KK Women's and Children's Hospital
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IN THIS ISSUE

SAVING LIVES, CHANGING FUTURES

The universal Lynch Syndrome Screening Programme at KKH is changing the lives of women with the inherited disorder and their families through early laboratory-based screening, counselling and long-term surveillance.

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Saving Lives, Changing Futures

The importance of Lynch syndrome screening for women with endometrial cancer

By Dr Adele Wong, Ms Eliza Courtney and Dr Joanne Ngeow

KKH LAUNCHES NEW UNIVERSAL LYNCH SYNDROME SCREENING PROGRAMME

An inherited disorder, Lynch syndrome causes patients to have a lifetime risk of developing colorectal cancer (31-38%), endometrial cancer (33%), ovarian cancer (9%) as well as other malignancies[2]. The condition has an estimated incidence of between 1 in 300 and 1 in 500 in the general population.

Endometrial cancer is particularly prevalent in women with Lynch syndrome, with up to 50 percent of patients presenting with endometrial carcinoma as their first tumour.

Previously, patients with Lynch syndrome were identified clinically using validated criteria followed by confirmatory gene testing. However, nearly 70 percent of women with Lynch syndrome presenting with endometrial cancers did not meet the criteria due to an absence of a personal or family history suggestive of the condition[3]. As such, laboratory-based tests are critical to any Lynch syndrome screening programme[3,4].

In February 2017, KK Women's and Children's Hospital (KKH) established a universal Lynch Syndrome Screening Programme for all patients diagnosed with endometrial cancer, regardless of age, in response to a recommendation by the Society of Gynaecologic Oncology to screen for hereditary syndromes[5].

The KKH universal Lynch syndrome screening pathway comprises laboratory-based immunohistochemistry (IHC) staining and microsatellite instability (MSI) analysis, following which patients with abnormal test results are referred to National Cancer Centre Singapore (NCCS) for further clinical examination, work up and counselling. Finally, germline gene analysis is performed to confirm the diagnosis.

CASE STUDY: MANAGING A HEREDITARY, LIFETIME RISK

57-year-old Madam Tan (not her real name) presented to the Department of Gynaecological Oncology at KKH with post-menopausal bleeding, and was diagnosed with a FIGO grade 2 endometrioid carcinoma with a 60 percent myometrial invasion. She subsequently underwent a total hysterectomy and bilateral salpingo-oophorectomy with staging lymphadenectomy.

Post-procedure, in line with the new KKH universal Lynch syndrome screening pathway, IHC and MSI analysis was performed on Madam Tan's tumour tissue. Laboratory results revealed that the tumour was MSI-high, indicating microsatellite instability. Loss of MLH1 and PMS2 MMR proteins – with the *MLH1* promoter not methylated – further indicated an *MLH1* genetic mutation.

Madam Tan underwent chemotherapy at KKH and was concurrently referred to receive genetic counselling at NCCS. She was surprised at her referral, as she was unaware of any family history of cancer, apart from her paternal aunt being diagnosed with colonic adenocarcinoma two decades prior.

At NCCS, in-depth history taking by the genetic counsellor enabled a detailed view of the incidence and type of cancers which afflicted Madam Tan's blood relatives. Through MMR germline gene sequencing, a germline *MLH1* pathogenic variant was identified in Madam Tan's DNA, confirming her diagnosis of Lynch syndrome.

Following her diagnosis, Madam Tan was provided with a family notification letter regarding the availability of predictive testing and relevant implications. She later discovered family history consistent with Lynch syndrome involving her paternal grandfather and his two siblings. Her children were diagnosed with the condition as well, and began cancer surveillance, specifically annual colonoscopies.

Two years following completion of her chemotherapy, between scheduled surveillance follow-ups (Table 1), Madam Tan visited her community healthcare provider due to constipation. She was referred for a colonoscopy where three tubular adenomas – one with focal high grade dysplasia – were discovered.

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IDENTIFYING THE GENETIC CULPRIT

Also known as hereditary non polyposis colorectal cancer (HPNCC), Lynch syndrome is an autosomal dominant syndrome due to germline mutations in one of the DNA mismatch repair (MMR) genes *(MLH1, MSH2, MSH6 and PMS2)*, or rarely germline deletions of *EPCAM* (resulting in *MSH2* inactivation), causing widespread replication errors/instability in genomic intronic sequences, known as microsatellites, resulting in MSI.

MSI can be caused by either germline or somatic MMR gene mutations. Non-hereditary somatic mutational gene silence through promoter hypermethylation of the *MLH1* gene causes similar MSI levels in the genome seen in 10 to 25 percent of sporadic tumours, especially colorectal and endometrial cancers. Unlike patients with colorectal cancers, further testing for V600E mutation of the *BRAF* gene is not beneficial as less than one percent of the population display this mutation.

Germline mutation in the *MSH6* gene is associated with the highest risk for developing endometrial carcinomas. Mutations in *MLH1* result in a higher risk of developing colorectal carcinoma while *PMS2* is associated with the lowest overall risk of developing Lynch syndrome-associated tumors.

The median time for Lynch syndrome patients with endometrial cancer to develop a second tumour is estimated to be 11 years.

Therefore, early identification of proband Lynch syndrome patients with endometrial cancer can result in timely and appropriate management to help reduce the potential of a second tumour in the patient, or in the case of her relatives, preventing tumours altogether.

THE KKH UNIVERSAL LYNCH SYNDROME SCREENING PATHWAY

Immunohistochemistry (IHC) testing is performed on formalin-fixed-paraffin-embedded (FFPE) tumour tissue. The sensitivity and specificity of the four MMR protein markers (MLH1, MSH2, MSH6 and PMS2) are 91 percent and 83 percent respectively; however the test cannot detect germline missense mutations when non-functioning MMR protein is produced.

