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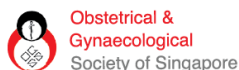
ASIA PACIFIC MATERNAL AND CHILD HEALTH CONFERENCE & INTEGRATED PLATFORM FOR RESEARCH IN ADVANCING MATERNAL & CHILD HEALTH OUTCOMES (IPRAMHO) INTERNATIONAL MEETING 2024

Optimising Perinatal Nutrition
for Better Population Health

23 & 24
February 2024

KKH Auditorium (Training Centre),
Women's Tower, Level 1 and Zoom Webinar

Jointly supported by:



ASIA PACIFIC MATERNAL & CHILD HEALTH CONFERENCE & IPRAMHO INTERNATIONAL MEETING 2023



Launch of the Singapore Perinatal Mental Health Guidelines on 17 February 2023.
(Left to right) Prof Tan Hak Koon, A/Prof Helen Chen, Prof Alex Sia, Dr Janil Puthuchear (Senior Minister of State, Ministry of Health and Ministry of Communications and Information), A/Prof Ng Kee Chong, Prof Tan Kok Hian, A/Prof Tan Lay Kok, A/Prof Ng Yong Hong



Welcome Message



Dear Colleagues and Friends,

On behalf of the Organising Committee, I bid a warm welcome to all of you to the Asia Pacific Maternal & Child Health Conference and Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO) International Meeting 2024, hosted at KK Women's and Children's Hospital (KKH), Singapore. The Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO) has evolved from the original Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children, to focus comprehensively on various pressing issues (e.g., mental health) in maternal and child care, besides metabolic health.

This meeting brings together doctors, nurses and allied healthcare professionals to discuss on diseases for women and children in our Asia-Pacific region. The best preventive efforts start upstream from preconception and at conception in the womb to the early childhood years. The optimal strategy must necessarily begin with effective battles against diseases with lifestyle and obstetric and perinatal interventions at this early phase, using a life course approach. This year we celebrate the 100-year anniversary of KK Women's and Children's Hospital as a maternity hospital.

We had a successful meeting in 2018 where the College of Obstetricians and Gynaecologists, Singapore Guidelines on the Management of Gestational Diabetes was launched. Through the meeting, we have also achieved and published the AFOG MFM Committee Consensus of GDM screening. We launched the Perinatal Society of Singapore Optimal Perinatal Nutrition Guidelines and published the Asia Pacific consensus in perinatal nutrition in 2019. In 2020, we launched the Perinatal Society of Singapore Guidelines on Physical Activity & Exercise in Pregnancy and published the Asia-Pacific consensus on physical activity and exercise in pregnancy and the postpartum period. In 2021 we launched Singapore Integrated 24-Hour Activity Guidelines for Children & Adolescents and published the Asia-Pacific Consensus Statement on integrated 24-hour activity guidelines for children and adolescents. In 2022, we launched the Singapore Integrated 24-Hour Activity Guidelines for Early Childhood with strong support from various colleges and societies in Singapore and SingHealth Duke-NUS Maternal & Child Health Research Institute. In line with RIE2025, these activities aim to translate our research findings for active dissemination and implementation and to improve the health of women and children, enhancing early life-course moments from preconception onwards and optimising the health and human potential of every child born in Singapore and our region. In 2023, the focus was on perinatal mental health and we launched the Singapore Guidelines for Feeding and Eating in Infants and Young Children under the auspices of College of Paediatrics and Child Health, Singapore.

This year we focus on Perinatal Nutrition - Feeding and Eating in Infants and Young and we will launch Singapore Guidelines for Feeding and Eating in Infants and Young Children under the auspices of College of Paediatrics and Child Health, Singapore. The conference on Day 1 will discuss perinatal nutrition in the morning session, followed in the afternoon by IPRAMHO Education and Training Session on perinatal mental health for excellence in perinatal care. On Day 2, the programme will invite the Asia Pacific experts to reach consensus on the perinatal nutrition as well as discuss about future research studies to address the current gaps in perinatal mental health in Asia-Oceania. Asia Pacific experts from Malaysia, Indonesia, Korea, Taiwan, India, Sri Lanka, Cambodia, Bangladesh, Nepal, Philippines, Myanmar & Mongolia as well as practitioners and healthcare professionals from Singapore will be at consensus and also present their studies at this Conference.

We are happy again for the strong support for past five years by members of several key organisations - Perinatal Society of Singapore (PSS), College of Paediatrics and Child Health Singapore (CPCHS), College of Obstetricians & Gynaecologists, Singapore (COGS), Obstetrical & Gynaecological Society of Singapore (OGSS), SingHealth Duke-NUS OBGYN Academic Clinical Programme (ACP) and SingHealth Duke-NUS Paediatrics Academic Clinical Programme. We are also grateful for the support given by the SingHealth Duke-NUS Maternal & Child Health Research Institute & Federation of Asia and Oceania Perinatal Societies (FAOPS). We thank the sponsors and the support of the NMRC (National Medical Research Council) collaborative centre grant - IPRAMHO) involving KKH, SingHealth Polyclinics and National Health Group Polyclinics, KKH Centre Grant & OBGYN ACP grant. In particular, we thank Lee Foundation for their education grant support. We look forward to seeing you physically or virtually at this exciting the Asia Pacific Maternal & Child Health Conference and IPRAMHO International Meeting! We thank everyone for the support and wish everyone a fruitful learning experience.

Professor Tan Kok Hian

Chairperson, Organising Committee

Lead, NMRC/MCHRI Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO)

Head & Senior Consultant, Perinatal Audit & Epidemiology Unit, KK Women's and Children's Hospital

Benjamin Henry Sheares Professor in OBGYN, Duke-NUS

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SINGAPORE JOURNAL OF OBSTETRICS & GYNAECOLOGY

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Acknowledgments:

Senior Minister of State, Dr Janil Puthucheary, Ministry of Health
Prof Victor Samuel Rajadurai, President, FAOPS

Optimising Perinatal Nutrition for Better Population Health

SCIENTIFIC PROGRAMME

DAY 1 – 23 FEBRUARY 2024 (FRIDAY), 9.00AM TO 5.00PM

KKH Auditorium (Training Centre), Women's Tower, Level 1

8.30am	Registration (Coffee and tea will be served at 8.15am)
9.00am	Welcome Address Professor Alex Sia <i>Chief Executive Officer, KK Women's and Children's Hospital, Singapore</i>
9.05am	Welcome Remarks on Asia Pacific Collaboration for Maternal & Child Health Professor Victor Samuel Rajadurai <i>President, Federation of Asia and Oceania Perinatal Societies</i>
9.10am	Opening Address by Guest-of-Honour Dr Janil Puthucheary <i>Senior Minister of State, Ministry of Health and Ministry of Communications and Information</i>
9.20am	IPRAMHO Initiatives for Maternal and Child Health Professor Tan Kok Hian <i>Organising Chairperson, Asia Pacific Maternal & Child Health Conference & IPRAMHO International Meeting 2024</i> <i>Lead, IPRAMHO, Singapore</i>
9.30am	College of Paediatrics and Child Health Singapore Initiatives for Child Health Associate Professor Chua Mei Chien <i>President, College of Paediatrics and Child Health, Singapore</i>
9.40am	Singapore Guidelines for Feeding and Eating in Infants and Young Children Associate Professor Chua Mei Chien <i>Chairperson, Singapore Guidelines for Feeding and Eating in Infants and Young Children Workgroup</i>
10.00am	Launch of the Singapore Guidelines for Feeding and Eating in Infants and Young Children
10.10am	Oral Scientific Posters Presentations Tea Break
10.30am	SYMPOSIUM I: VAST – The Principles of Feeding and Eating in Infants and Young Children <i>Chairs:</i> Associate Professor Chua Mei Chien <i>Head and Senior Consultant, Department of Neonatology, KK Women's and Children's Hospital, Singapore</i> Dr Han Wee Meng <i>Head, Department of Nutrition and Dietetics, KK Women's and Children's Hospital, Singapore</i>
10.35am	Key Components Towards Forming Healthy Eating Habits in Infants and Young Children: Food Variety Dr Ong Chengsi <i>Principal Dietician, Department of Nutrition and Dietetics, KK Women's and Children's Hospital, Singapore</i>

DAY 1 – 23 FEBRUARY 2024 (FRIDAY), 9.00AM TO 5.00PM

KKH Auditorium (Training Centre), Women's Tower, Level 1

10.55am	Key Components Towards Forming Healthy Eating Habits in Infants and Young Children: Eating Autonomy and Setting Dr Daniel Chan <i>Consultant, Endocrinology Service, KK Women's and Children's Hospital, Singapore</i>
11.15am	Key Components Towards Forming Healthy Eating Habits in Infants and Young Children: Food Timing Dr Loy See Ling <i>Principal Investigator, Department of Reproductive Medicine, KK Women's and Children's Hospital, Singapore</i>
11.35am	Panel Discussion Q&A
12.00pm	Lunch Break & Scientific Poster Exhibition in the Lecture Theatre
2.00pm	SYMPOSIUM II: Optimising Periconception and Perinatal Phase for Life Course <i>Chairs:</i> Professor Tan Kok Hian <i>Lead, IPRAMHO</i> <i>Head and Senior Consultant, Perinatal Audit & Epidemiology Unit, KK Women's and Children's Hospital, Singapore</i> Associate Professor Chua Mei Chien <i>Head and Senior Consultant, Department of Neonatology, KK Women's and Children's Hospital, Singapore</i>
2.05pm	Transforming Maternity & Perinatal Care: A Century of Progress and Life Course Perspectives Professor Tan Kok Hian <i>Head and Senior Consultant, Perinatal Audit & Epidemiology, KK Women's and Children's Hospital, Singapore</i>
2.25pm	Life Course Trajectories of Obstetric Medical Diseases Associate Professor Tan Lay Kok <i>President, College of Obstetricians & Gynaecologists Singapore</i>
2.45pm	Life Course Healthy Start: The Healthy Early Life Moments in Singapore (HELMS) Programme in KKH Dr Fabian Yap <i>Senior Consultant, Paediatric Endocrinology, KK Women's and Children's Hospital, Singapore</i>
3.05pm	Tea Break
3.20pm	Intergenerational Impact of Suboptimal Perinatal Mental Health Associate Professor Helen Chen <i>Head and Senior Consultant, Department of Psychological Medicine, KK Women's and Children's Hospital, Singapore</i>
3.40pm	Life Course Perspectives of Preterm Births: Preterm Pregnancy – A Global Problem Professor Teoh Tiong Ghee <i>Director, Maternal & Child Global Health and Care Transformation, KK Women's and Children's Hospital, Singapore</i>
4.00pm	Panel Discussion Q&A
5.00pm	End of Day 1 Programme

DAY 2 – 24 FEBRUARY 2024 (SATURDAY), 9.00AM TO 2.00PM

The meeting will be conducted via Zoom.

Supported by Perinatal Society Singapore & Federation of Asia and Oceania Perinatal Societies (FAOPS).

9.00am	<p>SYMPOSIUM III (VIRTUAL): Perinatal Nutrition Studies and Consensus Management in Asia Pacific Countries</p> <p>Update on IPRAMHO Asia Pacific Collaborative Group – Collaborative Efforts in Promoting Asia Pacific Maternal & Child Health Professor Tan Kok Hian <i>Lead, IPRAMHO</i> <i>Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO) Asia Pacific Maternal & Child Health Network</i></p> <p>Singapore Caregiver’s Feeding Practices in Infants and Young Children: Findings from the Integrated Variety, Autonomy, Setting and Timing (I-VAST) Study Dr Elaine Quah <i>Senior Research Fellow, Division of Obstetrics and Gynaecology,</i> <i>KK Women’s and Children’s Hospital, Singapore</i></p>
9.30am	<p>Asia Pacific Consensus Workshop on the Guidelines for Feeding and Eating in Infants and Young Children <i>Chairs:</i> Professor Tan Kok Hian <i>Lead, IPRAMHO</i> <i>Head and Senior Consultant, Perinatal Audit & Epidemiology Unit,</i> <i>KK Women’s and Children’s Hospital, Singapore</i></p> <p>Associate Professor Chua Mei Chien <i>Chairperson, Singapore Guidelines for Feeding and Eating in Infants and Young Children Workgroup</i></p> <p>Asia Pacific Perinatal Nutrition Health Collaborative Study Group: Singapore members Dr Rinawati Rohsiswatmo, Indonesia Associate Professor Azanna Ahmad Kamar, Malaysia Professor Ashma Rana, Nepal Associate Professor Jin Soo Moon, South Korea Dr Rathmony Heng, Cambodia Dr Nargis Ara Begum, Bangladesh Professor Sunil Raja Manandhar, Nepal Associate Professor Chiang Ming-Chou, Taiwan (R.O.C) Professor Cheah Fook Choe, Malaysia Professor Gerelmaa Zagd, Mongolia Dr Wai Lin Tun, Myanmar Dr Ranjan Kumar Pejaver, India Dr Jose B. Salazar, Philippines</p>

DAY 2 – 24 FEBRUARY 2024 (SATURDAY), 9.00AM TO 2.00PM

The meeting will be conducted via Zoom.

Supported by Perinatal Society Singapore & Federation of Asia and Oceania Perinatal Societies (FAOPS).

10.30am	<p>Perinatal Nutrition Studies and its Management in Asia Pacific Countries Presentations by Asia Pacific Partners</p> <ol style="list-style-type: none">1. Nutritional Guidelines for Preterm Infants in Indonesia Dr Rinawati Rohsiswatmo <i>Neonatologist and Head, Maternal and Child Health Centre RSCM KIARA, Department of Child Health, Faculty of Medicine in University of Indonesia, Cipto Mangunkusumo General Hospital, Indonesia</i>2. Navigating The Bridge Towards Full Enteral Nutrition for High-Risk Neonates Associate Professor Azanna Ahmad Kamar <i>Head of Department of Paediatrics, Faculty of Medicine, University Malaya, Malaysia</i>3. Feeding and Weaning Practices in Young Infants and Children in Nepal Professor Ashma Rana <i>President of Nepal Perinatal Society, Nepal</i>4. Importance of the Exact Measurement of Body Physics in Neonates and Infants Associate Professor Jin Soo Moon <i>Associate Professor of Department of Pediatrics, Seoul National University College of Medicine, Seoul, South Korea</i>5. Preterm Nutrition in NICU of Calmette Hospital: Current Practices and its Challenges Dr Rathmony Heng <i>Fellow in Paediatric Cardiology, University of Health Sciences, Cambodia</i>6. Neonatal and Infant Feeding Practice in Bangladesh Dr Nargis Ara Begum <i>Senior Consultant Neonatology, United Hospital, Dhaka, Bangladesh</i>7. Role of Human Milk Fortifiers (HMF) and Medium Chain Triglycerides (MCT) in Preterm Babies Nutrition Professor Sunil Raja Manandhar <i>Senior Vice-President, Perinatal Society of Nepal (PESON) Head, Paediatrics Department, Kathmandu Medical College Teaching Hospital, Nepal</i>8. Current Status of Nutritional Management for Preterm Infants in Taiwan Associate Professor Chiang Ming-Chou <i>Associate Professor, Chang Gung University, Taoyuan, Taiwan (R.O.C) Director, Division of Neonatology, Chang Gung Memorial Hospital, Linkou, Taiwan (R.O.C)</i>9. Transforming the Landscape of Neonatal Nutritional Support in an NICU in Malaysia Professor Cheah Fook Choe <i>Professor of Paediatrics and Neonatology, Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM)</i>
1.00pm	<p>Collaborative Studies in Asia Pacific for IPRAMHO Group – IPRAMHO Asia Pacific Collaborative Study on Caregiver’s Feeding Practices in Infants and Young Children: The Asia Pacific Integrated Variety, Autonomy, Setting and Timing (API-VAST) Study 2024</p>
2.00pm	<p>End of Day 2 Programme</p>

Commentary

The Next Lap - Taking a Life Course Perspective on Maternity Care

Kok Hian Tan^{1,2}, Tiong Ghee Teoh¹, Helen Chen^{2,3}, Victor Samuel Rajadurai^{2,4}, Ban Leong Sng^{2,5}, Mei Chien Chua^{2,4}, Seng Bin Ang^{2,6}, Lay Kok Tan^{1,2}

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KK Women's & Children's Hospital has been a cornerstone of maternity care in Singapore for a century, welcoming over 1.6 million newborns since 1924. Over this time span, Singapore's maternal mortality rate has seen a remarkable decline, plummeting from 750 per 100,000 births in 1932 to fewer than 10 per 100,000 births today. (1) Advances in medical treatments, such as antibiotics, blood transfusions, and improved obstetric care, have significantly reduced fatalities from issues like hemorrhage and infections, such as septic abortions. Instead, maternal mortality is now primarily attributed to conditions like pulmonary embolism, cardiac diseases, and other medical concerns, with suicide emerging as a noteworthy contributor.

Similarly, perinatal mortality rates have witnessed impressive reductions, decreasing from 35.4 per 1000 births in the 1950s to less than 5.0 per 1000 births in the 1990s. (2) As infections and perinatal asphyxia have come under better control through enhanced healthcare, the primary causes of perinatal deaths have shifted to congenital anomalies, prematurity, perinatal asphyxia, and infection. (2)

Effective antenatal care plays a pivotal role in preventing maternal deaths, stillbirths, and perinatal deaths. Looking forward to the next century of care, preventing and managing congenital anomalies and prematurity stand out as focal points for future healthcare efforts. Two other critical areas that demand our attention are metabolic and mental health within the realm of maternal well-being. (3) Both of which have downstream effects on the health of their offspring.

