held at Shangri-La Hotel.

Since 1858, KKH has embarked on an enduring mission to improve the health of women and children. Through the integration of clinical care, research and education, KKH seeks to improve patients' lives today, and redefine the possibilities of healthcare to benefit future generations.



Front Row: (centre) Guest of Honour, Deputy Prime Minister, Mr Tharman Shanmugaratnam and Mrs Tharman Shanmugaratnam, with (from left) Prof Alex Sia, CEO, KKH; Dr Amy Khor, Senior Minister of State, Ministry of the Environment and Water Resources & Ministry of Health; Mr Peter Seah, Chairman, Board of Directors, SingHealth; Prof Ivy Ng, Group CEO, SingHealth; A/Prof Ng Kee Chong, Chairman Medical Board, KKH. Back Row: (from left) Prof Bernard Chern, Chairman, Division of O&G, KKH; A/Prof Ong Chiou Li, Chairman, Division of Clinical Support Services, KKH; Ms Tan Soh Chin, Chief Nursing Officer, Ministry of Health; Prof Kenneth Kwek, Deputy Group CEO (Organisational Transformation and Informatics), SingHealth; Mr Tony Chew, Director, Board of Directors, SingHealth; Mr Chan Heng Kee, Permanent Secretary, Ministry of Health; Dr Lee Chien Ean, Deputy Group CEO (Regional Health System), SingHealth; Ms Ng Gaik Nai, Chief Nurse, KKH; A/Prof Chan Yoke Hwee, Chairman, Division of Medicine, KKH; A/Prof Kevin Lim, Chairman, Division of Surgery, KKH.



Prof Alex Sia, CEO, KKH, delivers a welcome address to guests at the KKH 160th Anniversary Dinner.



Guest of Honour, Deputy Prime Minister Mr Tharman Shanmugaratnam, delivers the keynote address at the KKH 160th Anniversary Dinner.

160 Years

Women and Children



Cake-cutting ceremony at the KKH 160th Anniversary Dinner: (centre) Guest of Honour, Deputy Prime Minister, Mr Tharman Shanmugaratnam and Mrs Tharman Shanmugaratnam, with (from left) Ms Ng Gaik Nai, Chief Nurse, KKH; Prof Alex Sia, CEO, KKH; Dr Amy Khor, Senior Minister of State, Ministry of the Environment and Water Resources & Ministry of Health; Mr Peter Seah, Chairman, Board of Directors, SingHealth; Prof Ivy Ng, Group CEO, SingHealth; and A/Prof Ng Kee Chong, Chairman Medical Board, KKH.



Mrs Tharman Shanmugaratnam (centre) receives a bouquet of flowers from Ms Ng Gaik Nai, Chief Nurse, KKH (left); and Prof Ivy Ng, Group CEO, SingHealth (right).



Previous chief executive officers of KKH, (from left) Prof Kenneth Kwek, Deputy Group CEO (Organisational Transformation and Informatics), SingHealth; Dr Jennifer Lee; and Prof Ivy Ng, Group CEO, SingHealth; with Prof Alex Sia, current CEO, KKH.



Medical residents from KKH put on a rousing musical in celebration of care for women and children.



Dance performance by Nursery-2 children from Learning Vision @ KKH.



Expendable gift for the Tan Cheng Lim-CCF Professorship in Paediatric Oncology, presented by Children's Cancer Foundation.



Establishment of the Benjamin Henry Sheares Professorship in Obstetrics and Gynaecology, presented by the Sheares family.



Establishment of Child and Maternal Health Programmes, presented by Tanoto Foundation.

Our Legacy of Care



PIONEERING CARE FOR WOMEN AND CHILDREN

KK Women's and Children's Hospital (KKH) began in 1858 as the fifth general hospital in Singapore, built near the Kandang Kerbau area. The hospital started seeing its first gynaecological and childbirth cases in 1865.



MODERN OBSTETRICS AND GYNAECOLOGY IN SINGAPORE

Dr Benjamin Henry Sheares (centre pictured) became the first Singaporean Professor of Obstetrics and Gynaecology at Kandang Kerbau Hospital (KK Hospital) in 1951. A dedicated doctor, teacher and researcher, Dr Sheares pioneered a procedure to create a vagina for women born without one – known as the 'Sheares Operation'.



IMPROVING MATERNAL AND INFANT HEALTH

KK Hospital introduced a domiciliary midwifery service in 1955 to help women deliver safely at home, provide antenatal home care to patients, and educate mothers and caregivers on proper infant care. Complex cases were referred to the hospital for management.

MIDWIFERY IN A MODERN AGE

Ms Maria Binte Jumhasan

Senior Nurse Clinician, Delivery Suite, KKH

"Caring for a woman during one of the most vulnerable times of her life, midwifery is a profession that demands both the head and the heart."

Since the early days of midwifery in Singapore, the role of the midwife has advanced by leaps and bounds both clinically and professionally.

Today, if you went into labour at KKH's Delivery Suite, the midwife assisting you would play an active and crucial role in your management. She would be accredited in cardiotocography (CTG) monitoring of the fetal heartbeat and uterine contractions during pregnancy, and even trained in episiotomy repair. She would also be skilled in nursing informatics, utilising tech-enabled work flows in your care.

Your midwife would likely have a diploma in nursing with a subspecialty in midwifery, a Bachelor of Nursing and even a Masters in Midwifery. Antenatally, she would educate you – and your family members if need be! – about lactation and breastfeeding, the benefits of skin-to-skin contact, and basic infant care. If you were an anxious first-time mother, she would be your counsellor and maybe even a confidante.