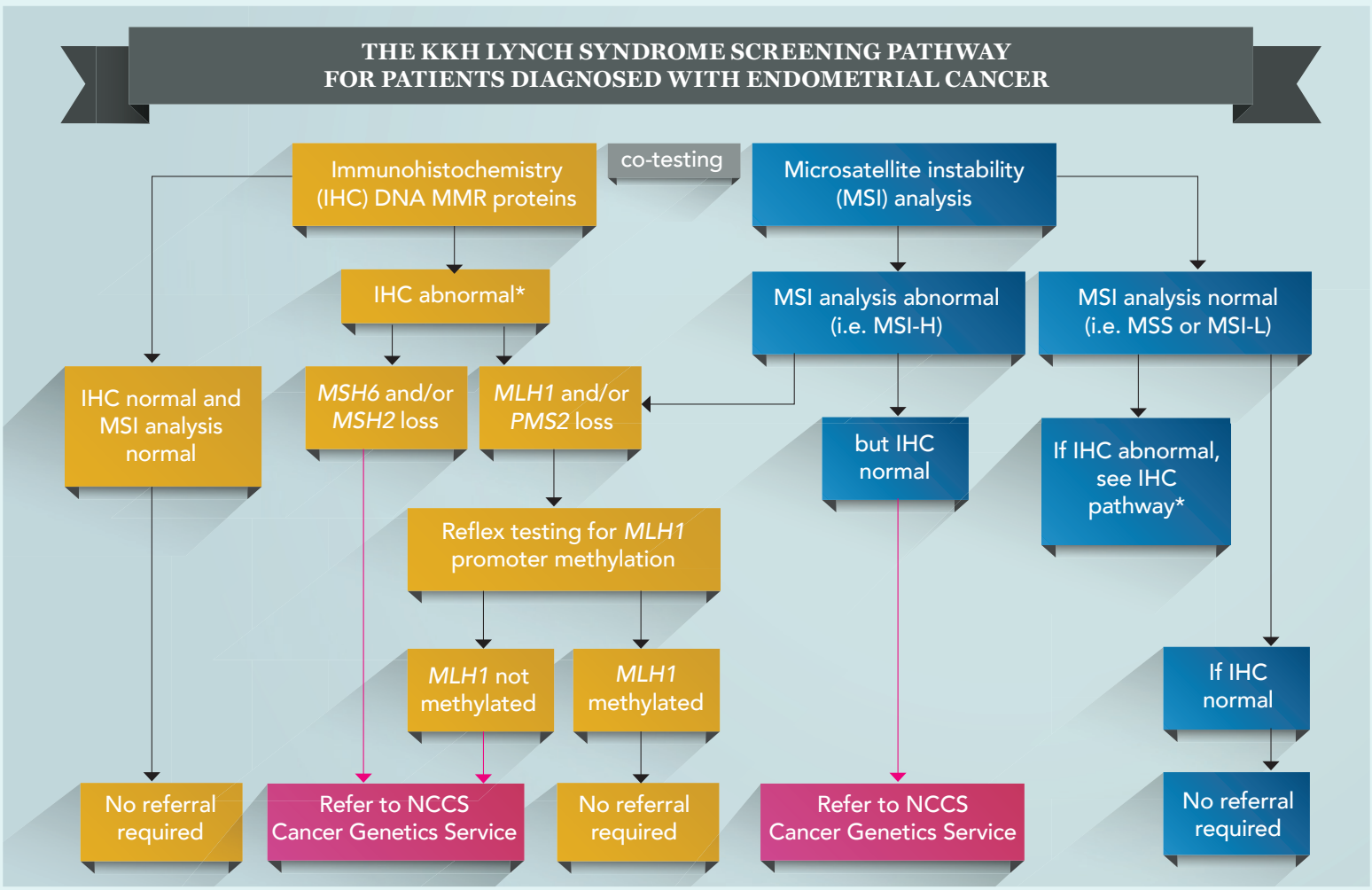

Figure 1. All patients diagnosed with endometrial cancer at KKH will be screened for Lynch syndrome, regardless of age. As the IHC and MSI screening tests do not distinguish between somatic and germline mutations in the DNA MMR genes, conformational germline gene analysis will be performed after further clinical examination, work up and appropriate counselling.

Normal MMR proteins form dimer complexes; MLH1-PMS2 and MSH2-MSH6 pairs. Mutation in one of the genes in the pairing leads to loss of staining of its partner protein (Figure 2). Gene silence via *MLH1* promoter methylation causes loss of MLH1/PMS2 IHC staining. Deletions in the *EPCAM* gene epigenetically silence the *MSH2* gene, resulting loss of MSH2/MSH6 staining.

MSI analysis using polymerase chain reaction (PCR) testing is performed on FFPE tissue with a five-marker mononucleotide panel (BAT25, BAT26, NR21, NR24 and NR27). Microsatellite stable (MSS) phenotype tumours will show normal microsatellite repeats as normal tissues. MSI-high (MSI-H) tumours show microsatellite instability in two or more of the tested loci while MSI-low (MSI-L) tumours show instability at one locus (Figure 3). Unlike IHC, MSI PCR cannot identify which gene is mutated.

Tumours with loss of IHC MLH1 protein expression require an additional PCR-based test to detect for *MLH1* gene promoter methylation. A patient with a tumour which tests negative with the *MLH1* gene promoter methylation test is encouraged to undergo germline mutation testing for Lynch syndrome.

Appropriate counselling and gene sequencing to uncover mutations in *MLH1, MSH2, MSH6, PMS2* and *EPCAM* genes are generally performed to confirm suspicions of a germline mutation using the patient's blood sample.

A NEW PARADIGM OF CANCER SURVEILLANCE

When possible, universal screening to supplement family history reporting is beneficial for the identification of those at risk of Lynch syndrome. Additionally, a multidisciplinary approach to the management of care of these patients and their families is crucial.

In the case of Madam Tan, her diagnosis and the establishment of a detailed pedigree of her family tree will help future generations in her family line who are seen at KKH and NCCS to be appropriately counselled about the need to undergo screening for Lynch syndrome, and cancer surveillance if required.