There is a growing interest in adopting a life course approach to women's health in the field of maternity care to enhance population health. Investing in trans-generational maternal health and implementing effective life course perinatal interventions, programs, and initiatives, both in Singapore and globally, is essential. This momentum should be embraced and accelerated by all stakeholders in maternal care. (4)

The Developmental Origins of Health and Disease (DOHaD) hypothesis, known as the 'Fetal Origins of Adult Disease,' posits that exposure to environmental influences during critical developmental stages can have profound consequences on an individual's short- and long-term health. Fetal adaptation to adverse uterine environments can impact survival and susceptibility to chronic diseases later in life. (5-8)

Managing medical or obstetric conditions during and after pregnancy is vital for lifelong well-being, benefiting both women and their families. Obstetrical medical conditions like preeclampsia and gestational diabetes were once thought to arise only during pregnancy and resolve after childbirth. There is now compelling evidence that these conditions have lasting effects well beyond pregnancy, influencing the risk of developing chronic diseases not only for the child but also for the woman later in life.

Pregnancy triggers physiological changes in women to accommodate the growing fetus. These changes serve as a maternal stress test, predicting the woman's health in later life. The physiological and hormonal changes of pregnancy create a proatherogenic metabolic syndrome that predisposes to endothelial dysfunction and glucose intolerance. From this perspective, obstetric medical conditions such as preeclampsia and gestational diabetes should be viewed as unmasking subclinical diseases during pregnancy, heralding the possibility of disease recurrence not only in future pregnancies but also in later life after completing the family. Consequently, pre-eclampsia during pregnancy increases the likelihood of recurrent pre-eclampsia, as well as chronic hypertension, chronic renal disease, and cardiovascular disease. Gestational diabetes follows a similar pattern, with an increased risk of developing type 2 diabetes mellitus later in life. (9,10)

While it is now known that pregnancy complications such as gestational diabetes and pregnancy-induced hypertension are associated with later life risks for type 2 diabetes mellitus and cardiovascular disease, respectively, it is less well accepted that other pregnancy complications are risk factors for maternal chronic disease. Recurrent miscarriage, stillbirth, spontaneous preterm birth, and placental abruption are all associated with increased risk for cardiovascular disease. (11)

In addition, many women experience labour-related and childbirth-related morbidity in the medium-to-long term after childbirth, beyond 6 weeks postnatally. These include dyspareunia (35%), low back pain (32%), urinary incontinence (8–31%), anxiety (9–24%), anal incontinence (19%), depression (11–17%), tokophobia (6–15%), secondary infertility (11%) and perineal pain (11%). Peripartum pain experience is particularly important – about 60% of first-time mothers described their pain as severe or extremely severe. (12) Hence, the need for effective pain management is essential to reduce the risk of persistent childbirth pain (13) and postnatal depression (14). Other conditions that occur, as a consequence of labour and childbirth which are less common, yet still have severe effects on women's health and wellbeing, include pelvic organ prolapse, thyroid dysfunction, mastitis, HIV seroconversion, post-traumatic stress disorder, psychosis, nerve injury, peripartum cardiomyopathy and venous thromboembolism. (15)

Furthermore, the period before and during pregnancy is increasingly recognized as an important stage for addressing malnutrition. This can help to reduce the risk of noncommunicable diseases in mothers and passage of risk to their infants. (16) Appropriate weight management during pregnancy is important. Inadequate gestational weight gain (GWG) is associated with an increased risk of SGA whereas excessive GWG is associated with increased risks of macrosomia and caesarean section due to failure to progress or CPD. (17) Breastfeeding is a postpartum pillar and a lifesaving intervention for both mother and newborn. It must be initiated at the most opportune time, namely within the first hour after birth. (18)

These findings have significant implications for the development of healthcare systems to prevent and improve women's health outcomes. Obstetric conditions should no longer be the exclusive concern of obstetricians, who typically provide pre-pregnancy advice and counseling for future pregnancies but do not typically care for women outside of pregnancy. The importance of taking an obstetric history by any healthcare provider looking after women is therefore of great significance. Pregnancy (akin to a stress test for various diseases) should be seen as a unique opportunity in a woman's life course to consider her health over the long term. (19, 20) Ongoing initiatives like Healthier SG and population health programs in Singapore provide excellent opportunities to address this crucial gap in providing seamless continuity of care for women whose vulnerabilities to developing chronic diseases have been uncovered during pregnancy. (21, 22)

Another critical area to consider is the consequences of preterm births, both spontaneous and medically induced. The global and national burden of preterm birth is substantial. It is still the commonest cause of infant mortality at less than 5 years of age. In the last 10 years, despite increased technological advances in medicine and paediatric care – the incidence has not decreased in the last 10 years. (23) There are also the effects of morbidity from preterm birth which include neurodevelopmental impairment, deafness, blindness, long term respiratory morbidity and chronic lung disease. The burden on health economics of preterm birth emanates from admittance to neonatal intensive care and to adulthood with increasing direct costs; and indirect costs which include psychosocial costs on the individual and the family. There is a need to address the challenge of reducing preterm births in both the short and long term, and to mitigate its impact on population health.

The life course approach to healthcare is also relevant for mental health, spanning from infancy to old age. Mental health issues during the maternity period are particularly important, as they affect behavior, adherence to medical advice and care, and clinical outcomes, both directly and indirectly. The latest 2022 MBRRACE-UK (Mothers and Babies: Reducing Risk through

Audits and Confidential Enquiries across the UK) report revealed that mental health issues, along with cardiovascular disease, have emerged as leading causes of maternal mortality. (24) It indicated that deaths from mental health-related causes, including suicide and substance abuse, account for nearly 40% of deaths occurring within a year after the end of pregnancy, with maternal suicide remaining the leading cause of direct deaths during this period.

Research has shown that even subclinical levels of depression or anxiety can impact the development of offspring. We are beginning to grasp the extent to which mental health can influence maternal sensitivity, attunement, reciprocity, and synchronicity. Maternal antenatal depression and anxiety can affect fetal brain development microstructurally (25,26) and functionally (27,28), with downstream effects on temperament (26), behavior (30) and school readiness (31). These findings are similar to the evidence growing worldwide (32,33). The downstream impact on neurobiology and neurophysiology can predict challenges in later life that can affect population health. A holistic approach involving healthcare, education, and social communities is recommended to maximize the potential of our children and future generations. (34)

Even before the first 1000 days, the preconception period is now increasingly recognized as a critical phase in maternal and child health development. A follow-on cohort study on mothers before their first visit to KKH - the Singapore Preconception Study of Long-Term Maternal and Child Outcomes (S-PRESTO) - found that preconception mental health is closely linked to antenatal mental health. (35) Given that antenatal mental health strongly influences postnatal mental health, early identification and intervention are crucial to ensure the best health outcomes for women and children. Evidence from GUSTO also suggests that lifestyle adjustments can benefit antenatal well-being.

The life course approach should encompass educating mothers before, during, and after pregnancy, in line with our commitment to promoting population health. Emphasizing the importance of maintaining a healthy diet and managing weight during pregnancy, encouraging maternal physical activity, and providing optimal nutrition are key components. Additionally, promoting healthy infant feeding practices, with a particular emphasis on breastfeeding, and fostering good eating habits in early childhood, serve as fundamental elements that can establish a robust basis for the health and development of mothers, children, and families. (36-40)

The impact of maternity care events and management extends throughout a person's lifetime. Pregnancy and breastfeeding have been shown to potentially reduce the risk of early menopause (41). Various factors during pregnancy, such as nutrition, environmental exposures, and maternal health conditions and disease states, are associated with fetal bone health and the risk of fractures in later childhood. Unfortunately, these factors are often overlooked when it comes to optimizing early bone health (42). In essence, the groundwork for lifelong bone health is established in utero, during pregnancy.

To embark on the next century of maternity care, we must prioritize at least these four key areas: Preventing Preterm Pregnancy; Enhancing Maternal Medicine; Implementing a Perinatal Life Course Approach for Improved Population Health; and Addressing Perinatal Mental Health.

Maternal health is a social issue - maternal ill-health and disability are not just medical problems, but outcomes of a complex interplay of eco-social forces, individual-level factors and lifestyles and exposures. The health sector and its leadership have an important role in saving the lives of women with pregnancy, labour, or postpartum complications, and should be expanded to mitigate the detrimental effects of maternal health determinants. (43) As leaders and advocates in maternity care, it is our duty to formulate an optimal life course strategy to strengthen maternity care in these key areas and encourage our faculty and staff to embrace change and confront the challenges in maternity and perinatal care that lie ahead.

Special Notes

In 2024, Kangar Kerbau Hospital (KKH) is commemorating its centennial year as a maternity hospital. This institution, which has welcomed the arrival of over 1.6 million newborns, held the distinction of being the world's largest maternity hospital from the 1950s through the early 1970s. Renowned for its groundbreaking research in obstetrics, gynecology, and reproductive medicine, KKH derives its name from the district in which it originally stood, known in Malay as "Kandang Kerbau," or "Buffalo Enclosure.", where buffaloes were an important mean of transport then. In Teochew and Hokkien, it was referred to as "Tek Kah," and in Mandarin, "Zhu Jiao," signifying its location "below the clumps of bamboo." (44)

KKH initially began as a general hospital in 1858 but underwent a transformation on October 1, 1924, under the guidance of Professor J S English, who served as the first Professor of Midwifery (later renamed Obstetrics) and Gynaecology (O&G). At that time, KK Hospital transitioned into a free maternity hospital with 30 beds. Since 1997, KKH has evolved into KK Women's & Children's Hospital, an academic clinical institution offering comprehensive healthcare services for women and children.

The authors of this commentary are all leaders at KKH and in Singapore, advocating for a life course approach to maternity care for both Singapore and the wider region in the forthcoming century of maternity care. Among them, Associate Professor Tan Lay Kok holds the position of President of the College of Obstetricians & Gynaecologists, Singapore (COGS) while Associate Professor Chua Mei Chien serves as President of the College of Paediatrics & Child Health Singapore (CPCHS) and as President of the Association for Breastfeeding Advocacy Singapore (ABAS), Professor Victor Samuel Rajadurai is President of the Perinatal Society of Singapore and President of the Federation of Asia and Oceania Perinatal Societies (FAOPS). Associate Professor Ang Seng Bin is President of the Menopause Society of Singapore and Secretary General of the International Menopause Society. Additionally, Prof Tan Kok Hian occupies the Benjamin Henry Sheares Professorship of Obstetrics & Gynaecology at NUS and serves as the Editor of the Singapore Journal of Obstetrics and Gynaecology. This journal originated from local discussions on Obstetrics and Gynaecology (O&G), which were initially documented in "The Bulletin of the Kandang Kerbau Hospital for Women" in 1956, under the editorial stewardship of Professor Benjamin Henry Sheares.

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College of Paediatrics and Child Health Singapore (CPCHS)

SINGAPORE GUIDELINES FOR FEEDING AND EATING IN INFANTS AND YOUNG CHILDREN

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INTRODUCTION

Nutrition plays an important role in the first 2 years of life, shaping not only a child's eating preferences but also long-term health and development (1). Provision of nutrition in childhood is complex, where multiple aspects of nutrient requirements, food variety, caregiver and child interaction, and environment must be considered.

In Singapore, gaps in infant and young child nutrition have been demonstrated by the Growing Up in Singapore Towards Healthy Outcomes (GUSTO) longitudinal cohort study, including inappropriate food textures and intake of added sugars (2, 3). Suboptimal caregiver feeding practices can negatively impact the child's intake, suggesting the need for guidance and recommendations to improve nutrition provision and intake during this period (4, 5).

Infant and young child nutrition practices must be intentional and progressive to help children achieve the developmental and nutritional milestones needed for optimal health. However, there are currently no national guidelines focused solely on the transition from being fed at birth to independent eating at the end of the second year of life. This workgroup aimed to provide an in-depth review of the literature, while accounting for the needs and cultural context of our multi-ethnic population locally. As such, we have developed recommendations focusing on aspects of early nutrition which can be classified into 4 main domains: Variety, Autonomy, Setting, and Timing (VAST). These guidelines are meant to complement the Singapore Integrated 24-hour Activity Guidelines published by the Academy of Medicine Singapore in 2021, elaborating and adding on to some of the guidelines on nutrition provision in children 0 to 6 years (6).

TARGET AUDIENCE

Healthcare professionals, parents and caregivers of children aged 0 to 2 years. We aim for these guidelines to be readable by the lay person, and to enable all those involved in the care of children aged 0 to 2 years to play a role in healthy eating behaviour formation. These guidelines provide goals and milestones in the transition from infant feeding to eating in a young child. These guidelines are applicable to term, healthy infants without medical conditions and feeding disorders. Preterm infants or those with medical conditions should seek advice from healthcare professionals. The workgroup utilized the GRADE Evidence to Decision frameworks for adoption, adaptation, and de novo development of trustworthy recommendations (GRADE-ADOLPMENT) approach to developing guidelines (7).

GUIDELINES

Focus on early feeding practices for infants and young children to foster healthy eating behaviours and habits, supporting optimal growth and promoting long-term health.

Eating habits are formed in infancy and frequently carry over into childhood (8, 9), heightening the likelihood of rapid weight gain, childhood obesity, and metabolic disorders (10, 11). This predisposes individuals to the development of diabetes and cardiovascular diseases in later stages of life (12). Hence, it is imperative to cultivate healthy eating habits from an early age.

Feeding practices in infants and young children should prioritize the cultivation of healthy eating behaviours and habits while ensuring appropriate growth during this crucial developmental phase. This aligns with the recommendations of the Early

Nutrition Project, which emphasizes that infant and young child feeding practices should be tailored to support appropriate weight gain (12). This is further substantiated by evidence demonstrating relationships between early feeding practices, eating habits, and weight gain velocity (11, 13).

Emphasize positive role-modelling in parents and caregivers to guide the development of healthy eating behaviours.

Parents and caregivers play a crucial role as role models in fostering healthy eating behaviours that endure from childhood through adolescence into adulthood. It is recognised that imitation forms a fundamental pillar of infant learning (14). These behaviours are influenced by a combination of maternal factors, socio-environmental elements, and informational factors, including knowledge, perceptions, attitudes, beliefs, and skills, all of which exhibit a positive correlation with the establishment of proper feeding habits (15). Additionally, studies indicate that frequency and variety of exposure, along with positive role modelling, contribute to increased vegetable consumption (16). Furthermore, evidence suggests that adequately preparing and providing healthy food positively affects a child's later diet, lipid profile, and micronutrient status, especially Vitamin D. This has also been shown through educational cooking interventions for parents during the introduction of solid foods to infants (17).

Attain eating habits that encompass children enjoying a variety of food at appropriate mealtimes while exercising autonomy in settings that are developmentally appropriate.

The workgroup has reached a consensus on four crucial domain areas, namely Variety, Autonomy, Setting, and Timing (VAST), which parents and caregivers should focus on to promote healthy eating behaviours and habits in infants and young children. These areas encompass encouraging food variety (V), establishing eating autonomy (A), cultivating distraction-free family mealtimes (S), and adapting to daytime eating schedules (T).

Ensure a diverse range of age-appropriate textures and flavours to provide an essential balance of nutrition, while emphasising the importance of healthy food preparation.

- a. **Exclusively breastfeed infants for the first six months of life, and introduce complementary foods when developmentally appropriate, while continuing to breastfeed.**
- b. **Between 6 and 12 months, introduce textures progressively into the infant's diet. Start with iron-rich food, preferably green vegetables. Provide early and repeated exposures to a wide variety of vegetables, fruit, carbohydrates, and proteins, without added sugar and salt.**
- c. **From 12 months, provide foods that are similar to the rest of the family, focusing on nutrient-dense options.**
- d. **In the first two years of life, avoid giving fruit juices and sugar sweetened beverages.**

Breastfeeding provides significant benefits for metabolic health of the child, particularly reducing risk of overweight and obesity of the child (18). The World Health Organization recommends that infants be exclusively breastfed for the first six months of life, and continued to be breastfed for up to two years or beyond (19). Breastfeeding is associated with a lower risk of rapid weight gain in infants in the first year of life compared to formula fed infants (20). Intake of fruit and vegetables have also been shown to be higher in infants breastfed for six months than those breastfed for less than six months (16, 21).

The introduction of complementary foods should occur around six months, but not earlier than four months, as earlier introduction may increase the risk of food allergies and excessive weight gain (22, 23). Between four to six months, complementary foods can be given when the infant demonstrates developmental readiness, e.g. the ability to hold their head up steadily, disappearance of tongue thrust reflex, showing interest in food and frequently putting things into their mouth (24).

The World Health Organization recommends to "gradually increase food consistency and variety as the infant gets older, adapting to the infant's requirements and abilities" (25). The introduction of lumpy solids after nine months of age has been associated with food refusal and picky eating reported later on in childhood (i.e. at 15 months, 38 months, 7 years) (26-28). As such, introduction of textures should occur gradually around 7-8 months, an important window for the development of oral skills and facial muscles, and no later than 10 months of age.

Iron is an important nutrient during the period of complementary feeding as iron stores in infants decrease around this period (22). There is strong evidence that iron-rich foods during complementary feeding, e.g. dark green vegetables, iron fortified infant cereals, meats and legumes, help maintain adequate iron status and prevent deficiency in the first year among infants at risk of insufficient iron stores or low intake (29).