WHEN A NEWBORN DOESN'T SURVIVE

Sometimes, due to circumstances, a newborn doesn't survive. This is a time where the mother and the family need support and comfort more

than ever. Regardless whether I am the attending midwife, I will visit and provide support to the patient, and also to my colleagues – yes, even medical professionals need support and comfort. We love every baby and mother that comes under our care, and a loss is felt keenly by everyone. Ours is a very rewarding profession, even though it comes with tears.

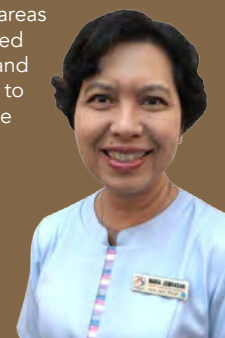
Despite the technological advances to midwifery training and patient care, some things never change. One, the skills of midwifery are learned in real time, on the job. Two, labour cannot be rushed. When a woman is in active labour, there is no telling how many hours it will take – and the midwife doesn't leave the mother's side until the baby is safely delivered. At our Delivery Suite, babies have a way of arriving all at the same time! This is why teamwork in patient care continues to be vitally important.

THE FUTURE OF MIDWIFERY

Although I have been a midwife for more than 26 years, midwifery still holds so much for me to explore – in the areas of redesigning care processes in line with evidence-based practice, and research into the links between mothers' and babies' health and psychosocial wellbeing. I am excited to discover better ways to care for our patients. Indeed, the future of health is ours to shape."



Scan this QR code to listen to midwife Ms Maria Binte Jumhasan's account of caring for pregnant mothers during the 2009 H1N1 virus outbreak in Singapore.

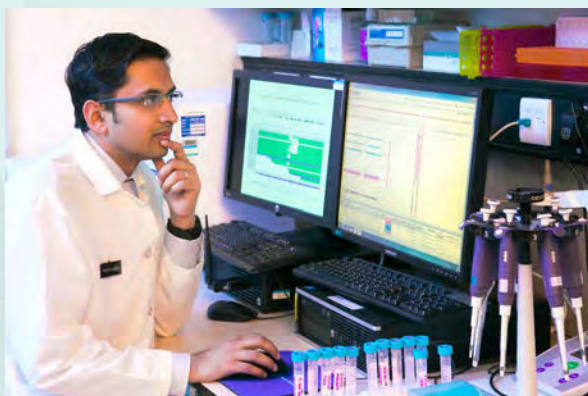


Advancing Cures; Improving Outcomes



HELPING TO PROTECT PREMATURE AND SICK BABIES IN NEED

Singapore's first human breast milk bank at KKH provides a ready supply of safe, pasteurised human breast milk to meet the breast milk needs of premature and sick babies.



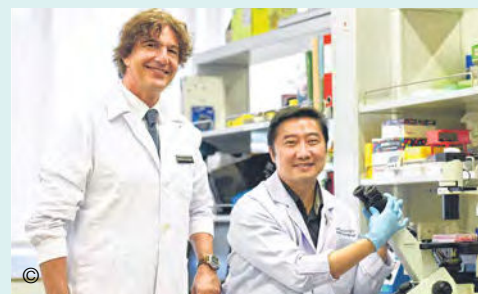
RESEARCH TO FIGHT DISEASE

KKH researchers continue to pursue translational research to bring about impactful health outcomes and advance the delivery of healthcare in Singapore; collaborating with research partners to better understand, and provide intervention for health issues such as childhood cancers, genetic disorders and infertility.



ENHANCING HEALTH OUTCOMES FOR EVERY BIRTH

KKH researchers are investigating the link between the health of mothers and their babies through a Singapore pre-conception study of long-term maternal and child outcomes.



RESEARCH TO AID DIAGNOSIS OF ARTHRITIS IN KIDS

KKH clinician scientists, part of a SingHealth Duke-NUS Academic Medical Centre research team, are uncovering specific type of immune cells that can help to predict and inform the management of arthritis in children.

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THE EVOLUTION OF MATERNAL FETAL MEDICINE

Professor George Yeo

Emeritus Consultant and Chief of Obstetrics
Department of Maternal Fetal Medicine
Director, Antenatal Monitoring Clinic, KKH

"Decades ago, there existed only general obstetrics for pregnancy. Pregnant women would visit the family doctor for check-ups, and deliver at home or in a nursing home.

In a developed country such as Singapore today, pregnant women deliver in hospitals only. Complicated pregnancies have come to be managed by Maternal Fetal Medicine (MFM) specialists and Obstetric Physicians.

THE INTERNET AGE

The age of instantaneous information arrived with the internet, making readily available good references for clinical governance and administrative governance through the websites of leading medical colleges and specialist societies. Systems and processes constructed out of uniquely KKH innovations and common sense could now be benchmarked against College Guidelines and kept up to date. Common protocols were developed, making nursing and delivery in the labour ward and clinics safer.

TAKING THE FIRST STRIDE

In 1993, Singapore decided to pursue subspecialty development of Maternal Fetal Medicine. KK Hospital made considerable advances in all three O&G subspecialties. We performed the first blood transfusion

for an anaemic fetus with rhesus disease, saving the pregnancy from an early preterm birth. Then in 1999, we introduced the concept and practice of engaging the considered choice of our pregnant women with a team of full time counsellors for Down Syndrome screening.