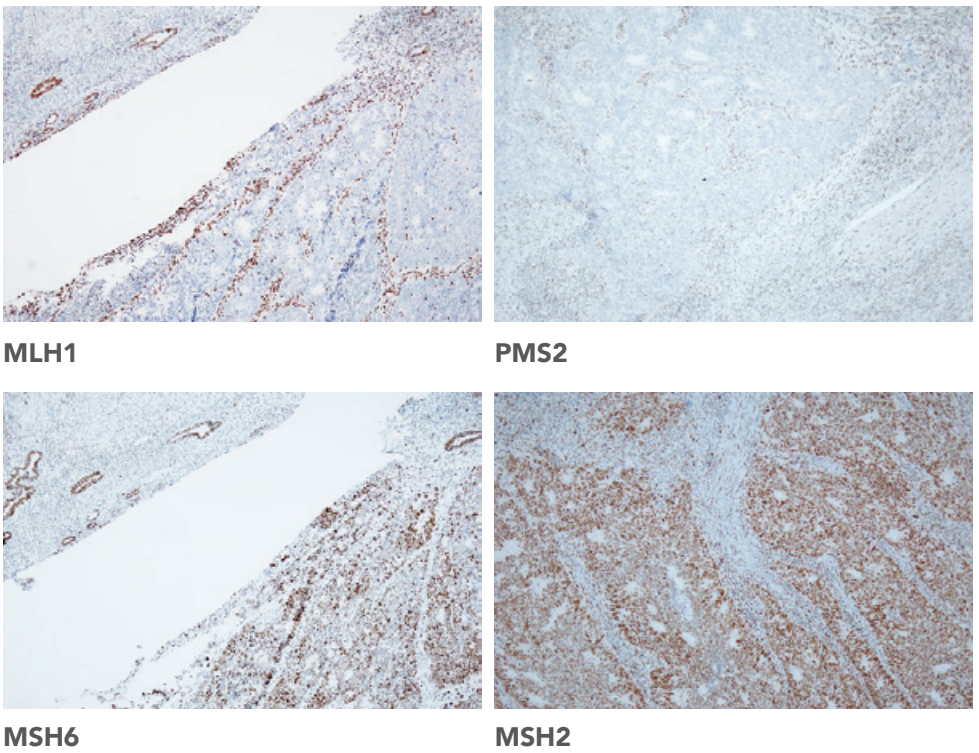

Figure 2. The immunohistochemistry results of a case requiring referral to NCCS due to the IHC staining pattern indicating abnormal complete loss of IHC staining in tumour cells for MLH1 and PMS2 but normal staining of tumour cells for MSH6 and MSH2.

Background stromal cells and lymphocytes, which act as internal positive control cells, indicate the stain is working. The benign glands (upper right) in both the MLH1 and MSH6 panel exhibit normal retention of IHC staining, as expected for normal tissue. The MLH1 promoter methylation test was negative in this case, an indication of a potential germline mutation in either the *MLH1* or *PMS2* gene.

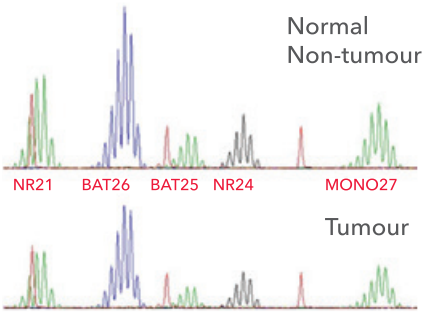

Figure 3A. A MSS case where the patient's own normal tissue is used for comparison to detect shifts in loci peaks in allelic regions of the DNA known to be susceptible to MSI in their tumour tissue using the five markers (NR21, BAT26, BAT25, NR24 and MONO27). In MSS cases, the peaks of each locus in the tumour are similar to that in a normal non-tumour tissue.

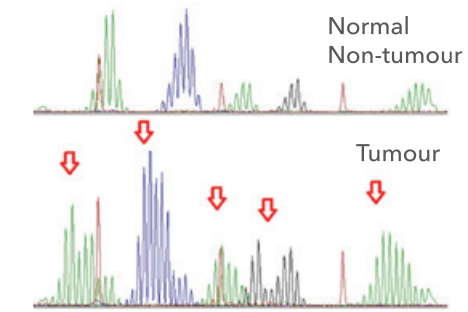

Figure 3B. A MSI-H case where all five loci show peaks with a left shift. The MSI-PCR test determines DNA replication error load resulting from loss or abnormal function of MMR proteins. MSI-H is defined as two or more loci exhibiting a shift in position of the peak. The x-axis denotes the size of the DNA fragment at the loci which are altered due to DNA MSI at the respective loci.

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LYNCH SYNDROME SCREENING GUIDELINES

These recommendations are based on the strength of confidence and GRADE (Grades of Recommendation, Assessment, Development, and Evaluation) – a well-accepted rating of evidence relying on expert consensus about whether new research is likely to change the confidence level of recommendations.

Table 1. Screening guidelines for at-risk or affected persons with Lynch syndrome

Intervention	Recommendation	Strength of recommendation
Colonoscopy	Every 1-2 years beginning at 20 to 25 years or; 2 to 5 years younger than age of youngest person diagnosed of colorectal carcinoma in family (if their diagnosis was before age 25). **Considerations:** Start at age 30 in *MSH6* mutation and age 35 in *PMS2* mutation families **Lynch syndrome carriers:** Annual colonoscopy	**Strongly recommended** **Level of evidence:** (III) well-designed and conducted cohort or case-controlled studies from more than one group with cancer **GRADE rating:** moderate
Pelvic examination with endometrial sampling	Annually beginning at 30 to 35 years	**Offer to patient** **Level of evidence:** (V) expert consensus **GRADE rating:** low
Transvaginal ultrasound	Annually beginning at 30 to 35 years	**Offer to patient** **Level of evidence:** (V) expert consensus **GRADE rating:** low
Oesophago-gastro-duodenoscopy with biopsy of the gastric antrum	Beginning at 30 to 35 years and subsequent surveillance every 2-3 years should be considered based on patient risk factors	**Offer to patient** **Level of evidence: (V) expert consensus** **GRADE rating:** low
Urinalysis	Annually beginning at 30 to 35 years	**For consideration** **Level of evidence: (V) expert consensus** **GRADE rating:** low

Adapted from Giardiello et al Guidelines on genetic evaluation and management of Lynch syndrome: a consensus statement by the US Multi-society Task Force on colorectal cancer. Gastroenterol. 2014 Aug;109(8):1159-79.