Consensus reached by the British Nutrition Foundation proposes a “vegetable first approach”, considering the evidence sufficient to recommend vegetables as the initial complementary food. This approach increases vegetable acceptance early on, with potential benefits for later food preferences and intake (30). Considering a high prevalence of inadequate vegetable consumption reported in Singapore, we encourage caregivers to offer vegetables as the first food during complementary feeding, frequently and in a variety, according to accessibility and affordability (31). Early and repeated exposure to foods, including fruit and vegetables, have been shown as an effective strategy to increase acceptance of that particular food (16, 32). This can serve as a strategy to ensure adequate vegetable and fruit intake in infants and children.

Continued provision of a variety of foods during complementary feeding helps to ensure that a larger range of nutrients are consumed (26). Inclusion of foods from animal sources, such as meat, poultry, fish and eggs, during complementary feeding is associated with higher diet quality and improved physical growth in children in low- and middle-income countries (33). There is inadequate evidence to suggest that intake of meat during complementary feeding is associated with overweight and obesity (34).

Vegan and vegetarian weaning diets have been associated with a greater risk of inadequate growth and neurological deficits, with greater reported deficiencies in vitamin B12, vitamin D, calcium, iron and riboflavin (35). There is no evidence to delay the introduction of allergenic foods, even in children with family history of atopy or mild eczema (36). Please refer to the 2019 Academy of Medicine Singapore Consensus Statement for the Primary Prevention of Allergy in At-Risk Infants for more details.

A variety of flavours is also encouraged during complementary feeding. Consumption of home-made versus commercial/ convenience complementary food was associated with higher diet diversity, better acceptance of new foods, higher HDL cholesterol levels and lower body fat within the first year of life (17, 37), suggesting that home-made foods with large variety may help broaden taste profiles compared to commercial foods. Most infants should be able to eat similar foods as the rest of the family by 12 months, and they require nutrient-dense foods such as meat, fish, eggs, fruit, vegetables and legumes (26).

Evidence suggests that sugar-sweetened beverage consumption during the first year of life is associated with increased obesity risk in childhood and poorer nutritional quality of diet (34). The intake of added sugars correlates with increased energy intake, development of non-communicable disease, including obesity and dental caries, and displaces intake of more nutrient dense foods. The WHO recommends to keep the intake of simple added sugars as low as possible at this age (38), while the United States Centre for Disease Control and Prevention (CDC) recommends avoiding all foods and beverages with added sugars before the age of two years (39). Although current evidence appears to have mixed outcomes, there seems to be a positive correlation between juice intake (including 100% fruit juice) in the first year of life and higher BMI z-scores (34). We thus additionally recommend the exclusion of all juices, including those without added sugar, before two years due to its high sugar content, potentially leading to a taste preference for sweet drinks and foods.

A preference for savoury tastes develops around four months of age, and early intake of foods containing sodium increases the preference for salty foods later in childhood (40). In view of the increased risk of hypertension with increased salt intake, various international organizations have recommended that no salt be added during the first year of life, as this may influence consumption of excessive salt later in life (22, 41). After the first year, salt may be used in moderation as part of adult foods and family meals.

Be attentive and responsive to hunger and satiety cues from birth. Encourage autonomy in feeding to nurture positive mealtime experience.

- a. From birth, respond to infant’s hunger and fullness cues, allowing them to set the pace for feeding.**
- b. From six months, respond to infant’s readiness to explore new textures and flavours. Encourage self-feeding and food play, allowing the infant to control the pace and determine the amount of food consumed.**
- c. By 12 to 18 months, involve the child in family mealtimes, using age-appropriate utensils. Encourage liquids from a cup instead of the milk bottle.**
- d. Between 18 and 24 months, build confidence for the child to eat and drink independently, using a fork, spoon, and cup.**

Allow infants to actively participate early in the weaning process, with introduction of finger foods and giving them autonomy in determining what, how much, and how fast to eat. The goal is to allow them to become more likely to consume the same food as their family and share the same mealtimes. They will be more sensitive to feeling full, less demanding in relation to feeding, and less prone to being overweight subsequently (14, 42). Encourage the child to explore the food’s textures, colours, tastes and

shapes through food play so that they experience food in a fun way. Overall, they should also be perceived to enjoy feeding more (43, 44).

In addition to more ideal appetitive behaviours, autonomy in feeding also influences subsequent metabolic health, associated with higher intakes of “healthier” food such as vegetables and unprocessed foods, with appropriate energy self-regulation. This has implications on the child’s physical growth and risk of developing obesity (43).

Traditional spoon feeding (TSF) should be integrated with responsive feeding practices to identify whether the child remains interested with hunger cues or is satiated. Responsive feeding helps infants to control caloric consumption (45). This promotes appropriate infant growth and reduces risk of developing obesity (46, 47).

In a systematic review and meta-analysis by Bergamini et al (48) and a randomized controlled trial comparing TSF and baby-led weaning (BLW) (49), the subsequent risk of developing overweight/obesity do not seem to significantly differ between the two groups. However, in a similar study by Taylor et al., BLW infants seem to show greater enjoyment of food and less food fussiness as compared to their TSF counterparts (49). A systematic review by D’Auria included 12 studies comparing TSF and BLW; and even though energy intake was similar between the 2 groups with higher consumption of total and saturated fat by the BLW infants, those with BLW had lower mean body weight (50). It is important to note that the definition of and adherence to BLW may differ across studies; the key is to promote the child autonomy in self-feeding and observe responsive feeding practices, whichever the mode of feeding provided to the child.

Establish regular, family-centred mealtimes in a calm and distraction-free environment.

- a. From birth, provide a comfortable and soothing environment to promote a secure and nurturing feeding experience.**
- b. From six months, have baby safely seated at a designated dining area while providing solids.**
- c. From 12 months, make mealtimes family-centred to promote social interaction and eating enjoyment with the family.**
- d. Encourage parents and caregivers to interact with infant and child during feeding and eating while avoiding screens and toys.**

To cultivate a safe and positive mealtime experience for infants and young children, the CDC recommends seating them upright in a secure high chair or booster seat, facing the feeder or family members at the table (51). This approach supports the formation of a healthy environment with mindful eating, enabling the child to pay attention to foods and facilitating the beginning of shared meals at home.

The Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity underscores the value of family meals, emphasising parents and children dining together for targeted obesity prevention (52). The act of sitting down as a family for mealtime not only imparts crucial eating habits to the child but also contributes to the development of essential social skills (51). It allows the child to experience a diverse range of meal options mirroring those of the parents (6). Thus, eating healthy foods together with the child at each meal is important.

Allowing the child to have input into food choices and discussing healthy foods at mealtime conversations are strategies to be incorporated during family meals to enhance a child’s positive eating behaviour (53, 54). These interactions can be further enriched by maintaining eye contact, offering smiles, and using positive facial expressions, creating a nurturing and engaging atmosphere. A supportive mealtime environment goes beyond these interactions to include the celebration of small milestones and achievements, such as trying new foods or engaging in self-feeding. Additionally, it involves ensuring that nutritious foods are easily accessible at home (54). Increasing the frequency of family meals has been associated with increased intake of nutrient-dense foods, particularly fruits and vegetables, resulting in a more balanced diet. Additionally, this practice fosters greater food enjoyment, reduces instances of picky or emotional eating, and enhances overall family dynamics, promoting increased interaction between parents and children (55, 56).

Moreover, maintaining a distraction-free environment during meals is vital for cultivating healthy eating habits (57). Children exposed to screens while eating tend to consume more unhealthy foods and display behavioural problems, including emotional reactivity and attention issues (58). To further support healthy habits, family members should set a positive example by refraining from watching television or using electronic devices during meals, an important strategy to prevent overeating (59). Avoiding screen time not only contributes to the child’s ability to self-regulate their eating behaviour but also enables the parent or caregiver to be attuned to the child’s satiety and hunger cues, fostering a holistic approach to mealtime interactions.

Encourage a gradual transition from round-the-clock feeding towards eating in the day as the infant approaches their first year.

- a. In the first six months, observe and respond to the infant's evolving feeding pattern, recognising their natural shift towards longer intervals between feeds, especially at night.**
- b. From six months, promote the establishment of feeding during the day, recognizing that some infants may sleep 6 hours through the night, and do not need night feeding.**
- c. From 12 to 24 months, maintain a daily routine of 3 meals and 2 snacks, ensuring that meals and milk feeds are synchronised with their waking hours in the daytime.**
- d. Keep each meal duration to 30 minutes, and not longer.**

As infants grow, their circadian rhythm gradually matures, leading to more consolidated wake and sleep episodes by 3-4 months; typically, by 6-9 months, most infants can sleep through the night with at least 6 hours continuous sleep (60). To align with this circadian rhythm development, aim to provide daytime feeds, while gradually reducing night-time feeds. Around the age of 6 months (no later than 6 months and no earlier than 4 months), when the infant shows developmental readiness for complementary foods, gradually introduce solids from once a day to 2-3 times a day between 6-8 months. Increase this to 3-4 times daily between 9-11 months, and continue this pattern from 12-24 months (38). Additionally, offer additional nutritious snacks 1-2 times a day, with a maximum of three meals and two snacks, for children aged 12-24 months, as desired by the child (38).

Introduce these complementary foods at a regular schedule predominantly during the day (before night fall), with appropriate portions spaced every 2-3 hours to prevent overfeeding (59). Importantly, follow the infant/ young child's hunger cues and allow them to adapt to a daytime feeding schedule that includes milk feeds. Having a routine can help children know what to expect when it is time for meals or snacks (51). Avoid frequent snacks or grazing (i.e. repeatedly eating small portions within short intervals throughout the day), and using feeding to soothe or to get the infant/young child to sleep (61). It has been demonstrated that reducing night-time feeds for infants aged 6-12 months helps regulate calorie intake, contributing to optimal growth (62, 63). Local data indicates that infants consuming more calories at night (after 7 pm) than during the day at 12 months had higher body fat gain and an elevated risk of overweight and obesity by 24 months (64). Furthermore, it is advisable to wean infants off nocturnal feeds and bottle feeding to mitigate the risk of dental caries (6).

Lastly, caregivers are encouraged to establish a routine for infants and young children, ensuring they begin eating within 15 minutes after food is introduced, and to keep the total meal duration between 20-30 minutes (65). This approach has been shown to effectively minimize distractions and discourage disruptive behaviour during feeding (66). Maintaining a structured routine for meal and snack times for young children is an important component of effective responsive feeding practices, enabling caregivers to recognize and respond to hunger and fullness cues in the child (67).

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This guideline summary, endorsed by College of Paediatrics and Child Health Singapore (CPCHS), Perinatal Society of Singapore, Health Promotion Board, Singapore Nutrition and Dietetics Association, Singapore Medical Association, and Singapore Paediatric Society, acts as an educational aid and reference for healthcare professionals practicing in Singapore.

The guideline summary does not define a standard of care, nor is it intended to dictate an exclusive course of management. It presents recognized clinical methods and techniques for consideration by practitioners for incorporation into their practice. It is acknowledged that management may vary and must always be responsive to the need of individual patients, availability of resources, and limitations unique to the institution or type of practice. Launched on 17 February 2023.

SUMMARY STATEMENTS OF COLLEGE OF PAEDIATRICS AND CHILD HEALTH SINGAPORE (CPCHS) GUIDELINES FOR FEEDING AND EATING IN INFANTS AND YOUNG CHILDREN

*CPCHS-IPRAMHO Feeding and Eating in Infants and Young Children Study Group 23 February 2024

- 1. Focus on early feeding practices for infants and young children to foster healthy eating behaviours and habits, supporting optimal growth and promoting long-term health.**
 - a. Prioritise the cultivation of healthy eating behaviours and habits.
 - b. Ensuring appropriate growth during this crucial developmental phase.
 - c. Tailored to support appropriate weight gain as early feeding practices and eating habits is directly related to weight gain velocity.

 - 2. Emphasise positive role-modelling in parents and caregivers to guide the development of healthy eating behaviours.**
 - a. Imitation forms a fundamental pillar of infant learning.
 - b. Frequency and variety of exposure will help in increasing vegetable consumption.
 - c. Adequately preparing and providing healthy food positively has a direct impact on a child's later diet, lipid profile and micronutrient status (especially Vitamin D)

 - 3. Attain eating habits that encompass children enjoying a variety of food at appropriate mealtimes while exercising autonomy in settings that are developmentally appropriate.**

4 crucial domain areas (VAST):

 - a. **Variety:** Encouraging food variety
 - b. **Autonomy:** Establishing eating autonomy
 - c. **Setting:** Cultivating distraction-free family mealtimes
 - d. **Timing:** Adapting to daytime eating schedules

 - 4. Ensure a diverse range of age-appropriate textures and flavours to provide an essential balance of nutrition, while emphasising the importance of healthy food preparation.**
 - a. Exclusively breastfeed infants for the first six months of life, and introduce complementary foods when developmentally appropriate, while continuing to breastfeed.
 - b. Between 6 and 12 months, introduce textures progressively into the infant's diet. Start with iron-rich food, preferably green vegetables. Provide early and repeated exposures to a wide variety of vegetables, fruit, carbohydrates, and proteins, without added sugar and salt.
 - c. From 12 months, provide foods that are similar to the rest of the family, focusing on nutrient-dense options.
 - d. In the first two years of life, avoid giving fruit juices and sugar sweetened beverages.

 - 5. Be attentive and responsive to hunger and satiety cues from birth. Encourage autonomy in feeding to nurture positive mealtime experience.**
 - a. From birth, respond to infant's hunger and fullness cues, allowing them to set the pace for feeding.
 - b. From six months, respond to infant's readiness to explore new textures and flavours. Encourage self-feeding and food play, allowing the infant to control the pace and determine the amount of food consumed.
 - c. By 12 to 18 months, involve the child in family mealtimes, using age-appropriate utensils. Encourage liquids from a cup instead of the milk bottle.
 - d. Between 18 and 24 months, build confidence for the child to eat and drink independently, using a fork, spoon, and cup.

 - 6. Establish regular, family-centred mealtimes in a calm and distraction-free environment.**
 - a. From birth, provide a comfortable and soothing environment to promote a secure and nurturing feeding experience.
 - b. From six months, have baby safely seated at a designated dining area while providing solids.
 - c. From 12 months, make mealtimes family-centred to promote social interaction and eating enjoyment with the family.
 - d. Encourage parents and caregivers to interact with infant and child during feeding and eating while avoiding screens and toys.
-

7. Encourage a gradual transition from round-the-clock feeding towards eating in the day as the infant approaches their first year.

- a. In the first six months, observe and respond to the infant's evolving feeding pattern, recognising their natural shift towards longer intervals between feeds, especially at night.
- b. From six months, promote the establishment of feeding during the day, recognizing that some infants may sleep 6 hours through the night, and do not need night feeding.
- c. From 12 to 24 months, maintain a daily routine of 3 meals and 2 snacks, ensuring that meals and milk feeds are synchronised with their waking hours in the daytime.
- d. Keep each meal duration to 30 minutes, and not longer.

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Professor Alex Sia graduated from the Faculty of Medicine, National University of Singapore in 1989. He pursued specialty training in Anaesthesia and Intensive Care Medicine at KK Women's & Children's Hospital (KKH) and Singapore General Hospital, and received his Master of Medicine in Anaesthesia in 1994, and Certificate of Specialist Accreditation in Intensive Care Medicine in 2012. He earned his Master in Business Administration in 2015 from Singapore Management University, under the Ministry of Health Holdings Hospital Administration Scholarship Scheme.

Prof Sia assumed the role of Chief Executive Officer, KKH, on 1 May 2017. Prior to that he was Chairman, Medical Board, KKH, and Senior Associate Dean (KKH Campus), SingHealth Duke-NUS Medical School, Singapore, from 2012-2017. Prof Sia was Director, KK Research Centre, from 2009 to 2013 and Deputy Group Chairman Medical Board of Singapore Health Services Pte Ltd, from 2016-2017.

Prof Sia is Professor, Duke-NUS Medical School, Singapore, and since 2013, Prof Sia has been Clinical Professor, Yong Loo Lin School of Medicine. He is also Adjunct Professor, Engineering Design & Innovation Centre, at the National University of Singapore.

Trained in Anaesthesia and Intensive Care Medicine, Prof Sia is concurrently Senior Consultant in the Department of Women's Anaesthesia, KKH.

Prof Sia's pursuit of advancement in the safety and reliability of patient care includes the development of closed-loop, automated and computer integrated administration of medications. He has been granted three patents by USPTO (United States Patent & Trademark Office) in this area of healthcare development and advancement. He is also involved in research into the pharmacogenomics of pain, particularly in relation to the use of opioids.



Professor Victor Samuel Rajadurai

Prof Samuel is a Senior Consultant in the Department of Neonatology at the KK Women's and Children's Hospital, Singapore. He is a Clinical Professor of Paediatrics at Duke-NUS and also a visiting Professor to Tianjin Central Hospital, China. He has had extensive experience in Neonatology for more than 35 years. Currently, he is the President of the FAOPS Organization, President of the Perinatal Society of Singapore and Chairman of the IPOKRATES Group in Singapore. In the past he has served as President of the College of Paediatrics and Child Health. He was the founding Director of the National Expanded Newborn Screening Programme. Prof Sam's research interests are perinatal asphyxia, PPHN, late preterm infants, chronic lung disease of prematurity, neonatal nutrition, hypoglycaemia, and newborn screening.

Prof Samuel has participated as a collaborator in a number of international multicenter randomized control trials including the OSECT trial, RAST study, UKOS trial, N3RO trial, PROTECT study, OPTIMIST-A trial and the PLUS trial. He is also an IPRAMHO investigator. He has been invited to speak at several national and international conferences and has also conducted Seminars / Workshops in Malaysia, Indonesia, Bangladesh, India, Japan, Cambodia and Myanmar. As a visiting Professor to People's Republic of China, he has been invited to lecture in several cities including Beijing, Shanghai, Guangzhou, Tianjin, Shijiazhuang, Shenzhen, Chengdu and Yinchuan for the past 15 years. His publications include 6 chapters in books, 130 abstracts and over 150 articles in journals.