In 2014, we introduced the combined first trimester screening for aneuploidy and birth defect screening — which remains the gold standard of birth defect screening. We were again the first to perform fetal surgeries such as the insertion of a fetal chest shunt to save terminally-ill hydropic fetuses, and laser photocoagulation for identical twins with Twin-to-twin transfusion syndrome, pregnancies if untreated would result in almost certain death.

More recently, we set up the first Non-Invasive Prenatal Testing (NIPT) laboratory in Singapore and helped to develop the local Chromosomal Microarray Analysis service for prenatal diagnosis in KKH. These developments are part of a continuum that began when that first stride was taken more than 25 years ago.

THE NEXT FRONTIERS

Maternal fetal medicine knowledge continues to grow at an exponential pace. The next frontiers will be defined by our patients' needs as we continue to place their welfare at the heart of all that we do. One major frontier may be how we deliver education to the public towards the wiser choice of conceiving, screening and birthing our next generation.



Scan this QR code to listen to Professor George Yeo share about how maternal fetal medicine was revolutionised over the last three decades by the internet age.



Building Health; Transforming the Community



BIG MOVE FOR A NEW START

In 1997, KKH opened with new premises and a new name. The main referral centre for newborn babies suffering from complex and high-risk medical conditions, KKH is also the first and only hospital in Singapore to lead in surveillance for childhood and women's obstetric vaccines to optimise patient safety.



BUILDING PARTNERSHIPS TO RESTORE LIVES

Working in close collaboration with key partners, supporters and agencies, KKH is helping to empower patients and their families to receive right-sited care and live meaningful lives within their communities.



INTEGRATED SUPPORT FOR VULNERABLE MOTHERS AND CHILDREN

KKH is leading a one-stop centre, providing integrated health, social and educational support for vulnerable mothers and children to optimise the developmental potential of children from vulnerable families.

COURAGE DURING A SARS OUTBREAK

Professor Chay Oh Moh

Emeritus Consultant, Respiratory Medicine Service,
Department of Paediatrics
Campus Director, Education Office, KKH

"The notification arrived on a Saturday afternoon. We had just 24 hours to set up a ward and intensive care facility in Tan Tock Seng Hospital (TTSH) for children suspected of having SARS (Severe Acute Respiratory Syndrome).

The nursing, medical, pharmacy, facilities and procurement teams rallied quickly, and by evening, we had assembled the necessary equipment as well as doctors and nurses who volunteered to go.

The SARS outbreak in Singapore began in February 2003, and TTSH and the Centre for Disease Control (CDC) were the designated facilities for isolating and treating suspected and probable SARS cases. All suspected cases of SARS had to be brought to TTSH, including children.

The team spent Sunday morning in TTSH setting up the paediatric ward and intensive care facility. I met with the TTSH medical director, infection

control team and intensive care unit director, and was assured that protocols – such as the necessary protective equipment – were already in place to prevent possible infection, even though much about the virus was still not known.

By evening all was ready, and just in time too, for the first paediatric patient was admitted the same evening. Over the next few days, the facility would be staffed round-the-clock by volunteer shifts of two doctors and four nurses, from KKH. As time went on, a doctor from National University Hospital volunteered to join our team at TTSH, alternating shifts with our doctors. We gratefully accepted!

PATIENT WITH SARS DISCOVERED

Back at KKH, it was discovered that a patient with SARS had visited our Women's Clinic. The medical and nursing teams immediately commenced contact tracing, ringing every single patient who had visited our Women's Clinic to make sure that they were well, and advising them on what to do should they develop a fever. Across KKH, already strict safety protocols were tightened, and additional restrictions imposed to minimise the risk of infection.

The risk of SARS wasn't fully known yet, and the source and route of infection were still to be determined. At a time when most people were avoiding being anywhere near TTSH, our healthcare staff were courageously stepping forward to the frontlines. Many doctors and nurses did not go home in between shifts, but stayed elsewhere, lest they posed a risk to their families



INTENSIVE CARE FOR VULNERABLE BABIES

KKH maintains the largest neonatal intensive care facility in Southeast Asia and Singapore's only extra-corporeal membrane oxygenation (ECMO) mobile service to improve outcomes for newborn babies.

and loved ones. It was an emotionally challenging time, especially for those who had young children. But everyone understood this was a national emergency, and were determined to work together for those who were depending on us for their lives.

UNSUNG HEROES

A crisis can bring out the best of human nature. Our colleagues in TTSH shared all that they knew about the situation as quickly as they could, to help us provide the best possible care for patients and staff at KKH. Many healthcare staff also risked their own safety to help men, women and children during the critical SARS period. It is my honour and privilege to work every day alongside these unsung heroes.



Scan this QR code to listen to paediatrician Professor Oh Moh reflect on the positive learnings that resulted from the 2003 SARS outbreak in Singapore.

A NEW MODEL OF NEONATAL INTENSIVE CARE

Ms Rajammal D/O Palaniappan Kaliappan

Nurse Clinician, Neonatal Intensive Care Unit, KKH

"A baby is a bundle of joy, and every parent wants to be able to bring their newborn home after birth. So it can be very challenging for parents when their newborn has to be admitted to neonatal intensive care, often unexpectedly.

Despite the term 'Neonatal Intensive Care', it is not only the infant who needs care, but also their family. Over the 30 years that I have been a nurse with KKH Neonatal Intensive Care Unit (NICU), there has been a paradigm culture shift to place greater emphasis on involvement of the parents in the care of the infants; supporting the family not just medically, but also emotionally and psychologically so that they feel comforted, understood and not alone on this difficult journey.