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Dr Adele Wong underwent a fellowship in gynaecologic and breast pathology at Massachusetts General Hospital, Boston, USA, as part of the SingHealth Health Manpower Development Plan in 2015. Her research interests include gynaecological pathology, in particular endometrial carcinomas.

Ms Eliza Courtney, Genetic Counsellor, Cancer Genetics Service, Division of Medical Oncology, National Cancer Centre Singapore

Ms Eliza Courtney delivers genetic counselling services regarding hereditary cancer syndromes to patients with cancer and their families. She holds a Masters of Genetic Counselling from the University of Sydney, Australia, and has previously held genetic counselling positions at a number of tertiary hospitals in Sydney.

Dr Joanne Ngeow, Head, Cancer Genetics Service, National Cancer Centre Singapore and Assistant Professor, Oncology Academic Clinical Program, Duke-NUS Graduate Medical School

Dr Joanne Ngeow currently leads the Cancer Genetics Service at NCCS with an academic interest in hereditary cancer syndromes and translational clinical cancer genomics. Her current clinical focus and research revolves around understanding cancer predisposition by studying cancers clustering in families, young adults and in families with multiple / rare cancer presentations.

Prevention: The Cure For Child Head Injuries

KKH-NUHS study finds non-compliance with safety measures to be significant among children with head injuries.

By Isadora Ong

A paediatric trauma surveillance study[1] jointly conducted by KK Women's and Children's Hospital (KKH) and National University Health System (NUHS) has revealed that, from January 2011 to March 2015, vehicle and bicycle incidents were a leading cause of severe paediatric head injuries resulting in death, neurological and physical deficits or poor quality of life.

Led by Dr Chong Shu-Ling, Staff Physician, Department of Emergency Medicine, KKH, researchers surveyed data from 1,049 children under 16 years presenting with head injuries at the hospitals' emergency departments who required a computed tomography scan, admission for monitoring of persistent symptoms, or who subsequently died from the head injury.

VEHICLE, BIKE INCIDENTS LINKED TO MOST SEVERE OUTCOMES

While vehicle and bicycle incidents accounted for a comparatively small percentage of the presenting cases (11.7%), they were associated with severe outcomes such as death, the need for invasive ventilation or neurosurgical intervention – making them the most dangerous mechanisms of head injury.

The main culprit was noncompliance with road safety laws. "Despite stringent regulations governing road safety in Singapore, best practices for vehicle, bicycle or motorcycle child passenger safety had not been observed for the majority of this group of head-injured children," Dr Chong says.

Forty-five percent of the children involved were vehicle or bicycle passengers, three quarters of whom were not using child car restraints or helmets. Young children are reliant on their caregivers to ensure that they are provided age-appropriate safety measures on the road.

Fifty-five percent were pedestrians – this group of road users is known to be at high risk of severe injuries compared to other road users; in particular older children who may not be supervised when crossing the road. "Due to their small body frame, child pedestrians are at increased risk of getting into a road incident – as they are less visible to motorists than adults. When involved in a collision, they are also more likely to sustain severe and multiple injuries.

"Lives can be saved and poor outcomes pre-empted through simple preventative behaviours such as compliance with road safety laws and proper supervision," Dr Chong emphasises.

She reiterates that children below 12 years should never be placed in the front seat of a vehicle; instead they should ride in the rear seat with age-appropriate restraints. Child cyclists must use helmets at all times.

"Lives can be saved and poor outcomes pre-empted through simple preventative behaviours such as compliance with road safety laws and proper supervision."

Dr Chong Shu-Ling
Staff Physician,
Department of Emergency Medicine, KKH

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FALLS IN THE HOME

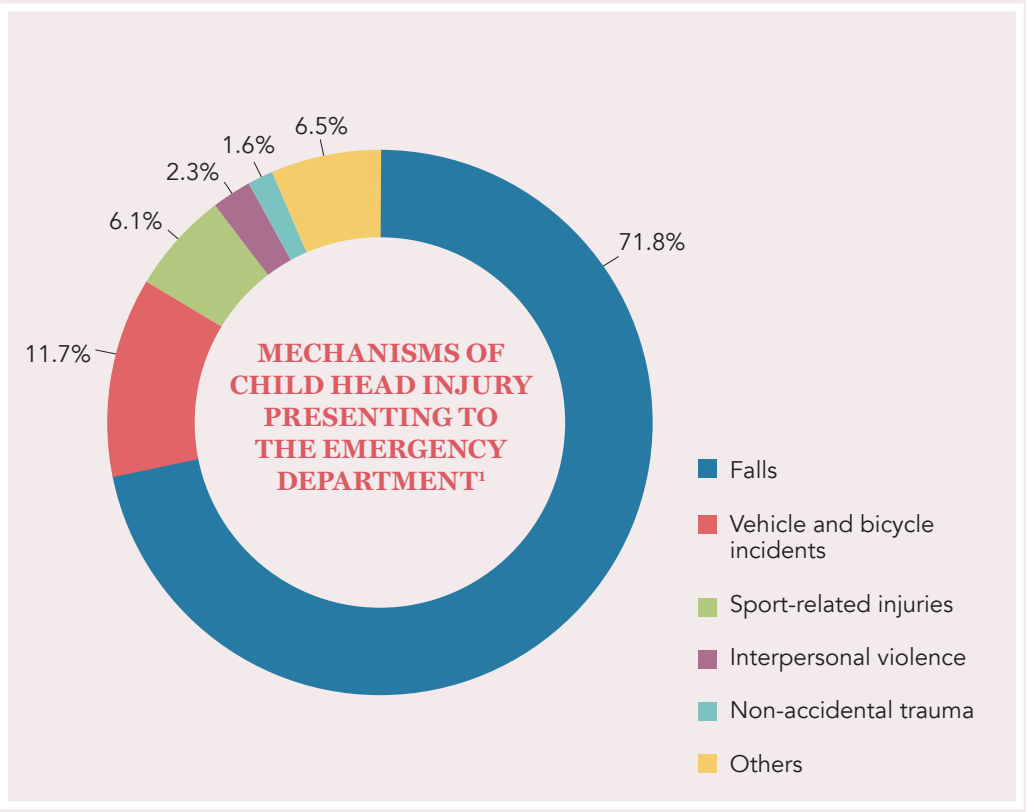
In the study, falls accounted for 71.8 percent of children presenting with head injuries, with more than half of the incidences occurring in the home. Most of these incidences involved furniture such as the adult bed and sofa. While the injuries were of lower severity, the likelihood of a severe outcome increased by 1.4 times with every metre increase in the height of a fall.