Professor Tan Kok Hian

Prof Tan Kok Hian is Head, Perinatal Audit & Epidemiology and Senior Consultant, Maternal Fetal Medicine in KK Women's & Children's Hospital, Singapore. Prof Tan has active teaching faculty appointments in 3 medical schools (Duke-NUS as Professor; and both YLL-NUS & LKC-NTU medical schools as Adjunct Professor). He is the Benjamin Henry Sheares Professor in Obstetrics and Gynaecology since 2019. Prof Tan is the Lead for Gestational Diabetes Mellitus (GDM), SingHealth Duke-NUS Diabetes Centre and the Lead Principal Investigator, NMRC Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO). He is President of Perinatal Society of Singapore and Past President of the Obstetrical & Gynaecological Society (OGSS) of Singapore. He is Chairman of the Congress Trust Fund of OGSS.



Prof Tan initiated and led in the implementation of universal GDM screening and also introduced the new IADPSG criteria in KKH and SGH since January 2016. He is the champion of GDM universal screening, which has now been adopted in all hospitals in Singapore with obstetric service. As Chairperson of College of Obstetricians & Gynaecologists, Singapore GDM Committee 2017-2018 and Chairperson, Expert Group GDM Appropriate Care Guide of The Agency for Care Effectiveness (ACE), Ministry of Health 2017-18, he was instrumental in leading GDM management. He facilitated the Asia Oceania Consensus in Gestational Diabetes in January 2018; the Perinatal Society of Singapore guidelines on Optimal Perinatal Nutrition in 2019 and Physical Activity & Exercise in Pregnancy in 2020; and consensus for Optimal Perinatal Nutrition, and Physical Activity & Exercise in Pregnancy for the Asia Pacific region.

He is currently PI for the Integrated Hyperglycaemia Incentivised Postnatal Surveillance Study (IHIPS) which is a RCT on lifestyle and wearable interventions to prevent post-partum diabetes in Asian women with a history of GDM, under Singapore NMRC 2021-2025 LCG grant.

Prof Tan received many awards for his academic & clinical contributions. These included World Health Organization - UAE Health Foundation Prize 2009 as KKH Integrated Perinatal Care Project Team Leader (project made innovative and outstanding efforts in the training & education for perinatal care) and the inaugural Singapore National Outstanding Clinical Quality Activist Award in 2010. He serves as a WHO consultant for Patient Safety and initiated the Global Action for Leaders & Learning Organizations on Patient Safety (GALLOPS) program to support the WHO Global Patient Safety Action Plan 2021-2030. He was awarded the Duke-NUS Golden Apple Generativity Award 2020 for his role in shaping the academic medicine culture in the SingHealth Duke-NUS Academic Medical Centre (AMC) and fostering a culture of learning and mentorship across institutions and professional groups.

Associate Professor Chua Mei Chien

Clinical A/Prof Chua Mei Chien is senior consultant and Head, Department of Neonatology at KK Women's and Children's Hospital. She holds concurrent appointments as Deputy Chairman, Division of Medicine and Academic Vice Chair (Clinical), Paediatric Academy Clinical Programme.

Her special areas of interest include preterm nutrition, breastfeeding and the impact of nutrition on long term health. She has led in numerous clinical programs and clinical trials in these areas.

Notably, she established the first Donor Human Milk Bank in Singapore, in partnership with Temasek Foundation in 2017, which has benefitted thousands of vulnerable sick and preterm babies. She is currently working towards establishing new models of care to stem the tide of metabolic disease in mothers and their children in Singapore, in line with the Healthier SG national agenda.



She has won numerous cluster and national awards for her work in human milk banking, her contributions to the Sale of Infant Foods Ethics Committee Singapore (SIFECS) as well as clinical service excellence.

She is the current President of both the College of Pediatrics and Child Health, Singapore and the Association of Breastfeeding Advocacy (Singapore). She also holds academic appointments with all three local medical schools.

Dr Han Wee Meng

Dr Han Wee Meng is currently the head and senior principal dietitian at the Department of Nutrition & Dietetics, KK Women's and Children's Hospital, Singapore. She has more than 20 years of experience in paediatric nutrition and was recently involved in the development of the Singapore Standards: Guidelines for nutrition and food services for infants and children, launched in 2023.



Dr Ong Chengsi

Dr Ong received her dietetics training from the University of California, Berkeley, and Teachers College, Columbia University, and obtained her PhD from the National University of Singapore. She is currently a Principal Dietitian at KK Women's and Children's Hospital, specializing in the areas of neonatal and pediatric nutrition, and nutritional support.

Her research areas include body composition, breast milk and nutrition in infants and children. She is a co-investigator of the Healthy Early Life Moments Singapore cohort study, and a workgroup member in developing the Singapore Guidelines for Feeding and Eating in Infants and Young Children.



Dr Daniel Chan

Dr Chan is a Consultant Paediatrician in Endocrinology Service, KK Women's and Children's Hospital. He looks after children with diabetes, growth, and other hormonal conditions. His main research interest is on the early life determinants of metabolic health. Currently, he is the principal investigator of a project under HELMS, or Healthy Early Life Moments in Singapore, developing an innovative model of care to optimize healthy diet, habits, and lifestyle within the first 1000 days of a child's life. His work was awarded the KK Women's and Children's Hospital Academic Medicine Start-Up Grant in 2022.



Dr Loy See Ling

Dr Loy is a Principal Investigator from the Department of Reproductive Medicine at KKH, and as an Assistant Professor with Duke-NUS Medical School. She attained her PhD in Human Nutrition, specializing in life course epidemiology and nutritional epidemiology. Till date, she has published nearly 100 papers, with half of them as first or senior author. She has received multiple publication awards and is the reviewer for many international journals. She is actively involved in various research studies, particularly cohort studies related to mother-offspring health. She is one of the core investigators who involves in the conception, design and implementation of the HELMS model-of-care, which is currently on-going at KKH.



Associate Professor Tan Lay Kok

Clinical A/Prof Tan Lay Lok is a senior consultant obstetrician and gynaecologist with a special interest in obstetric medicine and high risk pregnancy. Following his fellowship with Professor Michael de Swiet at Queen Charlotte's Hospital, he has developed several multidisciplinary obstetric services caring for mothers with diabetes, cardiac, rheumatological, hematological, kidney and other medical conditions at the Singapore General Hospital. He has peer reviewed publications and book chapters in these areas, and organizes regular courses and meetings in maternal medicine and peripartum management. He has also been actively involved, either as chair or committee member, in holding international congresses in O&G for the OGSS, including the 2018 RCOG World Congress held in Singapore. He has also a regular invited speaker at both local and regional meetings.



Currently, he is the head of the Maternal Fetal Medicine department at the KK Women's and Children's hospital which oversees almost 12 thousand deliveries annually. He is also actively involved in undergraduate and postgraduate teaching, and is also the Vice Chair of Education for the Singhealth OBGYN Academic Clinical Programme. He has been President of the College of Obstetricians and Gynecologists since 2021, and oversaw the publication of guidelines on the management of COVID-19 in pregnancy and COVID-19 vaccination in pregnancy.

Professor Fabian Yap

Prof Yap is a Senior Consultant Pediatric Endocrinologist at KK Women's and Children's Hospital in Singapore. He is Clinical Professor at the Duke NUS Medical School and a Principal Lead for Pediatrics at the Lee Kong Chian School of Medicine, Nanyang Technological University in Singapore.

He dedicates his time teaching and managing childhood growth and puberty, and studying why metabolic diseases start early in life. He is particularly interested in designing new models of care that links preconception health with pregnancy care and postnatal maternal-child health, so as to prevent non-communicable diseases during the earliest stages of life.



Associate Professor Helen Chen Yu

A/Prof Helen Chen is Senior Consultant Psychiatrist, Department of Psychological Medicine, KK Women's and Children's Hospital and Adjunct Associate Professor, Duke-NUS Graduate Medical School. She is also the Programme Director of the Postnatal Depression Intervention Programme, a mainstreamed MOH-funded project that targets screening and early intervention for Postnatal Depression amongst a cohort of recently delivered women. She completed her training in the area of perinatal psychiatry and women's mental health in UK at the Queen's Medical Centre, University of Nottingham, and has many years of clinical and experience working with women suffering from mental health difficulties related to childbearing. Her academic and research expertise has been related to emotional and psychological health issues in women, particularly in the context of motherhood.



Professor Teoh Tiong Ghee

Prof Teoh has more than 25 years as a consultant obstetrician and gynaecologist at Imperial College Healthcare and now at KK Women's and Children's Hospital. He is a subspecialist in Maternal and Fetal Medicine and his main area of interest is in academic and clinical preterm pregnancy prevention. He has trained and worked in Dublin, Oxford, Toronto, London and now Singapore.



Dr Elaine Quah Phaik Ling

Dr Quah is an Assistant Professor with Duke-NUS Medical School and a Senior Research Fellow at the Division of Obstetrics and Gynaecology at KK Women's and Children's Hospital (KKH). During her six-year tenure with the A*STAR Growing Up in Singapore Towards Healthy Outcomes (GUSTO) team, her research endeavors have been focused on the life-course approach to nutrition and the impact of behavioral nutrition on child health.

Her current role at KKH focuses on advancing maternal and child metabolic health where her research has transitioned from purely epidemiological pursuits to encompassing lifestyle interventions aimed at bolstering maternal and child metabolic health.

Her professional accomplishments are reflected in a substantial body of work that comprises 39 internationally peer-reviewed publications. She has played a pivotal role in various multidisciplinary committee workgroups led by KKH, including being a key member of the teams responsible for shaping the Singapore Integrated 24-Hour Activity Guidelines for Children and Adolescents (2020-2021) as well as the Singapore Integrated 24-Hour Activity Guidelines for Early Childhood (2022).



Professor Cheah Fook Choe

Prof Cheah is currently the Professor of Paediatrics (Neonatology) and senior consultant neonatologist at the National University of Malaysia [Universiti Kebangsaan Malaysia (UKM)] Medical Centre in Kuala Lumpur. He has been the consultant at the Neonatal Intensive Care Unit (NICU) of UKM, for more than 10 years, and was the Head of the unit from 2009-2014, before a research sabbatical in the USA and New Zealand. Prof. Cheah completed specialty training in general paediatrics in 1997 and was awarded the Masters in Medicine (Paediatrics) by the UKM. During this period, he also obtained professional qualifying diplomas in paediatrics from the Royal Colleges of Physicians of UK and Ireland. His neonatology subspecialty training commenced in 1997 in the Mater Mothers' Hospital in Brisbane, Australia and subsequently in the Maternity Hospital Kuala Lumpur, Malaysia. From 2000-2003, he was the Neonatal Fellow in the Christchurch Women's Hospital, New Zealand, where he pursued his PhD studies and neonatal paediatrics fellowship training, mentored by Profs Christine Winterbourn and Brian Darlow, successfully culminating in PhD (Otago) and the FRACP in 2003. He received further postdoctoral research experience as a visiting scientist, mentored by Professor Alan Jobe and Professor Suhas Kallapur at the Cincinnati Children's Hospital Medical Center, USA between 2006 and 2008. Prof Cheah is an active researcher with various clinical and translational research grants, including collaborative trials with international centres and have published more than 70 papers that are well-cited. He is also an accredited trainer in neonatology in



Malaysia and the Programme Director for Neonatology sub-Specialty training for UKM. He is examiner for the Royal College of Paediatrics and Child Health, UK and the Malaysian Conjoined Board Examinations in the Paediatric Specialty. Prof. Cheah is a fellow of both the Academy of Science, as well as Academy of Medicine of Malaysia, and Vice-President of the College of Paediatrics, Academy of Medicine of Malaysia, member of various bodies and societies in perinatal-neonatal medicine, and also in the editorial board of two high-impact journals (Neonatology and Frontiers in Pediatrics, neonatology section). His academic contributions include published books and book chapters such as "Lung Disease of the Preterm Infant and Effects of Intrauterine Infection- Malay version, 2015; English version 2018" ,"Feeding the Preterm Infant – a Practical Handbook-2017", "Nutritional Care of Preterm Infants – 2nd Edition, 2021", and the latest, "Evidence-based Clinical Practice in Feeding the Preterm Infant, 2022".

Associate Professor Azanna Ahmad Kamar

A/Prof Azanna Ahmad Kamar is an Associate Professor and Consultant Neonatologist at the Faculty of Medicine, University of Malaya (UM), Kuala Lumpur, Malaysia. A UM MBBS graduate herself, she further trained in Paediatrics at the Paediatric Institute, Hospital Kuala Lumpur, and in the Republic of Ireland, where she worked at the Rotunda Hospital, Our Lady's Hospital for Sick Children Crumlin, and the Coombe Women and Infants' University Hospital. She is currently the head of the Neonatal Intensive Care Unit (NICU) of the University of Malaya Medical Centre (UMMC).

Her deep interest in paediatric bioethics led her to complete her certification in Paediatric Bioethics from Children's Mercy Hospital, University of Missouri, Kansas City, USA in 2016. Besides teaching paediatrics, she also teaches the Special Population course of the Masters of Health in Research Ethics (MOHRE) programme, with interests in neonatal end-of-life issues, the impact of medical innovations, technology dependence, shared-decisions, and sociocultural influences in decision-making. She is also a keen advocate of quality improvement initiatives and has research interests in infection control, innovative neonatal engineering, neonatal ventilation, neonatal transport, resource allocation and infant nutrition.

She is the past President of the Perinatal Society of Malaysia (Council 2016/2017), member of the Malaysian Bioethics Community (MBC) and Clinical Ethics Malaysia (CEM), team member of the South East Asia Early Nutrition Academy (ENEA-SEA) e-learning infant nutrition platform under EU-Erasmus e-learning collaboration; the head of the Research and Publications committee of the Federation of Asia-Oceania Perinatal Societies (FAOPS), steering committee member of the Malaysian National Neonatal Registry (MNNR), scientific chairperson of the FAOPS 2022 congress, a champion of the Malaysian Prematurity Awareness Programme, past Organising/Scientific Chair of the Kuala Lumpur International Neonatology Conference (KLINC) and member of the Lancet Child Health Commission on the Future of Neonatology advisory group.

Research Interests:

Neonatal critical care; Paediatric bioethics; Newborn growth, health & nutrition; Infection Control; Medical technology & innovations; Perinatal palliative care; Quality Improvement Initiatives.



Professor Ashma Rana

Prof Ashma, MBBS (Sambalpur-Odisha- India), DGO (TU -KTM), MD (PGIMER – Chandigarh India) & FICS (Chicago 1998), Honorary Fellow Indian Academy of ObGyn (FIAOG) 2016; Obstetrician & Gynaecologist (retired) after 35 years of dedicated service as former Unit Chief, Head of Dept OBGYN, Tribhuvan University Teaching Hospital (TUTH), Institute of Medicine – (IOM), Kathmandu, Nepal.

She is the recipient of President Prize Award in 51st Annual Congress of JSOG. April 10-13 1999; International Session Prize in 52nd Annual Congress of JSOG (April. 1-4 2000) and Women in Medicine awarded by Nepal Medical Association (NMA) -2022. She has been associated with various National/International Organizations as President. Perinatal Soc Nepal (2021), Past President, South Asian Federation of Obstetrics and Gynaecology [(SAFOG) - (March 2015-17)], Nepal Soc of OBGYN [(NESOG), April 2011-13].

Interest in Medical Journalism: Editorial Board Member-Journal Nepal Medical Association (1997-1999), Journal of Institute of Medicine – JIOM (16th Aug 2005- 2013), Corresponding Editor Journal Obst Gyn Research - JOGR (June 2007 ~ 2013), Journal of South Asian federation of Obstetrics and Gynecology - JSAFOG [2009-2017] and Founder Editor- Nepal Journal Ob/Gyn (NJOG): Aug 2005-2011 and Journal Perinatal Society Nepal (2022)

Nominated as Member Academic council, Tribhuvan University, TU (2004-2006), Member Academic Council, Patan Academy of Health Science - PAHS (Dec 28th 2009-2011). She is involved as Member Postgraduate Medical Education Comm- PGMEC (April 1997 -1999); Preceptor MD Ob/Gyn, jointly found by IOM + National Academy for Medical Sciences – NAMS (2001 – 2004); Supervisor in Fellowship of College of Physicians & Surgeons (FCPS) Pakistan (2003 - 2015), Coordinator MD Post Graduate Prog, IOM + NAMS (April 2005 - Dec 2006) and Coordinator MD Obst Gynae NAMS Institute of Med (IOM) Maharajganj (May 2005)

Responsibilities in teaching learning / training field corroborating research projects were as principal researcher /coordinator in “The FIGO Leadership in Obstetrics and Gynecology for Impact and Change (LOGIC) Initiative in Maternal and Newborn Health FIGO LOGIC-NESOG (Nepal Society of Obstetricians and Gynaecologists) based at the community level research studies & activity – Dhankuta-Nepal April 2011-13.

Her future focus will be in promoting breast feeding through Pregnancy and birth utilizing TOT (Trainers of Training) on Baby friendly Hospital Initiative (BFHI) received on Dec, 20-22 1998. Also enthused to work on Kangaroo Mother Care, after having been exposed to two days’ workshop on 2nd Regional KMC Congress Ahmedabad Nov 30th - Dec 1 2023 as participant.