Teamwork, empathy and trust are absolutely crucial. Many of the infants admitted to the NICU stay for at least one to two months. We begin by engaging parents on the importance of initiating bonding with their infant from an early age, and teaching them ways to bond and interact with their infant such as through kangaroo care – which is placing the baby skin-to-skin on the parent's chest. We guide them on how to recognise and respond to their infant's cues, and encourage them to be an active participant in their infants care.

Parents are strongly encouraged to attend Parent Support group sessions which are led by nurses, physicians and allied health team. They will learn the importance of family integrated care, breastfeeding, post-discharge care and developmental care. A buddy nurse is assigned to the parents of infants with extremely low birth weight, to provide constant psychological and emotional support to parents and families during their stay in the hospital.

FAMILY INTEGRATED CARE

NICU is a highly technological environment tailored to provide care for the smallest and sickest neonates. When a neonate is admitted to NICU, the ability of the parents to spend quality time and provide meaningful care for their infant is often restricted. This affects the development of an ideal parent- infant relationship.

Family Integrated Care gives parents an opportunity to be involved in the caring of the infant from the beginning. This strengthens the bond between the parent and infant. Thus, it facilitates a smooth transition to home. NICU nurses bridge the care spectrum from assisting the family with bonding to empowering them to care for their baby.

SURROGATE PARENTS

Working in the NICU, we are surrogate parents to the infants. There will be some heartbreak, some happiness, and certain instances which you just cannot forget. Parents vividly remember the care we render and their journey in the NICU. A baby once came to us as a 24-weeker; who is now 18 years old, and still comes to visit us every year on her birthday with her parents. The mother of another NICU graduate just shared the happy news that the child is entering the secondary school of her choice.

In many aspects, neonatal nurses are the voice of the smallest and sickest patients who don't have one on their own. Neonatal nurses are strong patient and family advocates. As advocates we collaborate together with the multi-disciplinary and medical team to provide the best care to our infants.

The challenges and many rewarding experiences of our preemie graduates is the greatest satisfaction that makes me love my job.



Scan this QR code to listen to Nurse Clinician, Ms Rajammal D/O Palaniappan Kaliappan, share about when the unfortunate happens at the KKH Neonatal Intensive Care Unit.



Family Resilience Key to Living with Epilepsy in Adolescence

By Dr Judith Chew and Mr Muhammad Noor Latasa Bin Abdul Latiff



Epilepsy is a neurological condition that causes recurrent seizures without an immediate cause. In Singapore, the incidence of newly-diagnosed epilepsy among young people aged between one month to 15 years is estimated to be 24 per 100,000 person-years.

Adolescents with epilepsy are met with challenges of living with the condition, and face a higher risk of poorer psychosocial outcomes compared to their peers – such as higher levels of behavioural problems including aggression and social withdrawal, lower quality of life and social competencies, and poorer academic achievement. However, some adolescents experience success in managing the additional demands associated with their condition, and do not necessarily experience these poorer outcomes – these adolescents are described as resilient.

Resilience is often referred to as an individual's capacity to recover from, adapt or remain strong in the face of adversity. It describes individuals who have good outcomes despite being considered high-risk for maladjustment such as a chronic medical condition, maintain competence despite threats to their well-being, or recover from trauma. Self-esteem and adaptation are considered indicators of resilience.

The availability of external resources, such as parental and family support, positive peer relationships and mentoring programmes, reduce the likelihood of poor outcomes among high-risk youth. These, amongst a wide range of protective factors, are thought to foster resilience in adolescents by shaping their strategies in managing stressful demands that arise from adversity, and mitigate against poor outcomes such as low self-esteem.

STUDY: THE SIGNIFICANCE OF FAMILY RESILIENCE

Seeking insights into the influence of the family on the psychosocial outcomes of adolescents with epilepsy; particularly the effects of family processes from the adolescent's perspective, KK Women's and Children's Hospital (KKH) conducted a two-part study to examine key family processes that facilitate self-esteem.

Led by the Medical Social Work Department, from November 2013 to August 2014, self-reporting surveys were conducted with 152 patients aged between 13 and 16 years who were being seen by the Neurology Service after being diagnosed with epilepsy, and who were attending mainstream school.

Thereafter, face to face interviews were conducted with 15 of the study participants, exploring their experiences of living with epilepsy, and the influence of individual and family factors on their adaptation to the condition.

Findings indicated that the impact on family resilience increased with illness severity, and the presence of seizures despite taking medication was a significant risk factor that exerted demands on families. This, in turn, had a negative impact on young people's self-esteem and resilience.

Several family processes were found to promote resilience in adolescents. These included shared family beliefs, family connectedness, and effective communication that supported collaborative problem-solving. Families which demonstrated these processes were able to manage the added demands and stress associated with epilepsy more effectively.

FAMILY BELIEFS: OUTLOOK, MASTERY AND CONTROL

Family beliefs about normality, mastery and control had a strong influence on how the study participants viewed themselves and coped with the demands of living with epilepsy. Adolescents with chronic illnesses often not only strive to be 'normal', they also want to be treated likewise. Being told they were just like others, and being encouraged to lead a normal life contributed toward their sense of normalcy and confidence in their abilities to carry on with life (Figure 1).