Further, while children under the age of two comprised only 25 percent of those presenting with head injuries, 84.7 percent of this age group sustained their injuries from falls.

"Children under two years typically have a relatively large head in comparison to the rest of their body. This can predispose toddlers to falls and head injuries while engaging in daily activities such as jumping during playtime or climbing the stairs," explains Dr Chong.

"Heightened supervision is recommended for this age group, as children are particularly vulnerable to head injuries during the crucial years of rapid brain growth and neurocognitive development."

Other causes of paediatric head injuries noted in the study included contact with objects; sports-related injuries; interpersonal violence and non-accidental trauma.



"There is a valuable opportunity for education at the point of treatment for a minor head injury, as both the caregiver and child are at heightened awareness of the need to prevent future, more severe, head injuries."

Dr Chong Shu-Ling
Staff Physician
Department of Emergency Medicine, KKH

In seeking to prevent paediatric head injuries, Dr Chong recommends increased safety awareness during physical activities such as sport, with injuries promptly attended to and unresolved symptoms referred for medical assessment.

Activities associated with a higher risk of severe head injury – such as contact sports, ball games and gymnastics – should be closely supervised with safety measures and precautions strictly adhered to.

CULTIVATING A CULTURE OF SAFETY

The severely head-injured child faces the potential of life-long disability and loss in quality of life in the long term, or even death, with emotional, financial and social ripple effects spreading to the family and society.

In addition to providing timely diagnosis and intervention for children with head injuries, Dr Chong applauds community healthcare practitioners for the vital and valuable role they play in educating the child and their caregivers on future injury prevention strategies.

"There is a valuable opportunity for education at the point of treatment for a minor head injury, as both the caregiver and child are at heightened awareness of the need to prevent future, more severe, head injuries," says Dr Chong.

"Community healthcare practitioners are also well placed to meet the need for robust childhood injury surveillance in the community and to assist patients and families in accessing health and social support services as appropriate.

Working in concert, necessary action by caregivers, as well as healthcare providers, will go a long way towards reducing the incidence of child injuries and fatalities in our population."

References:

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AT A GLANCE: PAEDIATRIC HEAD INJURIES IN SINGAPORE
(JANUARY 2011- MARCH 2015)

BOYS

63%

GIRLS

37%

Road injuries constitute high risk for death, neurological and physical deficits or poor quality of life.

71.8%
caused by falls

41%
took place in the home

54.5%
of those with road injuries were pedestrians

45.5%
of those with road injuries were passengers or cyclists

1.4 times
The increase in likelihood of sustaining a severe head injury with every metre increase in the height of a fall

MANAGEMENT RECOMMENDATIONS FOR CHILD HEAD INJURIES

Open wounds
A patient with an open wound should be attended to immediately, and a neurological examination performed to determine the extent and severity of the head injury.

History taking
Information gathering from the child and caregiver is also vital to understand the history surrounding the circumstances of the injury and the child's symptoms.

Children under two years
Special care should be taken when assessing children under two years with head injuries, as preverbal children may have difficulty clearly communicating the symptoms of their injury, potentially increasing the likelihood of under-reporting or the delayed discovery of injuries.

If intracranial injury is suspected
If there is suspicion of an intracranial injury, the patient should be promptly referred to a tertiary centre.

Moderate to severe intracranial head injuries can result in swelling and blood clots in the brain (haematoma); neurosurgical intervention may be required – such as the evacuation of haematoma or intracranial monitoring – to reduce the risk of mental impairment, physical disability, or fatality.

Head injury symptoms requiring prompt referral for tertiary assessment
- Altered mental status or reduced consciousness
- Abnormal neurological examination (e.g. unsteady gait)
- Unusual behaviour (e.g. persistent crying or irritability) among younger children
- Persistent headache or vomiting among older children

When a Teen Refuses to Eat

The family-based approach to management of eating disorders in children and adolescents.

By Dr Siobhan Kelly, Dr Elaine Chew and Ms Lee Kim Nai

Artwork by an adolescent patient undergoing multi-family therapy for anorexia nervosa, depicting their feelings of being caught between family (red) and the pull of the eating disorder (black).

Despite commonly-held misconceptions, eating disorders – in which the central anxiety or difficulty centres around food and eating – are neither a lifestyle choice nor a 'normal adolescent phase'. Eating disorders are complex mental health illnesses which can have severe medical and psychosocial consequences, and can even be fatal.

The adolescent population (aged 10 to 19 years) is particularly at risk for this mental health illness; eating disorders are highly prevalent and represent the third most common chronic illness amongst this age group.

The four main types of eating disorders include anorexia nervosa (AN), bulimia nervosa (BN), avoidant restrictive food intake disorder (ARFID) and binge eating disorder (BED).

International data shows a continuing rise in the prevalence of eating disorders, particularly in children and adolescents[1]. Similar trends have also been seen locally, with KK Women's and Children's Hospital (KKH) seeing a steady increase in number of new referrals for suspected eating disorder. The hospital saw more than 70 new cases of suspected eating disorders in 2016 compared with 12 new cases in 2008.