Associate Professor Jin Soo Moon

A/Prof Jin Soo Moon is a pediatric gastroenterologist and performs upper and lower GI endoscopy for children in Seoul National University Children’s Hospital since 2012. Before 2012, he worked as an associate professor of Pediatrics, Inje University College of Medicine. Currently his clinical services encompass foreign body removal, PEG, polypectomy, EVL, and so on. He is also a consultant expert in clinical and public pediatric nutrition for the Korea government. His unit has one of the largest cohorts of childhood IBD and short bowel syndrome (SBS) in Korea and provides several programs for Crohn and the other colitis and SBS. Recently along with the incremental trend of home parenteral nutrition for pediatric SBS in Korea, he is very excited to research about improving quality of home PN.

Research interests: He is interested in genetic diagnosis of intestinal rare disorders, including very-early-onset IBD and have an academic concern about the development of social support for the intestinal failure in children. He has been also involved in the development of health policy for Korean children since 2005. Biomarkers of children’s growth and early indicators of complications in obesity are also in his research portfolio.



Dr Rathmony Heng

Dr Rathmony is a pediatrician/Neonatologist at NICU, Calmette hospital. She is also a Fellow in Neonatal/Pediatric cardiology, and her special area of interest is Screening for congenital heart diseases and its management along with prevention of rheumatic valvular acquired heart disease in children. Her new interest is PPHN in newborn and premature babies and also in preterm nutrition. She is also a fellow of ASEAN Federation of Cardiology since 2021. She is Lecturer at University of Health Sciences with BLS, PALS certificate in 2020 & DCH diploma, IPPC, 2017

She studied at University of Health Sciences, Phnom Penh. She obtained her Bachelor degree of Medical Sciences in 2005 and achieved her specialized doctor diploma in pediatric in 2010. Later she achieved postgraduate inter-university diploma in congenital heart diseases and pediatric cardiology in Marseille, France, 2011.



Dr Nargis Ara Begum

Dr Begum, FCPS (Paed), MD (Neonatology), is a senior consultant of Department of Neonatology in United Hospital, Dhaka. She was graduated from Dhaka Medical College (DMC) in 1987, completed fellowship in Pediatrics (FCPS) in 1998, and did her MD in Neonatology in 2004. Subsequently, joined in the neonatology department of NUH, Singapore as Clinical Fellow from 2005-2006. She worked as Clinical Associate in the department of Neonatology in KKH from 2006-2008. Then started her independent neonatology career in Bangladesh as a Consultant Neonatologist in United Hospital Dhaka from end of 2008 and directly involved in setting up NICU there. Dr. Nargis is working now in the same hospital as a Senior Consultant. She has numerous research works in the field of neonatology and did publication of 26 articles (national & international). She is a member of Bangladesh Pediatric Association, Bangladesh Neonatal Forum, and Bangladesh Perinatal Society. She has presented at national and international conferences. She has a strong commitment to exclusive breastfeeding of the newborn. Her professional and research interest include breast feeding, persistent pulmonary hypertension of newborn.



Professor Sunil Raja Manandhar

Prof Sunil is currently working as Professor and Head of the Neonatal Unit and Head of the Department of Pediatrics, Kathmandu Medical College Teaching Hospital (KMCTH), Kathmandu, Nepal. He is also Senior Chief Consultant Neonatologist of Pediatrics Department of KMCTH and Head of neonatal unit (40 beds providing level III and Level IV tertiary neonatal care) over the last 15 years. He is a Preceptor of the Doctor of Medicine (DM) in Neonatology for three years, and Preceptor of MD Pediatrics for an 8-year period under Kathmandu University. Currently, there are six post-graduate MD Pediatrics and two DM Neonatology residents pursuing their Level III and Level IV neonatal care training under his guidance. His daily clinical work is centered in the NICU managing newborns requiring Level III and Level IV neonatal care like mechanical Ventilation along with high frequency oscillatory ventilation, CPAP (bubble and nasopharyngeal), bedside neonatal echocardiography, double volume exchange transfusion, surfactant replacement therapy, partial exchange, neonatal resuscitation. He also spearheaded a program geared towards diagnosis and management of congenital heart disease using point-of-care echocardiography. He is managing premature babies with Inj. Paracetamol therapy for medically closing Patent ductus arteriosus (PDA) over the last 3 years and managing Atrial septal defect (ASD), ventricular septal defect (VSD), PDA (Patent ductus arteriosus) and neonatal Pulmonary Hypertension by giving inj. Milirinone. He provides level III and IV care to



reduce neonatal mortality of our country (Nepal's latest NMR is 21/1000 live birth and KMCTH NMR is 10/1000 live births).

He has been involved in maternal and neonatal health research activities for the last 10 years through MIRA (Mother and Infant Research Activities), which is an NGO working in maternal and perinatal health. MIRA has successfully completed several studies to identify important causes of perinatal and neonatal health problems in Nepal, including perinatal nutrition, birth asphyxia, multiple micronutrient supplementation in pregnant women and its effects on the mothers and the newborn babies. Most of these studies have been randomized controlled trials. Currently he is working as a senior Vice President of Perinatal Society Nepal (PESON). HE has also participated in various research activities concentrated on newborn health, and has presented several papers in various national and international conferences and published various articles in peer-reviewed national and international journals.

Dr Ming-Chou Chiang

Dr Chiang is a highly experienced neonatologist who currently holds multiple roles at Chang Gung Memorial Hospital in Taiwan. He serves as the Director of the Division of Neonatology, a consultant physician in the Division of Respiratory Therapy, and the Vice Chairman of the Committee of ICU Management. Additionally, he holds the position of Associate Professor of Pediatrics at Chang Gung University.

Dr Chiang's educational background includes a Bachelor of Medicine degree from China Medical University in Taiwan. He further pursued his post-doctoral research as a Research Fellow at Drexel University College of Medicine in the United States.

Dr Chiang's research interests primarily focus on the investigation of mechanisms underlying neonatal hypoxic ischemic encephalopathy (HIE) and exploring neuroprotection and therapeutic hypothermia as potential treatments. He is also dedicated to improving respiratory care and nutritional management for preterm infants and enhancing the quality of care and outcomes for this vulnerable population.

In addition to his clinical and research responsibilities, Dr Chiang holds significant leadership positions within the field of neonatology. He currently serves as the Director of the Taiwan Society of Neonatology (TSN) and Chairman of the Education and Academic Committee of TSN. He also actively contributes to various organizations as a committee member or consultant physician, while also serving as editorial board members such as *Frontier in Pediatrics*, *Pediatrics & Neonatology* as well as reviewers for numerous journals. Dr Chiang has published a substantial number of research papers throughout his career.



Dr Rinawati Rohsiswatmo

Dr Rinawati achieved her title as Professor of Pediatrics (Neonatology) from Faculty of Medicine University of Indonesia in 2020. She is a Neonatologist, a lecturer and currently holds the position of Head of Maternal and Child Health Center KIARA, Department Faculty of Medicine in University of Indonesia, Cipto Mangunkusumo General Hospital. She also has been serving as a Peer Reviewer for *Medical Journal of Indonesia*, *Sari Pediatri Indonesia*, *Frontiers Pediatrics* and *British Medical Journal*.



Professor Gerelmaa Zagd

Prof Zagd is a pediatrician and neonatologist in the Mongolia for over 39 years. She graduated from Saint Petersburg State Paediatric Medical University, Russia (1984), and did her neonatal training at Medical Academy of Sofia, Bulgaria (1989). She is currently a consultant neonatologist at the Central University Hospital of Mongolian National University of Medical Science, consultant neonatologist in Children's Hospital of the State Research Center on Maternal and Child Health, consultant neonatologist in Urguu Maternity Hospital, Ulaanbaatar, Mongolia. Also a retired Professor of Pediatrics at the Mongolian National University of Medical Science. She supervised the neonatal training for 108 pediatricians. She continues to focus her efforts on clinical training and education of pediatric residents, doctors, nurses and midwives in the field of newborn care.

She has published 53 books, handouts and book chapters; translated 4 books; edited 12 books; 59 original articles and 91 abstracts.

Now she is a President of the Mongolian Perinatal Association, which she founded in 2001; Board member of the Mongolian Pediatric Academy; Board member of the Mongolian Newborn Screening Association; Member and Country representative of the FAOPS, Member and Country representative of Asia and Oceania KMC Network.



Dr Wai Lin Tun

Dr Wai Lin Tun has obtained basic medical degree (MBBS) and Master of Medical Science (Pediatrics) in Myanmar and achieved MRCPCH (UK) in 2016. He has working experience for 2 and a half year in NICU, KK Women's and Children Hospital, Singapore. He founded 27-bedded NICU in 550-bedded Children Hospital, Mandalay. Dr Wai Lin Tun is currently working as head of NICU, 550-bedded Children Hospital, Mandalay.



Dr Ranjan Pejaver

Dr Ranjan Kumar Pejaver is a renowned pediatrician. After graduating with an MBBS degree from St. John's Medical College, Bengaluru, Karnataka in India, he became a member of the Royal College of Physicians, United Kingdom. Currently, Prof Ranjan is a Professor & Chief of Neonatology at People Tree @ Meenakshi Hospitals, Bangalore. He is a Fellow of the Royal College of Paediatrics and Child Health, United Kingdom; a member of Educational Committee of the World Association of Perinatal Medicine; and a former president of Federation of Asia Oceania Perinatal Societies (FAOPS). He is currently the advisor for FAOPS. He is Convenor of the Neonatology Chapter of Indian Academy of Pediatrics (IAP) and the president for National Neonatology Forum of India in 2021. Prof Ranjan is the editor in chief for Perinatology – Journal of Perinatal and Neonatal Care. Prof Ranjan is also the founder and editor of the journal, Nursing Digest.



Dr Jose B. Salazar

Jose B. Salazar, MD is a Professor IV of Pediatrics at the UERM Memorial Medical Center, Philippines, where he was the former Head of the Department of Pediatrics and currently the Head of the Neonatal Intensive Care Unit. Professor Salazar is also a Medical Specialist at the National Children's Hospital and Rizal Medical Center. He has authored research on neonatology and is one of the editors of the handbook on "Standards of Newborn Care" for the Philippine Society of Newborn Medicine.

Prof Salazar presently sits as a Board Member of The Philippine Pediatrics Society, Inc and a past president of the Philippine Society of Newborn Medicine (PSNBm) and the Perinatal Society of the Philippines (PAP). He is the current Deputy Secretary, Eastern Region of the Federation of Asia Oceania Perinatal Societies (FAOPS).



SPEAKER ABSTRACTS

Asia Pacific Maternal & Child Health Conference & IPRAMHO International Meeting 2024

IPRAMHO Initiatives for Maternal & Child Health

Prof Tan Kok Hian

Lead, IPRAMHO, Singapore

Senior Consultant & Head Perinatal Audit & Epidemiology, KKH

Vice President, Perinatal Society of Singapore

Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO) is a research platform to develop a seamless integrated model of care through optimal translation, implementation and evaluation of effective population prevention strategies. It evolved from the original Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children. IPRAMHO started as a Singapore National Medical Research Council (NMRC) funded joint collaborative centre grant awarded to KK Women's and Children's Hospital (KKH), SingHealth Polyclinics (SHP) & National Healthcare Group Polyclinics (NHGP). This is a unique collaborative centre grant where both Singapore public primary health care providers (SHP & NGHP) have come together to work with KKH, the largest tertiary and main referral center for Paediatrics, Obstetrics and Gynaecology in Singapore, on collaborative health research in women and children, aligning with national goals. IPRAMHO have worked on metabolic health and mental health for women and children.

Besides seeding grants to generate pilot data and nurturing healthcare research and implementation science professionals, IPRAMHO has been leading in building consensus for Singapore to improve health of mothers and children. Six local guidelines initiated by IPRAMHO on GDM; Perinatal Nutrition; Physical Activity & Exercise in Pregnancy; 24-Hour Activity for Early and Late Childhood and Perinatal Mental Health are available:

1. Guidelines for the Management of Gestational Diabetes Mellitus. Tan KH, Tan T, Chi C, Thian S, Tan LK, Yong TT. College of Obstetricians and Gynaecologists, Singapore. Singapore Journal of Obstetrics & Gynaecology. 2018; 49(1):9-13
2. Guidelines for Optimal Perinatal Nutrition. Chua MC, Tan T, Han WM, Chong MFF, Ang SB, Rajadurai VS, Khin LW Chi C, Lee J, Tan KH. Perinatal Society of Singapore. Singapore Journal of Obstetrics & Gynaecology. 2019; 50(1):10-12
3. Guidelines on Physical Activity & Exercise in Pregnancy. Lee R, Thain S, Tan KH, Ang SB, Tan EL, Tan B, Aleste MN, Lim, I Tan LK. Perinatal Society of Singapore. Singapore Journal of Obstetrics & Gynaecology. 2020; 51(1):9-16
4. The Singapore Integrated 24-Hour Activity Guidelines for Children & Adolescents (7-18 Years). College of Paediatrics & Child Health of Academy of Medicine Singapore, January 2021. Integrated 24-Hour Activity Guidelines for Children and Adolescents Study Group. Ann Acad Med Singap. 2022 May;51(5):292-299. doi: 10.47102/annals-acadmedsg.202141.
5. The Singapore Integrated 24-Hour Activity Guidelines for Early Childhood (Infants, Toddlers and Preschoolers). College of Paediatrics & Child Health of Academy of Medicine Singapore, January 2022. Ann Acad Med Singap 2023;52:310-20 <https://doi.org/10.47102/annals-acadmedsg.2022315>
6. Perinatal Mental Health Guidelines on Depression and Anxiety Group. College of Paediatrics & Child Health of Academy of Medicine Singapore, February 2023. Consensus statement on Singapore Perinatal Mental Health Guidelines on Depression and Anxiety. Ann Acad Med Singap 2023;52:467-75 <https://doi.org/10.47102/annals-acadmedsg.2023148>

In addition, the IPRAMHO was involved in 6 Asia Pacific consensus statements correspondingly, of which 5 have been published:

1. Asia & Oceania Federation of Obstetrics and Gynaecology, Maternal Fetal Medicine Committee's consensus statements on screening for hyperglycemia in pregnancy. Tan TYT; Hyperglycemia in Pregnancy Consensus Working Group, Ounjai Kor-anantakul. J Obstet Gynaecol Res. 2018 Nov;44(11):2023-2024. doi: 10.1111/jog.13813. Epub 2018 Sep 19. PMID: 30230130.
2. An Asia Pacific Consensus on Perinatal Nutrition and Breastfeeding. Tan KH, Tan TYT, Chua MC, Kor-Anantakul O, IPRAMHO Study Group. Ann Nutr Metab. 2019;75(1):86-87. doi: 10.1159/000501192. Epub 2019 Jun 25. PMID: 31238321.
3. Asia-Pacific consensus on physical activity and exercise in pregnancy and the postpartum period. Lee R, Thain S, Tan LK, Teo T, Tan KH; IPRAMHO Exercise in Pregnancy Committee. BMJ Open Sport Exerc Med. 2021 May 17;7(2):e000967. doi: 10.1136/bmjsem-2020-000967. PMID: 34055384; PMCID: PMC8130752.

4. Asia-Pacific Consensus Statement on Integrated 24-hour Activity Guidelines for Children and Adolescents. Loo BKG, Okely AD, Pulungan A, Jalaludin MY; Asia-Pacific 24-Hour Activity Guidelines for Children and Adolescents Committee. Br J Sports Med. 2021 Nov 8;bjssports-2021-104527. doi: 10.1136/bjssports-2021-104527. Epub ahead of print. PMID: 34750119.
5. Asia-Pacific Consensus Statement on Integrated 24-Hour Activity Guidelines for Early Childhood. Asia-Pacific 24-Hour Activity Guidelines for Early Childhood Committee. The Lancet Regional Health - Western Pacific, 2022. 100641, ISSN 2666-6065, <https://doi.org/10.1016/j.lanwpc.2022.100641>.
6. Asia-Pacific Consensus Statement on Perinatal Mental Health (Depression and Anxiety) Feb 2023

There has been interest on population mental health. A recent IPRAMHO survey in 2023/4 was conducted. Integrated Variety Autonomy Setting Timing feeding practices in infants and toddlers' survey study (I-VAST) examined the Singapore infant and toddler feeding and weaning habits. Findings from I-VAST study showed sub-optimal child eating behaviours and caregiver feeding practices and that Guidelines for Feeding and Weaning in Infants and Young Children in the Singapore population is important.

Singapore Guidelines for Feeding and Eating in Infants and Young Children under the auspices of College of Paediatrics and Child Health, Singapore, is indeed apt and well positioned to tackle the challenges of sub-optimal child eating behaviours and caregiver feeding practices in Singapore. The College of Paediatrics and Child Health, Singapore & IPRAMHO workgroup committee was timely convened and ably chaired by Chua Mei Chien. The dissemination, ownership & implementation of these guidelines can improve and make a positive impact on metabolic health for our population, enhancing and optimise the potential of every child born in Singapore and our region.

College Paediatrics and Child Health Singapore Initiatives for Child Health

A/Prof Chua Mei Chien

President of the College of Paediatrics and Child Health, Singapore

Suboptimal eating habits are detrimental. It is evident from a study published in 2016 from the GUSTO cohort that local infant feeding practices are far from ideal. Close to half of infants at age 9 months already had seasonings added to their foods and a third had sweetened beverages fed to them via a bottle. At age 12 months, 32.7% of infants were given blended food, while a third of them had food items added into their bottles.