The study participants recognised actual differences when comparing themselves to their peers, such as those with and without illness or restrictions.

"My dad will agree with me in not letting things prevent me from doing things that I want... He would agree that if it's something you can't do despite your efforts, then don't waste your time. Spend my time on other things that is more fruitful."

Figure 1. Quote from a 16-year-old study participant

Yet, most did not appraise themselves negatively and expressed that the presence of a difference was not synonymous to being different.

Those who had a positive outlook, and with a greater sense of mastery and control, demonstrated greater self-confidence and acceptance of their medical condition. Often, their beliefs mirrored that of their parents, which played a role in their positive views of themselves and their coping with the demands of living with epilepsy.

Study participants with higher self-esteem focused on their abilities, accepted that certain aspects of epilepsy were beyond their control, channelled their efforts toward fulfilling their responsibilities, such as adherence to medication, and actively pursued their interests. This in turn reinforced a personal sense of control over their lives (Figure 2).

These coping strategies, which were efforts to adapt to stress, were more suited to meeting the demands of uncontrollable aspects of chronic illness, as opposed to primary control coping, such as problem-solving, emotional modulation, that attempts to change the source of stress or reactions to it. Furthermore, it is likely that adolescents sustain or increase their self-esteem when they are successful in overcoming challenges.

FAMILY CONNECTEDNESS AND SUPPORT

Overall, the study participants' narratives described how greater family cohesiveness buffered the effects of stress, and reinforced the importance of family connectedness in facilitating their positive experiences of support within their families. Examples that were cited included: engagement in shared activities, validation and acceptance of the adolescent's feelings, providing and receiving both emotional and instrumental support in times of need, demonstrating affection and warmth, and successful management of family conflict.

These findings complement other studies on family processes, which show that family activities and rituals play a significant role in increasing adolescents' perceptions of family cohesion and reducing family conflict. This, in turn, has a positive effect on their psychosocial outcomes.

"I think they (my parents) will agree with me, because they also tell me that I must lead a normal life, like others. So I have epilepsy, other people may have other things. Everyone will have their strengths and weakness. So, it's like we are different, but also same."

Figure 2. Quote from a 15-year-old study participant

Our findings add onto a growing body of evidence that greater family connectedness is associated with positive psychosocial outcomes among adolescents with chronic illnesses, such as greater quality of life and lower behavioural problems.

FAMILY COMMUNICATION AND SHARED DECISION-MAKING

In this study, communication within the family was discussed in the context of participation in leisure and social activities. It was found that family communication was a vital factor in the study participants' adaptation to their condition. While parental control and overprotectiveness were perceived as barriers, study participants often engaged in negotiations through bargaining, reasoning and persuading to influence their parents' decisions.

During adolescence, the relational dimensions of parent-child communication, such as power and identity, become more prominent as established patterns of interaction are renegotiated in order to meet new demands for adolescent autonomy.

Processes that were found to promote resilience included collaborative problem-solving and shared decision-making, and were characterised by family members' openness to change and new solutions, and having room for negotiation and compromise. This allowed families to make decisions that considered family members' varying needs, which led them to feel valued and, in turn, strengthened their relationships with one another.

Acknowledging the reality of power differentials within parent-child relationships, particularly within Asian families, and having the space to negotiate is critical to successful collaborative problem-solving. As reflected in participants' experiences of positive and negative interactions, power differentials may be minimised though parents' acknowledgement of their child's needs.

These findings were similar to previous research among families of disabled children where the quality of family communication predicted higher levels of adaptation, and adolescents who reported openness of communication with their parents had greater parent-child relationship satisfaction and higher self-concept.

IMPLICATIONS FOR A FAMILY RESILIENCE-ORIENTED APPROACH TO PRACTICE

Adopting a family resilience framework provides social workers and other practitioners with a multi-systemic perspective when working with adolescents in strengthening their capacities to manage multiple demands arising from a chronic medical condition.

As existing literature suggests that most adolescents and families adapt successfully and do not necessarily have poorer outcomes compared to healthy peers, this group could benefit from universal-level interventions that address their psychosocial needs. For instance, family and patients with different chronic medical conditions who received psycho-education about family processes related with illnesses, reported improved quality of life.

Continued from page 11...

Based on the present study's findings, differing expectations, lack of clarity of roles and responsibilities are likely to result in family conflict, poorer medical and psychosocial outcomes. It is also essential to facilitate open communication where differing views are acknowledged and explored as it could potentially reduce socially imposed 'barriers to doing', such as parental control and restriction.

It would also be useful to include topics addressing adolescent autonomy, highlighting possible tensions between parent and child arising from conflicting demands.

In addition, the findings also suggest that interventions should focus on ways to foster a stronger sense of connectedness between family members. Shared activities and rituals are likely to provide opportunities

to enhance family cohesiveness, provide support and facilitate open communication between family members.

As culture influences how adolescents and their families cope with epilepsy and its associated stressors, it is essential to bear in mind how culturally specific beliefs and values influence key processes that promote positive outcomes when planning supportive interventions.

CASE STUDY: A FAMILY RESILIENCE-ORIENTED APPROACH TO MANAGING EPILEPSY

Diagnosed with epilepsy when he was eight years old, Lucas' (not his real name) seizures became uncontrollable in adolescence, causing him to experience seizures weekly, during which he would lose consciousness and fall, occasionally sustaining injuries.

Lucas experienced difficulty adhering to his medication schedule, and frequent seizures while outside the home posed a danger to his safety. He also refused to continue participating in school, which impacted his life.