TREATING THE CHILD AND FAMILY

The successful treatment of eating disorders in young people requires closely integrated medical and mental health management, as well as engaging the family in education and treatment.

To meet these specialised needs, KKH has developed a family-focused Eating Disorders Programme with the aim of providing patients the best evidence-based treatment while empowering families to help their child in recovery within the home, school and community.

The programme is led by a multidisciplinary team of adolescent medicine physicians, specialist nurses, clinical psychologists, dietitians, medical social workers and psychiatrists, and comprises both inpatient and outpatient management.

Inpatient care

Malnutrition is a frequent side effect of eating disorders, with associated medical complications such as bradycardia (an abnormally slow heart rate). The inpatient programme aims to medically stabilise these patients, and enable them to continue their journey to recovery at home, which is the best place for recovery.

The patient is admitted to the hospital and started on a safe and effective rapid refeeding protocol developed by dietitians. They are also closely monitored for refeeding syndrome – shifts in fluids

and electrolytes resulting from refeeding, which may cause serious clinical complications if not promptly managed.

Patients with significant social issues which may be impeding recovery are provided medical social assistance, as well as psychiatric management if there are concerns about co-morbid mood disorders or safety issues. Nursing-led guidelines are also in place to supervise patients during meal times, helping them to practice healthy eating patterns, and to manage challenging behaviours such as hiding food or secretly exercising in bed.

The average duration of hospital stay for a child with malnutrition is 10 to 14 days. To provide holistic care to patients and enhance their wellbeing during this time, they are encouraged to participate in activities such as art and craft by Activity Therapists and classes run by the non-profit organisation, Club Rainbow. Once the child is medically stable and eligible to move into the outpatient phase of treatment, parents are encouraged to practice meal supervision before the child is discharged, to empower them to help the child transition smoothly into the home environment and continue the journey to recovery.

Outpatient care

At KKH, Family-Based Treatment (FBT) is the first line of outpatient management for children and adolescents with eating disorders. This specialised intensive outpatient treatment empowers caregivers to take the lead in restoring their child's weight and normalising their eating patterns through helping them learn how to disrupt dysfunctional behaviours that are leading to (or maintaining) low weight, such as severe dieting and exercise. The treatment is led by clinical psychologists, and includes continued medical monitoring of the patient, as well as multidisciplinary management by the Eating Disorders Programme team, tailored around factors impeding each individual patient's recovery.

While the majority of patients respond positively to FBT, a proportion of patients – such as those with severe, refractory eating disorders – do not show expected improvements in eating disorder symptoms. To boost intervention for this group of patients, KKH is piloting possible adjunctive treatments such as Multi-Family Therapy (MFT), an intensive group intervention which focuses on working with families to help their child recover from their eating disorder.

MFT combines group therapy, family therapy and psychological education with creative, supportive activities and interventions. There are exercises for the whole group, as well as separate exercises just for the patients, siblings and parents.

By bringing together families who are all struggling with the same illness, MFT can help to create solidarity, reduce the sense of isolation and hopelessness, and diminish stigmatisation. Group intervention also allows families to learn from each other, thus facilitating new ways of thinking about habits and behaviours, leading to positive improvements.

MFT has shown good results in leading child and adolescent eating disorder programmes in the United Kingdom, United States and Australia. Following the first successful pilot of locally adapted MFT for anorexia nervosa in 2016, which showed promising clinical improvements in local patients, the team is working towards the integration of MFT and FBT to boost the effectiveness of family-based care for children and adolescents with eating disorders. Research is also ongoing to better understand predictors of treatment and local adaptions needed for our population.

CASE STUDY: FAMILY-CENTRED CARE FOR A TEEN WITH ANOREXIA

Twelve-year-old Jamie (not her real name) was admitted to KKH due to bradycardia as a result of losing 12 kg over a period of six months. She was referred to the Eating Disorders Programme and diagnosed with anorexia nervosa. Inpatient care was commenced comprising refeeding with close medical monitoring.

Jamie achieved medical stability after two weeks of inpatient care, and was discharged from hospital to commence outpatient FBT. However, her initial weight gain was poor and her case was examined by the KKH team to identify possible barriers to treatment. The team identified a number of barriers including; lack of consistency between her parent's response to the illness, difficulties in parents separating their child from the illness leading to high levels of conflict within the family, and difficulties managing their child's anxiety.

To rectify the issues, Jamie's family members were enrolled in MFT sessions, which focused on increasing communication and unity between her parents, and helping them to develop more helpful responses to her illness. The intensity of FBT was also increased and Jamie was further prescribed psychotropic medication to manage her anxiety and depressive symptoms.

Gradually, over two months, Jamie and her family began to adapt their behaviours and perceptions in response to FBT and MFT. This resulted in marked improvements in parental management of Jamie's illness and subsequent improvements in her weight gain.

Following improvements in Jamie's weight gain and eating disorder behaviours, a combination of individual and FBT was provided to increase Jamie's autonomy around eating and address her residual anxiety symptoms. With support from her family, Jamie has returned to school and is responding well to follow-on treatment.

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REACHING INTO THE COMMUNITY

The KKH team regularly engages with schools and community healthcare partners to encourage the early detection of children and adolescents with eating disorders and facilitate timely referral to specialised services.

In January 2017, the KKH team collaborated with students from CHIJ Secondary in a student-led initiative, where the students hand-made keepsakes and wrote notes of encouragement to improve the well-being of adolescents battling eating disorders. An interactive educational session was also held at the school, led by Dr Elaine Chew, Consultant, General Paediatric and Adolescent Medicine Service, KKH.

Dr Elaine Chew leads an interactive educational session on eating disorders for students at CHIJ Secondary.