In Singapore, poor dietary habits with excessive intake of calories have led to the rising incidence of childhood obesity. From 2017 to 2021, the proportion of students who are overweight (BMI-for- age at or above the 90th percentile) in schools had increased from 13% to 16%. This is a cause for concern as overweight and obesity children tend to become overweight adults who are at increased risks of cardiovascular disease, hypertension, hypercholesterolemia, and stroke.

On the flipside, poor caloric and nutrient intake can cause faltering growth. The prevalence of children in kindergarten who are underweight or severely underweight stands at 7.6% in 2017, based on Health Promotion Board's School Health Services. This is ironic in a nation where food is widely and easily available.

These observations point towards the importance of establishing healthy eating habits from an early age. This is crucial and contributes to the laying of a strong foundation for long-term health and wellbeing. The focus of feeding practices for infants and young children should be on fostering healthy eating behaviours and habits for optimal growth.

To support our nation's Healthier SG agenda to improve population health, the College of Paediatrics and Child Health (CPCHS) CPCHS is delighted to lead in efforts to produce the Singapore Guidelines for Feeding and Eating in Infants and Young Children, in partner with IPRAMHO and Healthy Early Life Moments in Singapore (HELMS). This set of guidelines and consensus statements have been carefully crafted based on current evidence and endorsed by local professional bodies and partners providing care to young children. It serves to complement the Consensus Statement on Singapore Integrated 24-hour Activity Guidelines for Early Childhood launched in 2022 by the college and IPRAMHO.

We look forward to working closely with the community of paediatricians, family physicians, other healthcare related personnel and families to use these guidelines in daily practice with the aim of improving the health of our children in Singapore. This is certainly an important step in our nation's war against malnutrition, obesity, and diabetes and of paramount importance in Healthier SG.

Singapore Guidelines for Feeding and Eating in Infants and Young Children

A/Prof Chua Mei Chien

Chairperson, Singapore Guidelines for Feeding and Eating in Infants and Young Children Workgroup

Early childhood feeding is complex. Currently, there is a lack of local detailed guidance on feeding and eating which focus on habit formation. This is the gap we hope to address.

The Singapore Guidelines for Feeding and Eating in Infants and Young Children consists of a set of 7 over-arching guidelines, of which 3 are general and 4 are domain specific. These were crafted after evaluation of existing infants and young child feeding and nutrition guidelines, systematic reviews and journal publications from the last 10 years. We also took into consideration the findings from a Singapore caregiver feeding practices and children eating behaviours survey conducted in October to November 2023.

The four domains in the guidelines include variety(V), autonomy (A), setting (S) and timing (T). We hope to inculcate in young children a positive attitude towards food, reduce food fussiness and food neophobia through exposure to a wide variety of foods of different textures and flavours (V). We advocate for parental responsiveness to the child's appetite to enhance self-regulation and healthier eating in the child (A). Mealtimes should be distraction-free and family-centred to promote food enjoyment and reduce fussy and emotional eating (S). To prevent excessive calorie intake, food intake should be in the day as much as possible (T).

Within this set of guidelines, there is an emphasize on positive role-modelling in caregivers as essential pillars to guide the development of healthy eating behaviours. There is also a shift in caregiver to child feeding responsibilities and focus on the achievement of specific feeding goals and milestones. When properly followed, there will be a positive progression from a child who is being fed to one who can eat independently with appropriate supervision, contributing to the achievement of optimal growth and better long-term health outcomes.

SYMPOSIUM I – VAST – THE PRINCIPLES OF FEEDING AND EATING FOR INFANTS AND YOUNG CHILDREN

Key components towards forming a healthy eating habits in infants and young children:

Food variety

Dr Ong Chengsi

Principal Dietician, KK Women's and Children's Hospital, Singapore

Key components towards forming a healthy eating habits in infants and young children:

Eating autonomy and setting

Dr Daniel Chan

Consultant Paediatrician, Endocrinology Service, KK Women's and Children's Hospital, Singapore

Key components towards forming a healthy eating habits in infants and young children:

Food timing

Dr Loy See Ling

Principal Investigator, Department of Reproductive Medicine, KK Women's and Children's Hospital, Singapore

Nutrition during the first two years of a child's life not only shapes subsequent dietary preferences but also exerts profound effects on long-term metabolic health and neurodevelopment. Optimizing nutrition during this critical period involves a multifaceted approach, assimilating various factors such as nutrient requirements, food variety, caregiver-child interaction, and environmental influences. For the Singaporean context, we have formulated a comprehensive set of recommendations directed towards parents and caregivers, with the overarching goal of fostering healthy feeding practices and promoting positive eating behaviours in infants and young children. Our guidelines centre around four key domains, collectively abbreviated as VAST: Variety, Autonomy, Setting, and Timing. VAST was developed through an extensive process, combining insights from a thorough

systematic literature review, evidence gleaned from local studies, and domain experts input. This foundation ensures that the recommendations are not only rooted in global scientific understanding but also tailored to the specific needs and nuances of the Singaporean population. Variety (V) focuses on ensuring a broad and balanced food repertoire during the initial two years of life. This initiative aims to instil a positive attitude towards food while ensuring appropriate nutrients for health, mitigating common issues such as food fussiness and neophobia that tend to peak between the ages of 2 and 6 years. Autonomy (A) emphasizes the promotion of self-regulation in the child and responsive feeding of the caregiver, with the ultimate objective of achieving independent eating by 1-2 years of age. Setting (S) is dedicated to creating an optimal eating environment, characterized by minimal distractions, and establishing a family-centred mealtime. This is designed to enhance the overall enjoyment of food and reinforce positive eating behaviours. Timing (T) addresses the transition from round-the-clock feeding to predominantly daytime eating as infants approach their first year. This physiologic shift aims to align biological clock rhythms in metabolic regulation while preventing excessive calorie intake. Further details about the rationale and supporting evidence of VAST framework will be discussed. VAST encompasses a diverse range of considerations to ensure the holistic development and well-being of infants and young children.

SYMPOSIUM II – OPTIMISING PERICONCEPTION AND PERINATAL PHASE FOR LIFE COURSE

Transforming Maternity & Perinatal Care: A Century of Progress and Life Course Perspectives

Prof Tan Kok Hian

Head and Senior Consultant, Perinatal Audit & Epidemiology, KK Women's and Children's Hospital, Singapore

For a century, KK Women's & Children Hospital has been at the forefront of maternity care in Singapore, delivering over 1.6 million babies since 1924. During this time, the maternal mortality rate in Singapore has plummeted from 750 per 100,000 births in 1932 to less than 10 per 100,000 births today. Advances in medical treatments, including antibiotics, blood transfusions, and improved obstetric care, have led to a significant reduction in deaths from hemorrhage and infections such as septic abortions. Instead, maternal mortality is now largely driven by conditions like pulmonary embolism, cardiac diseases, and other medical issues, with suicide emerging as a notable contributor.

Similarly, perinatal mortality rates have seen remarkable declines, dropping from 35.4 per 1000 births in the 1950s to less than 5.0 per 1000 births in the 1990s. As infections and perinatal asphyxia have been better controlled through enhanced healthcare, the primary causes of perinatal deaths have shifted to congenital anomalies, prematurity, perinatal asphyxia, and infection.

Optimal antenatal care plays a pivotal role in preventing maternal deaths, stillbirths, and perinatal deaths. Looking ahead to the next century of care, preventing and managing congenital anomalies and prematurity are focal points for future healthcare efforts. Two other critical areas that demand our attention are metabolic and mental health within the realm of maternal wellness.

There is a growing interest in adopting a life course approach to women's health within the field of maternity care. To improve population health, it is essential to invest in trans-generational maternal health and implement effective life course perinatal interventions, programs, and initiatives both in Singapore and globally. This momentum should be embraced and accelerated by all stakeholders in maternal care.

The Developmental Origins of Health and Disease (DOHaD) hypothesis, also known as the 'Fetal Origins of Adult Disease,' suggests that exposure to environmental influences during critical stages of development can have profound implications for an individual's short- and long-term health. Fetal adaptation to adverse uterine environments can affect survival and susceptibility to chronic diseases later in life. In addition, managing medical or obstetric conditions during and after pregnancy is crucial for lifelong well-being, benefiting both women and their families.

To embark on the next century of maternity care, we must focus on four key areas:

Preventing Preterm Pregnancy

Enhancing Maternal Medicine

Implementing Perinatal Life Course for Improved Population Health Addressing Perinatal Mental Health

As leaders and champions in maternity care, it is our responsibility to develop an optimal strategy to bolster maternity care in these key areas and encourage our faculty and staff to embrace change and tackle the maternity and perinatal challenges that lie ahead.

Life Course Trajectories of Obstetric Medical Diseases

A/Prof Tan Lay Kok

President of the College of Obstetricians & Gynaecologists Singapore

Obstetrical medical diseases such as preeclampsia and gestational diabetes are often thought to arise only during pregnancy and resolve with the delivery of the baby. There is now convincing evidence that these conditions have long lasting impacts well beyond the duration of the pregnancy, influencing the risk of the development of chronic disease later on in the woman's life.

Pregnancy brings out physiological changes in the woman to meet the demands of the growing fetus. These physiological changes serve as a maternal stress test, which in turn predicts the health of the woman in later life. The physiological changes of pregnancy produce a proatherogenic metabolic syndrome which is predisposed to endothelial dysfunction. Seen from this point of view, the manifestation of obstetric medical diseases like preeclampsia and gestational diabetes should be seen as the unmasking of subclinical disease during pregnancy, which then heralds the possibility of disease returning not only in future pregnancies, but also in later life after completing the family.

Hence pre-eclampsia occurring in pregnancy increases the likelihood of recurrent pre-eclampsia, but also for chronic hypertension, chronic renal disease and cardiovascular disease. Gestational diabetes has a similar pattern with increased risk for type 2 diabetes mellitus developing later in life. There are other obstetric conditions which can reveal a vulnerability to long term medical conditions, including cancer.

This has implications on the development of health care systems to improved women's health outcomes. No longer should obstetrical conditions be the sole domain of obstetricians, who, while they may provide pre-pregnancy advice and counseling for future pregnancies, would not normally be looking after the woman outside pregnancy. The importance of taking an obstetric history by any health care worker looking after women is therefore of great importance. The ongoing Healthy SG and population health initiatives are therefore excellent opportunities to redress this vital gap in providing a seamless continuity of care for women whose vulnerabilities to developing chronic disease have been unveiled during pregnancy.

Life Course Healthy Start: The HELMS Program in KKH

Prof Fabian Yap

Senior Consultant, Paediatric Endocrinology, KK Women's and Children's Hospital, Singapore

The formation of human life from pre-conception to early postnatal life is particularly sensitive to developmental disruption by nutritional factors and/or environmental exposures, that may lead to harmful consequences to health later in life. Contemporary disorders whose origins begin early in life include hypertension and diabetes, coronary and cerebral vasculopathy, as well as mitogenic and mental health conditions. To forestall these conditions from developing, health delivery systems must adapt from the way they are currently organized and pay more attention to preventive health.

Healthy Early Life Moments in Singapore (HELMS) is a life-course oriented program that specifically aims to optimize metabolic and mental health in mothers and their babies. It builds upon the current system of care that has helped tackle undernutrition, communicable diseases, and neurodevelopmental delay in Singapore. In the research arm of the program, HELMS examines whether an integrated lifestyle intervention that is initiated pre-conception, and which continues throughout pregnancy and the postpartum period, can improve the metabolic and mental health of overweight and obese women, as well as improve early child growth.

The HELMS intervention model can also be translated to a model of clinical care through establishment of preconception services and postnatal Dyad-care clinics. These current gaps in clinical care can provide support, information, guidance, and nudges, in person and through digital platforms. Such upstream care delivery systems can balance the present health system which is

tilted towards downstream disease care. In this way, the health landscape can serve to better mitigate risk factors in addition to providing disease care and cure.

Intergenerational Impact of Suboptimal Perinatal Mental Health

A/Prof Helen Chen

Head and Senior Consultant, Department of Psychological Medicine, KK Women's and Children's Hospital, Singapore

The life course approach to healthcare is relevant to the origins of mental health through the continuum from cradle to grave. Research has demonstrated that even non-clinical levels of depression or anxiety can have impact on development of offspring. We are beginning to understand the extent of how mental health can influence maternal sensitivity, attunement, reciprocity and synchronicity. The downstream impact on neurobiology and neurophysiology can predict for latter life challenges that can bear impact on population health. A holistic approach that galvanises the whole village, involving healthcare, education, and social communities is recommended to give our children and future generations their optimal potential.

Life Course Perspectives of Preterm Births: Preterm Pregnancy - A Global Problem

Prof Teoh Tiong Ghee

Director, Maternal & Child Global Health and Care Transformation, KK Women's and Children's Hospital, Singapore

Over the last 10 years, there were 152 million babies born before 37 weeks of pregnancy in the world. Preterm birth is now the leading cause of child death accounting for 1 in 5 of all deaths of children less than 5 years of age with nearly 1 million dying from preterm complications. In 2020, there were 13.4 million babies born too soon and in spite of advances in medicine and treatment strategies, this number has not changed anywhere in the world in the last 10 years.

Preterm survivors can suffer long term health consequences with an increased risk of disability and developmental delays. The psychological, emotional and financial impact of caring for these survivors on the family and indeed society cannot be underestimated. Whilst there have been strategies and advances in managing and treating these premature babies when they are born, there is still work needed in reducing and preventing this global challenge of preterm birth. The preterm pregnancy rate in the SingHealth hospitals is 10.17% and this has also not improved significantly in the last 7 years.

The challenge is that the multi-factorial causes and associations with preterm pregnancy delivery – and the still the best predictor of risk is that of a previous preterm pregnancy delivery. This presentation will discuss spontaneous preterm pregnancy rather than iatrogenic preterm delivery and the current research and management strategies.

SYMPOSIUM III – PERINATAL NUTRITION STUDIES AND CONSENSUS MANAGEMENT IN ASIA PACIFIC COUNTRIES

Update on IPRAMHO Asia Pacific Collaborative Groups - Collaborative Efforts in Promoting Asia Pacific Maternal & Child Health

Prof Tan Kok Hian

Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children (IPRAMHO) Asia Pacific Maternal & Child Health Network

IPRAMHO Asia Pacific Maternal & Child Health Network was first initiated in 2017 when plan was made towards having annual international IPRAMHO meetings on maternal metabolic health. The representative members & investigators are from various Asia Pacific countries including Singapore, Malaysia, Thailand, Indonesia, Philippines, Myanmar, Vietnam, Japan, China, India, Sri Lanka & Australia. This is a unique network where Asia Pacific experts and partners in maternal health have come together to work on collaborative maternal and metabolic health research for the region, supplementing global WHO efforts.

This IPRAMHO network has been leading in building consensus for Asia Pacific region to improve metabolic health of mothers and children. Six Asia Pacific consensus statements have been achieved, of which 5 have been published:

1. Asia & Oceania Federation of Obstetrics and Gynaecology, Maternal Fetal Medicine Committee's consensus statements on screening for hyperglycemia in pregnancy. Tan TYT; Hyperglycemia in Pregnancy Consensus Working Group, Ounjai Kor-anantakul. *J Obstet Gynaecol Res.* 2018 Nov;44(11):2023-2024. doi: 10.1111/jog.13813. Epub 2018 Sep 19. PMID: 30230130.
2. An Asia Pacific Consensus on Perinatal Nutrition and Breastfeeding. Tan KH, Tan TYT, Chua MC, Kor-Anantakul O, IPRAMHO Study Group. *Ann Nutr Metab.* 2019;75(1):86-87. doi: 10.1159/000501192. Epub 2019 Jun 25. PMID: 31238321.
3. Asia-Pacific consensus on physical activity and exercise in pregnancy and the postpartum period. Lee R, Thain S, Tan LK, Teo T, Tan KH; IPRAMHO Exercise in Pregnancy Committee. *BMJ Open Sport Exerc Med.* 2021 May 17;7(2):e000967. doi: 10.1136/bmjsem-2020-000967. PMID: 34055384; PMCID: PMC8130752.
4. Asia-Pacific Consensus Statement on Integrated 24-hour Activity Guidelines for Children and Adolescents. Loo BKG, Okely AD, Pulungan A, Jalaludin MY; Asia-Pacific 24-Hour Activity Guidelines for Children and Adolescents Committee. *Br J Sports Med.* 2021 Nov 8;bjsports-2021-104527. doi: 10.1136/bjsports-2021-104527. Epub ahead of print. PMID: 34750119.
5. Asia-Pacific Consensus Statement on Integrated 24-Hour Activity Guidelines for Early Childhood. Asia-Pacific 24-Hour Activity Guidelines for Early Childhood Committee. *The Lancet Regional Health - Western Pacific*, 2022. 100641, ISSN 2666-6065, <https://doi.org/10.1016/j.lanwpc.2022.100641>.
6. Asia-Pacific Consensus Statement on Perinatal Mental Health (Depression and Anxiety) Feb 2023

Some studies are still ongoing and there were 5 published studies from the network. These include:

1. Clinical practice in diabetic pregnancy screening in Asia-Pacific Countries: a survey review. *Acta Diabetol.* 2019 Jul;56(7):815-817
2. Comparing Different Diagnostic Criteria for Gestational Diabetes Mellitus in Relation to Birthweight in Sri Lankan Women *Frontiers in Endocrinology.* 2018 Nov 15;9:682
3. Exploring Abnormal Glucose Metabolism in Pregnancy among Australia Chinese Migrants. *BMJ Open Diab Res Care* 2020;8:e000903.
4. 24 h Activity Guidelines in Children and Adolescents: A Prevalence Survey in Asia-Pacific Cities. Quah PL, Loo BKG, Mettananda S, Dassanayake S, Chia MYH, Chua TBK, Tan TSZ, Chan PC, But BW, Fu AC, Wong SM, Nagano N, Morioka I, Kumar S, Nair MKC, Tan KH. IPRAMHO Group. *Int J Environ Res Public Health.* 2023 Jul 19;20(14):6403. doi: 10.3390/ijerph20146403. PMID: 37510635; PMCID: PMC10379132.
5. Clinical Practice of Vitamin D Screening and Supplementation in Pregnancy in Asia-Pacific Countries: a Survey Review. Asia Pacific IPRAMHO Group. *Heliyon* 2023 <https://doi.org/10.1016/j.heliyon.2023.e21186>

It is hoped that our efforts can give greater awareness and knowledge to help improve population metabolic health of mothers and women, enhancing and optimise the potential of women and every child born in our region.