Eventually, he was referred to the Medical Social Work Department at KKH, where medical social workers conducted targeted sessions with Lucas and his mother to gain insights into their personal understanding about his medical condition, treatment plan and concerns.

Through individual interviews, it was established that Lucas' non-adherence

to medication was not only due to misinformation about his medication, but also affected by his search for self-identity and a deeper yearning to be viewed as a normal teenager, as well as the desire for autonomy in decision-making. Lucas was also reluctant to continue participating in school as he felt that he was unable to focus and keep up with his classmates, and preferred skills-based training.

Identifying the challenges faced by Lucas and his family, medical social workers were able to collaborate with his care team at the Neurology Service to address the family's misconceptions about medication efficacy. The neurologist further adjusted Lucas' medication regime to accommodate his lifestyle.

Concurrently, individual and family counselling were provided to aid Lucas and his family in negotiating parent-child expectations and improving their

communication and collaborative problem-solving.

Following the counselling sessions, Lucas and his family gained a better understanding of his treatment plan, and he demonstrated improvement in adherence to his medication schedule. Lucas' mother also adjusted her parenting style following his feedback during family counselling, and Lucas was able to improve his communication with her. This resulted in improved family relationship and resilience.

Targeted and culturally sensitive support from tertiary as well as community agencies is crucial in optimising the capacity of individuals and their family members to increase resilience in facing illness-related challenges.

The KKH care team continues to partner Lucas and his family in improving his adherence to his medication schedule and addressing other stressors as they arise.

This article is adapted from Chew, J., Carpenter, J., & Haase, A. M. (2018). Young people's experiences of living with epilepsy: The significance of family resilience, Social Work in Health Care, 57:5, 332-354. doi: 10.1080/00981389.2018.1443195. Please refer to the original article for the detailed list of references.



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Dr Judith Chew oversees the Medical Social Work Department at KKH in vital research studies of individual and family resilience, issues relating to women's and children's health, adolescence issues, child abuse and neglect, and young mothers in Singapore. In 2009, Dr Chew received a MSc in Evidence-based Social Intervention from the University of Oxford, United Kingdom and obtained a PhD in Social Work from the University of Bristol, United Kingdom in 2016.



Mr Muhammad Noor Latasa Bin Abdul Latiff, Medical Social Worker, Medical Social Work Department, KK Women's and Children's Hospital

Mr Muhammad Noor Latasa Bin Abdul Latiff graduated from the National University of Singapore with a Degree in Social Work, and has been a medical social worker with KKH for six years. Mr Noor provides assistance to patients and their families in various areas such as crisis intervention, as well as work with children with acute or chronic medical conditions, including those with neurological conditions.

Interceptive Orthodontics For The Paediatric Patient

By Dr Goh Aik Wei, Dr Koo Chieh Shen and Dr Chng Chai Kiat

Orthodontic treatment has traditionally been regarded as a teenage rite of passage. Some benefits of treatment are obvious (straighter teeth), while others are less visible (improved bite and jaw positions). In general, orthodontic treatment can begin when all the permanent teeth have erupted (11 to 12 years old). However, there is a group of children who should consider starting treatment at a younger age.

Permanent teeth generally begin to erupt at the age of six to seven years, and it is during this time that orthodontic problems become apparent. The Association of Orthodontists (Singapore) strongly recommends that all children undergo orthodontic screening by seven to eight years. Both the medical and dental practitioners play crucial roles in the early identification and diagnosis of orthodontic problems, and in making timely referrals to the orthodontist for further assessment and intervention.

It is precisely this group of young patients, as early as seven to eight years, who will benefit the most from early orthodontic treatment. This is because most children's deciduous teeth are changing, their permanent teeth developing and their jaws still growing. During this period of time, certain conditions and problems may be easier to address through interceptive orthodontics¹.

Tertiary assessment and intervention are valuable in orthodontic cases, where

the timing of intervention and long-term planning of orthodontic treatment are critical for an optimal outcome. At KK Women's and Children's Hospital (KKH), the Dental Service provides comprehensive care from childhood to adulthood.

The main goals of early orthodontic intervention are early correction and prevention to achieve a functional and stable bite. Often, the child wears a type of oral appliance for six to 12 months.

It is important to note that children who receive interceptive orthodontics generally still require braces later on in life. However, early intervention at a younger age may shorten or simplify future correction during their second phase of orthodontic treatment.

From a psychosocial perspective, early orthodontic treatment significantly improves patients' self-concept and self-esteem. This early increase in self-esteem may still be important for children, especially if the child had been repeatedly teased or bullied in school because of their teeth.

This article aims to explore and highlight the current best practice recommendations for the following commonly-seen orthodontic problems:

CLASS I MALOCCLUSION

The Class I malocclusion (Figure 1) is the most commonly seen malocclusion in Singapore, with a prevalence of 48.1 per cent.



Figure 1. Class I malocclusion



Figure 2. Class II malocclusion with protrusive upper teeth

Generally, there is minimal skeletal involvement and the condition is easily treated by orthodontics only. Such patients seldom require interceptive treatment and are routinely seen at KKH when more of their permanent teeth have erupted.

CLASS II MALOCCLUSION

The second most common malocclusion in Singapore is the Class II division 1 malocclusion with proclined upper incisors and an increased overjet (Figure 2), with a local prevalence of 26.3 per cent².