Common signs and symptoms of eating disorders in adolescents:

- Rapid weight loss or poor weight gain
- Insufficient food intake for weight gain
- Secondary amenorrhoea
- Excessive exercise
- Vomiting or laxative abuse

What to do if an eating disorder is suspected in a child under 16 years:

1. The child should be promptly referred to the Adolescent Medicine Service at KKH for further assessment.
2. While waiting for an outpatient appointment at KKH, the family can be advised to start the child on three main meals and three snacks daily, and the child should be excused from physical activity.
3. If the child displays signs of medical instability such as bradycardia, hypotension, electrolyte abnormalities, or dehydration, they should be urgently referred to Children's Emergency at KKH.

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Dr Siobhan Kelly, Principal Psychologist, Psychology Service, KK Women's and Children's Hospital

Dr Siobhan Kelly is a principal psychologist specialising in child and adolescent eating disorders, and works closely with the adolescent medicine and psychiatry teams at KKH to provide integrated care. Dr Kelly underwent further specialist training in child and adolescent Family-Based Treatment (FBT) from the Training Institute for Child and Adolescent Eating Disorders, USA.

Dr Elaine Chew, Consultant, General Paediatrics and Adolescent Medicine Service, Department of Paediatrics, KK Women's and Children's Hospital

A keen researcher, Dr Elaine Chew specialises in the management of adolescents with complex health issues, obesity and eating disorders. In 2016, Dr Chew completed further specialist training in adolescent medicine at The Children's Hospital at Westmead in Sydney, Australia.

Ms Lee Kim Nai, Nurse Clinician, General Paediatrics and Adolescent Medicine Service, Department of Paediatrics, KK Women's and Children's Hospital

With more than 22 years of experience, Ms Lee Kim Nai provides nursing care and management for adolescents with eating disorders. In 2008, Ms Lee underwent a Health Manpower Development Programme attachment with the Division of Adolescent Medicine at the Hospital for Sick Children in Toronto, Canada.

Building Partnerships To Restore Lives

By Rebecca Tse

Working in close partnership, a collaboration between KK Women's and Children's Hospital (KKH) and St. Andrew's Community Hospital (SACH) is empowering technologically-dependent children and those requiring specialised care to live meaningful lives and integrate back into their communities.

Leveraging combined strengths: Members of the KKH and SACH care teams meet fortnightly to discuss the care needs of their paediatric patients.

"A hospital is not the ideal place for a child to be in for the long term," says Dr Chan Yoke Hwee, Deputy Chairman, Division of Medicine and Senior Consultant, Children's Intensive Care, KKH. "As much as possible, all children deserve to experience family cohesion in the home, receive education in schools together with their peers, and enjoy social interactions in the community."

"For children who depend on long-term life-sustaining technological or medical support, our mission is to lessen their need for hospitalisation and integrate them and their families back into their homes and communities whilst providing them support," adds Dr Chan, who also heads the Paediatric Homecare Service at KKH.

The Paediatric Homecare Service helps to support children with tracheostomies, those requiring oxygen and airway support, those requiring tube feeding or long-term parenteral nutrition, and those requiring stoma care and clean intermittent urinary catheterisation. Since its establishment in 2001, the programme has benefited more than 1,700 children, and provided breathing support to more than 100 patients at home.

COLLABORATIVE, COMMUNITY-BASED CARE

Key to the Paediatric Homecare Service's success has been the ongoing close collaboration between KKH and St. Andrew's Community Hospital (SACH), which has enabled it to expand beyond the home in adopting a community-based model of care for paediatric patients in Singapore.

"KKH and St. Andrew's Community Hospital have been working together since 2008, when our paediatric homecare team provided clinical attachment training for nurses from SACH to assist in their establishment of an inpatient paediatric facility that provides care for children who require longer term non-acute medical and/or rehabilitative care," says Dr Cristelle Chow, Consultant, General Paediatrics & Adolescent Medicine Service, KKH.

The close collaboration fostered a partnership between KKH and SACH, tapping on SACH's close ties with the community and KKH's expertise in tertiary acute care to provide collaborative management for paediatric patients requiring custodial, respite and rehabilitative care.

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To facilitate cross-institutional teamwork, the Paediatric Homecare team conducted an initial induction and attachment programme for the SACH team. Thereafter, medical professionals from the KKH Homecare team continue to attend fortnightly patient care conferences and paediatric ward rounds at SACH.

"Combined management from both KKH and SACH has been greatly beneficial in optimising progress for our paediatric patients with complex care needs, enabling seamless care for each child," says Dr Chow.

"In addition to receiving step-down medical and nursing care at SACH, being outside the acute hospital setting also reduces their likelihood of acquiring nosocomial infections, and enables them to have a better quality of life."

HELPING FAMILIES BUILD MEANINGFUL LIVES

"Generally, paediatric patients cared for at SACH have the opportunity to attend the Early Intervention Programme for Infants & Children (EIPIC) at special schools several days a week. They also receive greater levels of interaction with social workers and more intensive rehabilitation from the SACH care team whilst the KKH team continues to monitor their progress and addresses their medical care needs," says SACH Nurse Manager, Ms Karen Seng.

To date, 86 paediatric patients from KKH have benefited from community-based care at SACH. The Paediatric Homecare Team continues to partner with families and community healthcare providers such as nursing homes and hospices to strengthen their capacity to provide continuity of care for children requiring specialised care.

"When a child is in hospital for a prolonged duration, both the child and the family unit are greatly affected," says Ms Seet Soh Cheng, a Nurse Clinician with the Paediatric Homecare Team.

"By empowering the family and community healthcare providers to care for technology-dependent children and those requiring specialised care in a more natural community setting, this model of care helps to strengthen family bonds and enables the child to experience a meaningful life while remaining safe in the community."

Working hand in hand: (left to right) Dr Fatima Singaporewalla, SACH; and Nurse Clinician Lee Mei Yi and Dr Cristelle Chow from KKH check on a patient's progress at SACH's paediatric inpatient facility.

INTEGRATED CARE IN ACTION:
About the paediatric homecare programme

To support the diverse and specialised needs of children requiring homecare and their families and caregivers, the Paediatric Homecare Programme is run by a multidisciplinary team comprising specialist nurse clinicians, community nurses, doctors, physiotherapists, occupational therapists, speech therapists, dietitians, pharmacists, medical social workers as well as staff with biomedical engineering expertise.