Singapore caregiver's feeding practices in infants and young children: Findings from the Integrated Variety, Autonomy, Setting and Timing (I-VAST) study

Dr Elaine Quah

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Despite increased efforts aimed at reversing the upward trends in childhood obesity, from 2017 to 2021, the proportion of students who were overweight (BMI-for-age at or above the 90th percentile¹) in schools (primary, secondary and pre-university levels) had increased from 13% to 16%. The increase was mainly observed in the last two years. Research shows that children who are overweight at the age of five face a fourfold higher risk of developing obesity during later stages of childhood compared to their peers with normal weight. The scarcity of effective interventions to address weight-related issues and counteract obesity underscores the necessity for increased emphasis on preventive measures, particularly from a very early age.

This talk will address how early feeding practices, including breastfeeding, a diverse diet, and delaying the introduction of sugary beverages and juices, can exert a lasting impact on the risk of obesity later in life. Our local studies have shown how dietary choices of young children are profoundly influenced by the knowledge, beliefs, and behaviors of their caregivers, particularly parents. Yet, there is limited understanding of caregiver feeding practices and child eating behaviors in the specific domains of variety, autonomy, setting and timing, especially in infants and young children. This study aims to delve into various aspects:

examining maternal knowledge, beliefs, and actions related to early child feeding practices and child eating behaviors in the various domains of variety, autonomy, setting and timing.

Nutritional guidelines for preterm infants in Indonesia

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Premature birth remains a leading global health concern, especially in developing countries, including Indonesia. Indonesia is currently ranked 5th among the countries in the world with the highest rate of premature birth, reaching 675,700 preterm births annually. This issue should be promptly managed as prematurity, along with low birth weight, is a major risk factor of stunting and further neurodevelopmental consequences. This is supported by a multicenter study involving 137 developing countries which reported that 32.5% of stunting cases occurred due to preterm birth. Moreover, Indonesian ministry of health announced that in 2022 the prevalence of stunting in Indonesia reached 21.6%.

Early detection and comprehensive management of nutritional deficiencies and growth faltering in very preterm infants should be highly promoted. We found that a decline in a weight-for-age z-score of ≥ 1.2 is proven to be a reliable indicator of growth faltering.

To maintain linear growth and avoid growth faltering, we implemented nutrition bundle for preterm infants. It consists of five steps of nutrition care, including performing nutritional assessment, calculating nutritional requirements, determining route of delivery, selecting formula / Intravenous Fluid (IVF), and monitoring. When dealing with very preterm infants, most large cities in Indonesia implement early aggressive nutrition within one hour after birth, after the baby is stable. We administer 2-2.5 g/kg/day of amino acids along with phosphate and 1-3 g/kg of lipid solution (containing soybean base, fish oil, olive oil, and medium-chain triglycerides (MCT)) within 24 hours. Furthermore, enteral feeding should be started as early as possible, and any delay is not permitted unless there is an absolute contraindication. Providing mother's own milk from early life until discharge is often challenging. However, it remains the most preferred option for enteral nutrition, followed with donor's milk. Human Milk Fortifier (HMF) is usually introduced when enteral feeding reaches 75-100 mg/kg/day. The total optimal volume usually never exceeds 150 ml/kg/day.

Navigating The Bridge Towards Full Enteral Nutrition for High-Risk Neonates

A/Professor Azanna Ahmad Kamar

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High-risk neonates who require intensive care, i.e. very low birth weight (VLBW) infants, infants with congenital malformations including gut malformations, cardiac conditions and other morbidities often have problems achieving full enteral nutrition. Failure or delayed achievement of full enteral nutrition is associated with faltering growth and hence, long-term metabolic consequences. We suggest a preventive strategy by carefully navigating the journey across this challenging bridge towards full enteral nutrition. Firstly, the bridge towards full enteral nutrition should be built with a good foundation as soon as a high-risk neonate is identified in-utero, where targeting adequate gestational weight gain (GWG) and ensuring antenatal preparedness via awareness of possible feeding difficulties, and parental teaching of effective breast milk expression. Secondly, upon delivery, providing early parenteral nutrition (PN) as a life-saving procedure reduces the incidence of associated neonatal morbidities for high-risk neonates, and therefore, must be adopted as a quality improvement initiative for any neonatal unit without such facilities. Provision of timely and adequate PN to ensure positive nitrogen balance and to meet the high metabolic demands of a sick neonate, e.g., early supply of stock total PN (TPN) whilst awaiting the establishment of enteral feeding is often difficult in developing nations. The recommendation for concomitant initiation of early provision of minimal enteral nutrition (MEN) or trophic feeding of 10-20 ml/kg/day via naso/orogastric tube within 3 days of admission for babies who do not require total nil enteral nutrition, especially for VLBW infants, i.e. early MEN + PN strategy, is a feeding milestone strongly supported by published literature. The third navigation challenge is the challenge of stepping up enteral gavage feeding to achieve at least 120 ml/kg/day by the 2nd to 4th week of life which can be fraught with challenges as 'start-stop' cycles due to perceived 'feeding intolerance' can prolong this period. Fourthly, priming the environment for timely initiation of first oral feeding by at least 33 to 34 weeks postmenstrual age in preterm infants and based on feeding cues for other high-risk neonates is suggested by

promoting early kangaroo mother care (KMC). Inefficient suck-swallow-breathing rhythms, swallowing disorders and difficulties in maintaining breathing stability with apparent life-threatening events (ALTE) or evidence of brief resolved unexplained events (BRUE) may however hinder an efficient feeding process. Evidence-based oral-motor assessment and specific investigations such as Functional Endoscopic Evaluation of Swallowing (FEES) may be required to characterise dysfunctional oral-motor rhythms. The final navigational challenge is to ensure optimal caloric intakes for all these bends across the bridge, from optimisation of in-utero growth, the calories from the provided PN, and oral caloric supplementation from within the NICU till post-discharge. [Keywords: total parenteral nutrition (TPN), neonatal feeding, caloric intake, high-risk neonate, preterm]

Feeding and Weaning Practices in Young Infants and Children in Nepal

Professor Ashma Rana

President of Nepal Perinatal Society, Nepal

Infant and young child feeding (IYCF) is a key area to improve for child survival and promote healthy growth and development. The first two years of the child's life provide a critical window of opportunity to ensure survival, growth, and development through optimum infant and young child feeding practices. Nepal government has developed and implemented different programs to improve infant and young child feeding practice. However, the practice remains poor and is a major cause of malnutrition in Nepal. In Nepal, weaning traditionally begins with the Rice Feeding Ceremony (Pasnee) where children receive their first meal. The ceremony is performed at five months of age for a girl and six months for a boy. The recommendations for feeding infants and young children (6-23 months) include: continued breastfeeding; introduction of solid, semisolid or soft foods at 6 months; appropriate food diversity (at least five food groups per day).

National strategy for IYCF should be exclusively breastfed up to 6 months i.e no other fluids or food given to achieve optimal growth, development and health. Children 0-6 months of age should be breastfed on demand, that is, they should be given to suckle whenever they want tonight and day, 8-10 times a day.

Some key implementations on IYCF guidelines include around 6 months start with smooth, soft, pureed or finely mashed textures. Around 7-8 months move towards mashed, grated, minced and finely chopped foods. Encourage soft finger foods that the infant can hold and chew such as rusks, soft vegetables and fruit. Around 9-12 months include soft chopped foods. According NDHS (Nepal demographic health survey) 2022, 55% of children age 0-23 months engaged in early initiation of breastfeeding, 78% of children age 6-23 months met the minimum dietary diversity requirement and 56% of children under 6 months were exclusively breastfeed.

Importance of the Exact Measurement of Body Physics in Neonates and Infants

A/Professor Jin Soo Moon

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In 2022, Korea Infant Physical Growth Examination Survey (KIPGroS) collected anthropometric data to revise the 2027 Korean Growth Charts for Children and Adolescents and to assess the compatibility of using the WHO Growth Standards as an integrated component of the 2017 Korean National Growth Standards. The study aimed to investigate the growth status of infants from birth to 36 months using the KIPGroS anthropometric data collected from November 2020 to July 2023. The survey was conducted in 10 institutions, including 7 university hospitals and 3 affiliated local hospitals located in five cities or provinces. From November 2020 to March 2023, 76 of the 255 subjects screened dropped out for personal reasons. There were differences in cohort enrollment and dropout rates by region. The total estimates of KIPGroS data were around 2400 weight, length, and head circumference measurements. The z-scores of the KIPGroS anthropometric data compared to the WHO standard growth chart show that the exclusive or predominant breastfeeding group is closer to the WHO multicenter growth reference study than the partial breastfeeding group. The subjects' breastfeeding maintenance period was as follows: 50% (50% of men, 54% of women) breastfed for 3 months, 42% (38% of men, 46% of women) for 6 months, and 27% (21% of men, 33% of women) breastfed for up to 12 months. The study shows high breastfeeding rates compared to other previous survey data in Korea. However, as a cohort pursuing a survey based on predominant breastfeeding, the 6-month breastfeeding dominance rate is less than half. Therefore, caution is needed in interpreting and analyzing the results.

For the follow-up study, the goal is to collect anthropometric data from 90 subjects in the predominant breastfeeding group up to 24 months and a total of 170 subjects up to 36 months to assess the WHO Growth Standards charts.

Preterm nutrition in NICU of Calmette hospital: Current practices and its challenges

Dr Rathmony Heng

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Premature infant requires greater nutrition need to achieve optimal growth in the neonatal period than any other time of their life. Preterm infant requires 110-130 kcal/kg/day. They must be closely monitored and may require intervention to promote better growth with long term outcome.

Feeding the premature baby is very challenging. Our objective is to meet recognized nutritional requirement of preterm infant in order to achieve an acceptable standard of normal growth and normal neurodevelopment for Cambodian preterm, to prevent nutritional deficit (premature malnutrition) through early and aggressive parenteral and enteral nutrition which could be applicable to all medical and nursing professional and to ensure evidence-based safe feeding practice.

We establish a protocol of common best practice with a team managing newborn in 4 hospitals in Cambodia with a willingness to change and adapt regarding a nutrition for preterm in order to find a standardised guideline that can be put into practice across Cambodia.

Both enteral and parenteral nutrition are both very fundamental for preterm, especially for extremely premature babies (< 28 weeks of gestation) when full enteral feeding is generally delayed because of the severity of acute medical problem such as immature lung function. Breast milk is the best milk for preterm and enteral feeding can be started as early as possible once the hemodynamic is stable. Human milk fortifier could be added for those who are not gaining weight and under breast milk feeding, especially during hospital stay.

Parenteral nutrition plays a major role to provide sufficient calories. Aminoplasma 10% is safe to use for children according to our experience and monitoring and lipofundin 20% is also proven to be safely acceptable if we can infuse slowly with electric pump. Luckily, up until present, some infant parenteral nutrition product can be found in Cambodia (Vaminolact, SMOF 20%) and we adapt and adjust preterm nutrition accordingly but sometimes unavailable due to small market.

Without parenteral nutrition, there will be reduced macronutrients, micronutrient, poor growth, poor neurological outcome and possible chronic lung diseases in the future young generation.

Neonatal and infant feeding practice in Bangladesh

Dr Nargis Ara Begum

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National nutritional strategy of Bangladesh is to improve nutritional status, growth, and development of newborn and infant. Full term neonates should be exclusively breastfeed since birth up-to completed six months. Preterm babies should get fortification of breast milk (if available), as well as supplementation with vitamins and minerals. After 6 months of age, introduction of complementary feeding starts along with breast feeding up-to the age of 2 years. Home based, locally available, nutritionally adequate food supplement is advocated as weaning food. A combination of whole grains, vegetables, legumes, fruits, meat, fish are essential for a healthy balanced weaning food (khichuri, sujir halwa, vegetable puree, soup, juice).

It is recommended that newborns are put to the breast within the first hour of life but in Bangladesh, early initiation of breastfeeding is only 47 per cent. Just 63 per cent of infants are exclusively breastfed. Bangladesh has shown great progress in reducing malnutrition over the last few decades. The prevalence of stunting and underweight are 28% and 10%, respectively. Breast feeding promotion began in Bangladesh in early 1980's and baby friendly hospital campaign (BFHI) began in 1992. Infant and young children feeding (IYCF) adopted by WHO and UNICEF are widely considered as one of the most immediate solutions for child under nutrition. BRAC introduced pusticon-5 (iron, vitamin A, vitamin-C, folic acid and zinc) in the complementary feeding of community infants to prevent micronutrient deficiency.

In Bangladesh access to healthy diets is critical for achieving the 2030 Sustainable Development Agenda. To achieve nutrition outcomes, Social Behavior Change Communication (SBCC) has been integrated across nutrition-specific and nutrition-sensitive interventions, including greater focus on promotion of breastfeeding and increased consumption of affordable diversified diets.

Role of Human Milk Fortifiers (HMF) and Medium Chain Triglycerides (MCT) in preterm babies' nutrition

Professor Sunil Raja Manandhar

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Senior Vice-President, Perinatal Society of Nepal (PESON)

Proper nutrition in neonatal period is required for optimal neurological and cognitive development. It helps in retaining immunity against infection also. However, providing optimal nutrition is very much challenging particularly in premature preterm babies. The reasons for not able to start proper enteral feeding are immaturity of sucking and swallowing reflexes, immaturity of bowel function, high risk of necrotizing enterocolitis (NEC), illness leading to reduce feeding eg. Hyaline membrane disease (HMD), Sepsis, Patent ductus arteriosus (PDA), congestive cardiac failure (CCF) etc.

Human breast milk is ideal feeding for all infants. However, protein and minerals content in human breast milk is insufficient to meet the daily need of growing preterm babies. Fortified human milk provides the premature infant adequate growth, nutrient retention and biochemical indices of nutritional status as compared to unfortified human milk. Compared with preterm formula, fortified human milk may provide significant protection from infection and NEC. Preterm human milk has low vitamins constituents (Vitamin A, B, E, C) to meet their daily requirements. So, human milk has to be supplemented at least with protein, calcium and phosphorus. The main objective of HMF is to provide preterm babies with enteral protein 3.5 - 4.5 g/kg/day to support their rapid growth. The primary goal of HMF supplementation is to optimize the nutritional status and to promote proper growth of preterm babies comparable to that in utero. Studies have shown that the addition of human milk fortifier (HMF) in human breast milk is associated with short term improvement in weight, head circumference and length of preterm babies.

The ability of Very LBW babies to absorb fat is poor due to immaturity of liver and decreased bile salt synthesis. However, fat is the major source of calorie intake in preterm babies, fat in the form of Medium chain triglycerides (MCT) can passively diffuse from the gastrointestinal tract to the portal system without requirement for modification like long chain fatty acids. So, MCT have also shown significant increase in weight gain and enhances calcium absorption and nitrogen retention.

Current Status of Nutritional Management for Preterm Infants in Taiwan

A/Professor Chiang Ming-Chou

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Director, Division of Neonatology, Chang Gung Memorial Hospital, Linkou, Taiwan

With the improvement of care, the survival rate of preterm infants increases, particularly for extremely preterm infants. Among the delicate cares for preterm infants, antenatal corticosteroid therapy, thermoregulation, respiratory support, nutritional management, hemodynamic monitoring, neurocritical care, and infection prevention are of utmost importance. The concepts of nutritional supplementation for preterm infants may change with the new evidence from research results. Additionally, nutritional management for preterm infants varies among hospitals in Taiwan. Therefore, with the support of the Taiwan Society of Neonatology, the first edition of the "Recommendation on Nutritional Care for Taiwan Preterm Infants" was published in 2015. Last year, the fourth edition of the handbook was published. In the presentation, I will summarize the process and content of this most updated recommendation.

Transforming the landscape of neonatal nutritional support in an NICU in Malaysia

Professor Cheah Fook Choe

Professor of Paediatrics and Neonatology

Faculty of Medicine, Universiti Kebangsaan Malaysia (UKM), Malaysia

The experiences and strategies in enhancing neonatal nutrition in an academic hospital will be shared to highlight the elements of success and fundamentals in forming a dedicated team with the passion for change. This group shall become a formidable voice in championing the cause to optimise and enhance the nutritional status of especially the preterm infant. Protocols and guidelines development journey in parenteral and enteral nutrition support in the NICU, together with how some hurdles were overcome in addressing resource limitations and socio-cultural variabilities will be further discussed.