Protruding upper incisors have been associated with a high incidence of dental trauma. In addition, the small size of the child's mandible often causes the lower teeth to bite into the upper palatal gingivae. This may cause gingival recession or pain to the palatal tissue. Left untreated, the bite may worsen, eventually requiring surgical correction. The prolonged gingival trauma on the palate may also cause irreversible gum disease.

Early treatment with a functional appliance (Figure 3) or headgear has been shown to reduce new incidences of incisal trauma by 33 to 41 per cent³. Interceptive treatment is often able to limit the damage in growing patients, allowing the periodontal tissues to spontaneously improve once the source of trauma is removed.

Growth modification should ideally be timed when there is still potential for growth, ideally during the adolescent growth spurt.

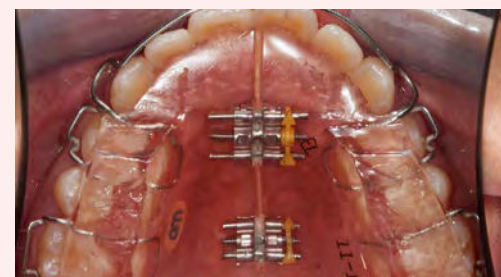


Figure 3. Functional appliance to correct Class II malocclusion

Continued from page 13...



Figure 4. Class III malocclusion with protrusive lower teeth

Generally, this treatment can be initiated at about 11 to 12 years in females, before menarche, and 12 to 13 years in males. The growth of the mandible can be redirected in a forward direction by active posturing of the mandible. As the child continues to grow, natural musculoskeletal changes will lead to remodelling of the temporomandibular joint and the development of the mandible in its improved position.

CLASS III MALOCCLUSION

The Class III malocclusion (Figure 4) is more prevalent in Singapore compared with Caucasian populations, and is the third most common malocclusion with a 22.4 per cent prevalence locally².

Patients with Class III malocclusions often experience functional impairment, being unable to bite with their front teeth. In less severe cases, they are able to touch their front teeth together, resulting in a posterior open bite. In order to function, they temporarily posture their mandible forward, which over time may result in remodelling of the temporomandibular joint in its new forward position. Left untreated, this may cause the patient to develop more severe bite and jaw problems.

Some children with a small maxilla can benefit from facemask protraction therapy to pull the maxilla forward whilst they are young and the circummaxillary sutures are not completely fused. This is often initiated at eight to 10 years in males and females.

The force of mandibular growth cannot be fully resisted if the patient has an excessively large mandible; the patient may still outgrow the prescribed treatment and develop a reverse overjet again later on during the secondary growth spurt. However, there is supporting evidence indicating that early facemask protraction



Figure 5. Anterior cross bite at the central incisors

therapy can reduce the severity of the skeletal discrepancy and may obviate the need for orthognathic surgery in the future.

ANTERIOR CROSSBITE

An anterior crossbite occurs when an upper tooth is trapped behind the lower tooth, and the lower teeth bite ahead of the teeth (Figure 5). Left untreated, this may lead to wear and fractures of the anterior teeth, as well as gingival recession and mobility of the incisor teeth.

In the long term, an untreated anterior crossbite could affect the development of the maxilla, and cause functional displacement and asymmetry of the mandible, poor eruption of teeth and temporomandibular joint disorders.

Fixed orthodontic treatment and upper removable appliances are commonly used to correct the crossbites, and most crossbites in a growing child can be corrected within six months of treatment.

ANTERIOR OPEN BITE

The anterior open bite (AOB) occurs when the anterior teeth are unable to meet, despite the posterior teeth meeting together (Figure 6). With the anterior teeth rendered ineffective for chewing, the posterior teeth bear more of the chewing load and are worn down at a quicker rate. This is a less common condition, with an estimated four per cent prevalence in Singapore.

AOB can also be caused by habits such as having the tongue protruding and pushing against the front teeth, or non-nutritive sucking. It can also develop as a result of excessive downward vertical growth of the mandible. In younger children, prolonged duration of the thumb-sucking habit causes



Figure 6. Anterior open bite

a more severe malocclusion to develop⁴. Patient compliance and cooperation is essential in eliminating the causal habit; the child must first be motivated to terminate these habits before the clinician intervenes.

If the habitual cause of AOB is addressed early, the open bite may close spontaneously. However, if left untreated into late adolescence or even adulthood, AOB correction can be complex, time consuming and more costly. In more severe cases, orthognathic jaw surgery may be required to correct the condition.

Infrequently, a sudden and rapid development of an anterior open bite may also be attributed to condylar resorption of the temporomandibular joint, such as juvenile idiopathic condylar resorption, which is more commonly seen in adolescent females.

TEETH ERUPTION PROBLEMS AND IMPACTION

Failure of eruption of the maxillary permanent incisor teeth (Figure 7) usually presents in the mixed dentition stage and is often noticed between seven to nine years. This often occurs secondary to space loss, obstruction or trauma⁵. The anterior maxilla segment is also prone to development of extra or malformed teeth, which may impede the eruption of the permanent teeth in approximately 28 to 60 per cent of cases⁶.

Missing and unerupted maxillary incisors can be regarded as unattractive and can have a negative impact on facial and dental aesthetics, which may then affect self-esteem and social interaction in an adolescent patient⁷. In addition, permanent teeth stuck under the gums may sometimes result in the development of a cyst, or injury due to pressure against adjacent teeth roots.