Before a child is discharged from KKH into homecare, a home environment assessment is conducted, and the team engages and empowers the child's parents and caregivers to optimise the home situation for recovery. This includes teaching them the skills and procedures to facilitate the child's safe and effective discharge, and to provide the daily care needed to sustain the child's health and well-being at home.

Where necessary, caregivers are also taught to administer total parenteral nutrition (TPN) for children requiring intravenous feeding, and to operate life-sustaining medical technology such as CPAP (Continuous Positive Airway Pressure) and BiPAP (Bilevel Positive Airway Pressure) machines, oxygen concentrators or suction machines. Manuals detailing individualised care protocols and hands-on training are also provided.

Homecare team members accompany the child and family home after discharge to settle them into the home environment, and conduct follow-up visits to assess how the family is progressing and render ongoing support.

KKH Receives $2.2 Million Boost To Battle Childhood Cancer

By Lisa Loh

The fight against childhood cancer has received a $2.2 million boost with two programmes launched at KK Women's and Children's Hospital (KKH) to improve treatment outcomes and long-term care delivery for children and their families battling cancer.

Established through the generosity of Children's Cancer Foundation (CCF), the programmes reside under the SingHealth Duke-NUS Paediatrics Academic Clinical Programme and are aimed at improving long-term care delivery and outcomes for patients during treatment and beyond.

The CCF Psychosocial and Supportive Care Programme for Paediatric Oncology aims to enhance cognitive, emotional and physical treatment outcomes for patients through neuro-psychosocial care, rehabilitative, dietetic and nutritional care. Research will be used to develop innovative models of delivering longer-term psychosocial and supportive care for patients undergoing treatment and also cancer survivors.

"The fight against cancer impacts children and their families mentally, emotionally and physically. Survivors continue to be at an increased risk of developing a multitude of post-treatment effects such as neurocognitive sequelae and deficits, and a higher risk of complications in body functions later in life," shares Dr Jasper Tong, Director, Allied Health, KKH and Deputy Group Director, Group Allied Health, SingHealth, who also leads the CCF Psychosocial and Supportive Care Programme for Paediatric Oncology.

"We are very grateful to CCF for their gift which enhances our ability to provide psychosocial and supportive care for patients during treatment and beyond."

The second initiative, the CCF Paediatric Oncology Survivorship Programme seeks to drive innovative models of care for cancer survivors for the long term. This will be achieved through the extension of the database of childhood cancers, research and development of models of clinical care.

"KKH manages approximately 70 percent of children with cancer in Singapore. Harnessing valuable information on the disease and follow-on effects of treatment is valuable to expand the existing database of what we know about childhood cancer," says Associate Professor Tan Ah Moy, Senior Consultant, Haematology/Oncology Service, Department of Paediatric Subspecialties, KKH, who also leads the CCF Paediatric Oncology Survivorship Programme.

"This will support the initiation of clinical trials and research aimed at enabling us to better help each child with cancer and their family achieve an optimal quality of life."

CHANGING THE FUTURE OF HEALTHCARE
WOMEN MAKING A DIFFERENCE

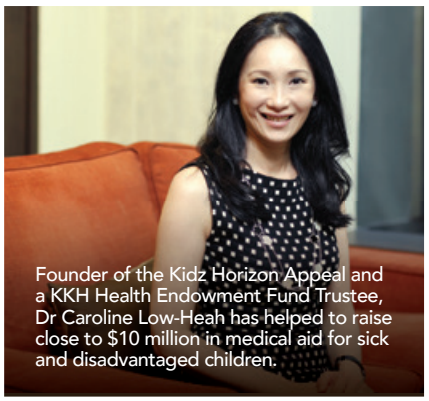

KKH's longest-serving staff member, Madam Low Ah Moey works in the Central Sterile Supply Unit, and in her 80s, has worked at the hospital for more than 60 years.

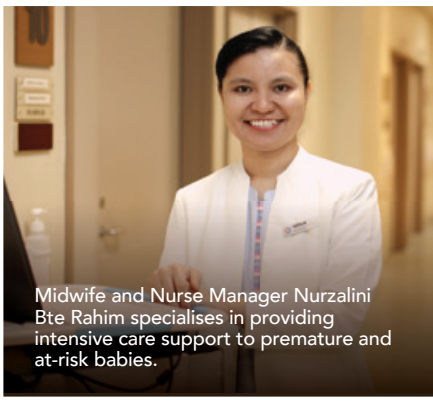

Chief Administrative Resident, Dr Ho Weng Yan, mentors junior doctors-in-training and supports the Obstetrics and Gynaecology National Training Programme.


Recipient of the Distinguished Volunteer Award, Sumitera Bte Letak lends a warm heart and listening ear to women battling cancer.


Dr Sadhana Nadarajah, Former Director of KKH's in-vitro fertilisation centre, founded the Clinic for Adolescent Pregnancy to help young women take charge of their future.


Head of the Pharmacy department at KKH, Irene Quay runs automation and robotics projects, transforming the future of healthcare delivery.


Founder of the Kidz Horizon Appeal and a KKH Health Endowment Fund Trustee, Dr Caroline Low-Heah has helped to raise close to $10 million in medical aid for sick and disadvantaged children.


Midwife and Nurse Manager Nurzalini Bte Rahim specialises in providing intensive care support to premature and at-risk babies.

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KKH HEALTH ENDOWMENT FUND

ABOUT KK WOMEN'S AND CHILDREN'S HOSPITAL

Founded in 1858, KK Women's and Children's Hospital (KKH) is a recognised leader in Obstetrics, Gynaecology, Paediatrics and Neonatology. The 830-bed academic medical institution is Singapore's largest tertiary referral centre for high-risk women's and children's conditions. More than 600 specialists adopt a multi-disciplinary and holistic approach to treatment, and harness compassion, 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 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.

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