Figure 7. Impeded eruption of upper front tooth (indicated by arrow)



Figure 8. Treatment of an unerupted maxillary tooth

Delayed eruption of the permanent maxillary incisor teeth can be considered in the following circumstances:

- Eruption of the corresponding contralateral incisor occurring more than six months earlier
- Failure of eruption of the maxillary incisors more than one year after the eruption of the mandibular incisors
- A significant deviation from the normal teeth eruption sequence

Management of an unerupted tooth may involve one or a combination of the following:

- Removal of the physical obstruction
- Creation of space with fixed orthodontic treatment (Figure 8)
- Surgical intervention to apply traction to the unerupted tooth

In summary:

- The child can be referred to the orthodontist at seven to eight years, when the adult teeth are starting to erupt.
- Early orthodontic treatment can greatly benefit some patients, when correctly indicated.
- In complex cases, early orthodontic treatment is crucial, as it makes future treatment more straightforward when the child is older.

REFER A PATIENT

Healthcare professionals can refer patients to the paediatric Dental Service at KKH for assessment, by contacting the hospital at **+65 6294 4050**.



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Dr Goh Aik Wei works closely with cross-disciplinary teams to provide orthodontic treatment for patients with complex medical conditions, special needs, trauma, or needing early interceptive treatment. Dr Goh completed her undergraduate and postgraduate orthodontic training at the National University of Singapore, and was awarded Membership in Orthodontics from the Royal College of Surgeons in Edinburgh in 2017.



Dr Koo Chieh Shen, Dental Registrar, Dental Service, KK Women's and Children's Hospital

Dr Koo Chieh Shen acquired his degree in dentistry at the National University of Singapore in 2011. He completed a three-year specialist Orthodontic training programme at the Eastman Dental Institute in London and was awarded Membership in Orthodontics from the Royal College of Surgeons in Edinburgh in 2016. Dr Koo has particular interests in interceptive orthodontics, and cleft and craniofacial anomalies.



Dr Chng Chai Kiat, Senior Consultant, Dental Service, KK Women's and Children's Hospital

Chief Dental Officer, Ministry of Health, and a senior consultant with the Dental Service at KKH, Dr Chng Chai Kiat treats a wide array of orthodontic cases, and is known for 'Surgery First' Ortho-orthognathic management and treatment for patients with cleft and cranio-facial problems.

With a keen interest in clinical research, particularly in the field of orthodontics, Dr Chng's research interests include biology of tooth movement, 3D imaging and the aetiology, genetics and prevention of cleft deformity. Dr Chng is also Director, Clinical Head KKH, Clinical Service, SingHealth Duke-NUS Oral Health Academic Clinical Program.

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Celebrating Our Heritage,
Shaping The Future

Since 1858, KK Women's and Children's Hospital has embarked on an ongoing journey to transform care and advance medical innovation, research and education, evolving from humble beginnings as a general hospital to become Singapore's tertiary referral centre for women and children today.

In 2018, as KKH commemorates 160 years of heritage in serving the community and caring for women's and children's health, we remain committed on our mission to deliver excellent, holistic and compassionate care for generations of women and children to come.

REVOLUTIONISING AND INNOVATING CARE (1978 – 2018)



Big move for a new start Moving to its current premises in 1997, KK Hospital transforms to become KK Women's and Children's Hospital (KKH), housing Singapore's first and only purpose-built Children's Hospital.

Today, KKH not only manages obstetrics and gynaecological conditions in women, but is also a tertiary referral centre for children from birth to the age of 16 years.



Giving vulnerable, premature babies a chance of survival In July 2013, KKH establishes its Neonatal Intensive Care Unit, the largest facility of its kind in Southeast Asia. The hospital has since introduced therapies such as extracorporeal membrane oxygenation (ECMO) and Whole Body Cooling to enable better health outcomes in preterm babies.



Automating to enhance medication safety KKH rolls out a robotic bottle dispensing system (BDS) at the Emergency Pharmacy in 2015, enabling swift and accurate medication dispensing round-the-clock through automation of the dispensing workflow.



Optimising metabolic health KKH forms the Integrated Platform for Research in Advancing Metabolic Health Outcomes in Women and Children (IPRAMHO) in partnership with SingHealth Polyclinics and National Healthcare Group Polyclinics, to advance translational research in metabolic health in women and children.



Launching Singapore's first human milk bank KKH establishes the KK Human Milk Bank in 2017 to provide a ready supply of pasteurised human breast milk to premature and sick neonates. To date, more than 600 premature and sick infants have benefitted from the donated breast milk.

ABOUT KK WOMEN'S AND CHILDREN'S HOSPITAL

KK Women's and Children's Hospital (KKH) is Singapore's largest tertiary referral centre for Obstetrics, Gynaecology, Paediatrics and Neonatology. Founded in 1858, the 160-year-old academic medical institution specialises in the management of high-risk conditions in women and children. More than 500 specialists adopt a compassionate, multi-disciplinary and holistic approach to treatment, and harness medical innovations and technology to deliver the best medical care possible.

Accredited as an Academic Medical Centre, KKH is a major teaching hospital for all three medical schools in Singapore, Duke-NUS Medical School, Yong Loo Lin School of Medicine and Lee Kong Chian School of Medicine. The 830-bed hospital also runs the largest specialist training programme for Obstetrics and Gynaecology and Paediatrics in the country. Both programmes are accredited by the Accreditation Council for Graduate Medical Education International (ACGME-I), and are highly rated for the high quality of clinical teaching and the commitment to translational research.