LIST OF POSTER ABSTRACTS

APMCH001 Folic Acid as a Treatment for Autism Spectrum Disorder in Children: An Open Label Pilot Study (FOLIN-P Study)

Wong Chui Mae¹, Seyed Ehsan Saffari², Koh Hwan Cui¹, Tan Shiyun Charmain¹, Hie Szu Liang³, Yeo Joo Guan⁴, Joyce Lam Ching Mei⁵

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APMCH002 Providing public education on feeding and communication development and difficulties through Instagram

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APMCH003 Radiation Dose Management of the Fluoroscopy Guided Nasojejunal Tube Insertion Procedure in a Pediatric Hospital

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APMCH004 Understand Patient's Implementation of Eating Disorder Care in the Home Setting

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APMCH005 Mixed Methods Evaluation of a Novel Community-Hospital Partnership for Eating Disorder Care

Courtney Davis¹, Jamie Lim Yong Qi², Oh Hui Xin², Khairunisa Binte Khaider¹, Nurul Syukrina Binte Mohamed Fazli¹, Elaine Chew Chu Shan¹

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APMCH006 Improving the molecular diagnosis of genetic disorders with long-read sequencing

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APMCH007 Differences in glucose readings between the continuous glucose monitoring calibration-free interstitial sensors versus capillary blood glucose monitoring by glucometer

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APMCH008 Continuous glucose monitoring feedback in the subsequent development of gestational diabetes: a pilot randomized controlled trial in pregnant women

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APMCH009 Integrated Variety Autonomy Setting Timing feeding practices in infants and toddlers' study (I-VAST)

Quah Phaik Ling¹, Loy See Ling^{2,3,4}, Ong Chengsi⁵, Daniel Chan Wei Keong⁶, Chua Mei Chien^{7,4}, Yap Kok Peng^{4,6,8}, Tan Kok Hian^{1,4}

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APMCH010 IADPSG Criteria of Gestational Diabetes- Is it Optimized Across Ethnicities?

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APMCH011 Integrated Hyperglycaemia Incentivised Postnatal Surveillance Randomised Controlled Trial Preliminary Study: Impact of a diet and physical activity program coupled with wearable device use on anthropometric measures, and lifestyle behaviours in patients with a history of gestational diabetes (GDM)

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Fatin Insyirah Fadil¹, Nur Adila Ahmad Hatib², Muhammad Fairuz Abdul Rahman¹, Dhillshad Muhammad A Qadir¹, Zul Ikmal Zullkefle¹, Siti Nurzakiah Zar'an¹, Siti Munawarah Maaroo¹, Mohamad Azri Ahmad¹, Suzanna Sulaiman¹

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APMCH013 Trends in patient-reported outcomes from pregnancy to 18 months after delivery: a study of first-time mothers in Singapore

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APMCH016 Head Circumference Measurement Matters!

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APMCH017 Reminders for Efficiency

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APMCH018 Visual Learning in Child Vaccination Training

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APMCH019 A Real-Time Preconception Model of Care for Maternal & Child Health

Tan Yu Bin¹, Ku Chee Wai^{1,2}, Tan Sze Ing³, Ku Chee Onn⁴, Godfrey Keith M.^{5,6}, Tan Kok Hian Tan^{1,7}, Chan Shiao-Yng^{8,9}, Yang Liying^{10,11}, Yap Fabian^{1,3,12}, Loy See Ling^{1,2}, Jerry Chan Kok Yen^{1,2,13}

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APMCH020 Ethnic differences in feeding and eating practices in infants and young children in Singapore

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APMCH021 Developing an instrument for infant feeding and lifestyle evaluation: Content validation and a cross-sectional assessment of current caregivers' practices

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APMCH022 Improving quality of lactation support for postnatal mothers in the primary care setting

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APMCH023 Compassionate CARE for Young Mothers: Exploring the Impact of a Specialised Multidisciplinary Antenatal Clinic on Adolescent Pregnancy Support and Empowerment

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APMCH024 Understanding The Needs and Concerns of Adolescent Single Mothers in Singapore

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POSTER ABSTRACTS

APMCH001 Folinic Acid as a Treatment for Autism Spectrum Disorder in Children: An Open Label Pilot Study (FOLIN-P Study)

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Background

Autism affects approximately 1% of the population and is the top cause of disease burden in children aged 0-14 years old in Singapore. The folate cycle has been implicated in the pathophysiology of autism due to its role in the glutathione oxidative stress pathway, amino acid and DNA methylation reactions, and neurotransmitter synthesis pathway. Previous research on folinic acid supplementation in autistic children has suggested potential benefits.

Objectives

The primary aim of this pilot study was to determine the safety, feasibility, and efficacy of oral folinic acid in improving communication and behaviour in autistic children.

Methods

10 autistic children were recruited into an open label pre-post treatment within-subjects design study. At T=0, 12 and 24 weeks, participants underwent safety evaluations and standardised assessments of language, autism symptoms, adaptive skills, and global illness severity. During the Control Period (0-12 weeks), participants continued with standard care. After the 12-week study visit, the Treatment Period (12-24 weeks) commenced during which participants took oral folinic acid at 2 mg/kg/day.

Results

All 10 children (9 boys, 1 girl; aged 4-8 years), successfully consumed oral folinic acid supplements with no adverse events. There was a clinically significant reduction in Pervasive Developmental Disorder Behaviour Inventory (PDDBI) Autism Composite T-score with treatment (mean [SD] T-score 49.2 [8.89] pre-treatment, 44.6 [6.19] post-treatment, $p=.103$). A T-score of 50 indicates that the average score that an autistic child would show, while T-scores below 40 indicate low to minimal autism symptoms, hence reducing the T-score shows clinical effectiveness. There were also trends towards gains in receptive language, adaptive behaviours and overall Clinical Global Impression scores.

Conclusions

Folinic acid is a safe and feasible potential treatment for autism. These pilot results will be used to apply for grant funding to conduct a future double-blind randomised controlled trial.

APMCH002 Providing public education on feeding and communication development and difficulties through Instagram

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Background

KK Women's and Children's Hospital (KKH) Speech Language Therapists (SLTs) work with families to empower them to reach their children's feeding and communication potential. This is traditionally done through face-to-face consultations and patient education. Yearly public seminars are also organised to disseminate information on paediatric feeding and communication. During the COVID-19 pandemic, face-to-face services were disrupted, prompting KKH SLTs to explore other methods for patient and public education.

Objectives

An Instagram page (@kkh.speechtherapy) was launched in August 2020 to connect with patients and provide public information during the pandemic. The project's objective has since evolved to providing public education and awareness on Speech Therapy for the prevention of feeding and communication difficulties.

Methods

Instagram is one of the most popular social networking platforms for millennials in Singapore, and was selected as its user demographics match our target audience. Evidence-based information on paediatric communication and feeding were condensed into bite-sized and accessible content. Graphics, photos, and videos were used to increase readability and engagement.

Results

Since August 2020, @kkh.speechtherapy has an average of one content upload per week. 155 posts have been published, covering a range of subtopics on feeding and communication. As of 1st December 2023, @kkh.speechtherapy has a total following of 2852 users. In 2023, the average user reach per month exceeded 12 times the total number of participants who attended KKH SLT public seminars in the same year.

Conclusions

KKH SLTs have created a strong online presence on Instagram, offering public education on feeding and communication development, and bringing support closer to families. This empowers caregivers to make informed decisions in helping their children reach their potential. We plan to extend our work in evaluating the usefulness of this platform to families in the future.

APMCH003 Radiation Dose Management of the Fluoroscopy Guided Nasojejunal Tube Insertion Procedure in a Pediatric Hospital

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Background

A nasojejunal tube (NJT) is a long feeding tube which is inserted via the nostril into the stomach, through the pylorus, past the duodenum and into the proximal part of the jejunum. Once in the correct place, feeding can be commenced safely without the risk of reflux as the stomach is effectively bypassed. Gut peristalsis moves the feed along the small bowel where it is digested and absorbed by the child.

Objectives

Aim of this retrospective study is to evaluate the radiation dose received by the child during the procedure, and to discuss the radiation safety under the international guidelines.

Methods

A total of 193 NJT insertion procedures were performed at our institution over a period of 4 years, between Jan 2020 to December 2023. Intermittent low dose x-ray fluoroscopy to check placement of guidewires and catheters were used during the procedure.

Patients were categorised into several age groupings.

Dose area product (DAP) from each NJT procedures were recorded from the system. Median values for the duration were calculated and presented.

Results

Fluoroscopy time captured across all age groups range from 5.7 to 8.3 min.

DAP was delivered accordingly from 0.25 mGycm² to 0.94 mGycm² for 0-, 1-, 5- and 10-years old age groups.

Effective dose gathered around 0.4 mSv was estimated for age groups 0-, 1- and 5- years old. Effective dose of 0.26 was estimated for 10-year-old group.

Ways to optimise the radiographic images without increasing patient dosage are reviewed.

DAP was delivered "precisely" across all age groups. Smaller amounts of DAP were noted to younger patients, whereas larger amounts of DAP were delivered to older patients.

Conclusions

Precise delivery of DAP for all age group resulted in “flat” effective doses of around 0.4 mSv.

Through this retrospective study, it is concluded that the procedure is relatively safe for the patient according to the ICRP guidelines.

APMCH004 Understand Patient’s Implementation of Eating Disorder Care in the Home Setting

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Background

Adolescent eating disorders are complex and serious illnesses with risk of significant morbidity and poor outcomes. In a family-based therapy model, caregivers of youth with eating disorders play a significant role in their recovery supporting the nutritional rehabilitation process at home as well as providing emotional support. While evidence-based programs have been developed to help support and equip caregivers for these roles, little is known about how caregivers implement care advice at home and factors that lead to successful implementation.

Objectives

1. To understand how parents interpret health care professionals’ guidance on caring for youth with eating disorders.
2. To understand components of successful health care professional communication
3. To understand parental factors and strategies that lead to successful home-based recovery

Methods

In-depth qualitative interviews and focus groups (n=19) were conducted with parental caregivers of youth with eating disorders (n=8) and healthcare providers (n=11) to understand the caregiving experience. Interviews were transcribed and analysed using standard qualitative methods. These interviews will inform the development of parental interventions.

Results

Multiple key themes emerged from the interviews. First, parents felt that a strong trust with the health care providers was essential for home recovery. Second, parents identified as understanding the severity of the illness as an important step to be prepared for future challenges. Parents also identified parental emotional status at the time of communication as well as the time of implementation at home as a factor which impacts their effectiveness. Parents also described a need to have autonomy and creativity in how guidance was implemented. Finally, parents identified the reliance on pre-morbid family strengths and relationships as a tool for recovery.

Conclusions

Health care providers’ communications and future parental skills training programs for caregivers of youth with eating disorder should consider the above factors in communication and program design.

APMCH005 Mixed Methods Evaluation of a Novel Community-Hospital Partnership for Eating Disorder Care

Courtney Davis¹, Jamie Lim Yong Qi², Oh Hui Xin², Khairunisa Binte Khaider¹, Nurul Syukrina Binte Mohamed Fazli¹, Elaine Chew Chu Shan¹

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Background

Given the high level of illness complexity as well as the need for multidisciplinary treatment, Eating Disorder (ED) care has been traditionally centralized in tertiary hospitals. In the context of rising youth with ED post-COVID-19, we evaluated a new model of hospital-community partnership to establish a support program for caregivers of youth with ED.

Objectives

This mixed-methods study aims to demonstrate the acceptability and efficacy of the support program for caregivers of adolescents with ED receiving care at KKH. Moreover, the caregivers' experience with the program recovery was explored using qualitative interviews.

Methods

The support group consisted of 13 online sessions. The materials were based on an existing general mental health curriculum from a community organization and thirty percent of the materials was adapted for EDs. Survey data was collected at baseline and 3- to 6- months post completion. Surveys included baseline demographics, the Parents versus Anorexia (PVA) scale, and the Warwick Edinburgh Mental Well Being Scale (MWBS) and analysed using standard methods. Qualitative interviews were conducted with participants exploring the impact of their participation and analysed using thematic analysis.

Results

Seventeen caregivers were recruited into the study. Acceptability ratings (n=13) have been high with 92% rating the quality of program as good or excellent and 100% who definitely or probably would refer a friend. There were no significant changes in PVA or MWBS post-participation. Thematic analysis identified emotional regulation, communication skills, and self-efficacy key themes related to improved caregiver capacity. Improved social support, self-care, and decreased isolation were identified as key themes related to improved caregiver wellbeing.

Conclusions

This project has shown that community-hospital partnerships are an effective strategy to provide support for adolescents with ED. The program showed good acceptability and qualitative results demonstrated a deep impact of the program on participants.

APMCH006 Improving the molecular diagnosis of genetic disorders with long-read sequencing

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Background

Molecular tests are regularly used to diagnose, confirm, or exclude common Mendelian disorders.

Multiple tests may be needed but next-generation sequencing can detect most mutations as a single test. Regardless, commonly used short-read platforms cannot resolve long repeat expansions, which still require traditional methods involving PCR amplification and capillary electrophoresis or southern blot analysis. However, long-read sequencing could possibly cover the whole repeat expansions, and other large insertions/deletions. Oxford Nanopore Technologies (ONT) long-read also features adaptive sampling, an amplification-free target enrichment that is achieved by ejecting reads that are not of interest during sequencing.

Objectives

This study aims to use ONT's adaptive sampling to accurately size repeat expansions and detect other variants.

Methods

Genomic DNA were extracted from whole blood and sheared to 10-20 kb before library preparation. Each library was loaded onto a MinION or PromethION flow cell for a single run. Adaptive sampling targeted 40 genomic regions associated with common Mendelian disorders, including repeat expansion disorders.

Results

The four samples ran on individual MinION flow cell for 72 hours yielded 10-27 million reads, with 13-36× coverage across all target regions. Whereas on a PromethION flow cell, sufficient coverage was achieved within 24 hours due to having five times more sequencing pores. The same flow cell was reused for more samples in separate runs. With an average of 27× coverage on DMPK gene, three reads fully span a 4 kb trinucleotide repeat expansion and another three reads partially cover that region. Other samples with known variants in the alpha- and beta-globin gene, consisting of single nucleotide variations, insertions/deletions and structural variants, were also detected.

Conclusions

Long-read sequencing can detect different types of variants, including difficult-to-sequence trinucleotide expansions. With adaptive sampling, it is more cost-effective than whole genome sequencing. Furthermore, it requires little hands-on preparation time and replaces multiple tests.

APMCH007 Differences in glucose readings between the continuous glucose monitoring calibration-free interstitial sensors versus capillary blood glucose monitoring by glucometer

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Background

Continuous glucose monitoring (CGM) is increasingly used in obstetrics and gynaecology. ¹There is a scarcity of studies investigating variations in glucose readings from CGM sensors used in clinical practice, versus glucose readings from the traditional glucose meter.

Objectives

This study is designed to assess the differences in glucose readings between the Freestyle Libre and Dexcom G6 CGM sensors, compared to the blood glucose meter.

Methods

Two healthy non-pregnant volunteers participated in the study, and wore simultaneously both the calibration-free Freestyle Libre (Abbott Diabetes Care, Alameda, California, USA) and the Dexcom G6 sensor (Dexcom, Inc., San Diego, CA, USA) on the upper arm, either left or right, for a maximum of 14 days for the Freestyle Libre, and up to 10 days for the Dexcom G6. The Freestyle Libre recorded interstitial glucose readings every 15 minutes, ² while the Dexcom G6 recorded interstitial glucose readings every 5 minutes. ³ Glucose values were recorded before and after meals during breakfast, lunch, and dinner on three separate days by either scanning the Freestyle Libre CGM sensor with a smartphone, or obtaining glucose readings real-time through the Dexcom G6 CLARITY mobile application. Blood glucose values were recorded using the Accu-Chek Active glucose meter (Roche Diagnostics GmbH, Mannheim, Germany). This study was exempted from an ethics review, under the institutional policy. The description of the glucose values was presented as mean and standard deviation averaged over three days for both individuals.

Results

The analysis of glucose readings reveals a consistent pattern: the average glucose values obtained from the Dexcom G6 CGM consistently registered higher ($6.54 + 0.80$ mmol/L) than those from the Freestyle Libre ($5.49 + 0.65$ mmol/L) and the glucometer ($6.17 + 0.55$ mmol/L, with p -value < 0.05 between groups). Across all recorded data points, the Dexcom G6 CGM sensor yielded the highest values, followed by the glucose meter, and finally the Freestyle Libre CGM sensor.

Conclusions

This study highlights the considerable variations in glucose readings provided by different CGM systems. It underscores the need for more extensive studies to validate the impact of each CGM system on glycemic control. This work emphasizes the importance of considering CGM characteristics when prescribing these devices, and the consideration of prior calibration for calibration-free devices.

APMCH008 Continuous glucose monitoring feedback in the subsequent development of gestational diabetes: a pilot randomized controlled trial in pregnant women

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Background

This study evaluated the effects of receiving glucose feedback from continuous glucose monitoring (CGM) by intermittent scanning (unblinded group), and CGM with masked feedback (blinded group) in the subsequent development of gestational diabetes (GDM).

Objectives

The aim of the study was to compare GDM outcomes in patients from the unblinded group versus the blinded group.

Methods

This was a prospective, single-center pilot randomized controlled trial including n=206 pregnant women in the first trimester of pregnancy with no prior diagnosis of type 1 or type 2 diabetes. The participants were randomized into the unblinded group or blinded group and wore the CGM in the first trimester of pregnancy (9-13 weeks), the second trimester of pregnancy (18-23 weeks), and late-second to early-third trimester (24-31 weeks). The primary outcome was GDM rate as diagnosed by the 75-g oral glucose tolerance test (OGTT) at 24-28 weeks.

Results

Over 47 months, 206 pregnant women were enrolled at 9-13 weeks. The unblinded group had a higher prevalence of women who developed GDM (21.5% vs 14.9%; $p>0.05$), compared to the blinded group. In the unblinded group compared to the blinded group, plasma glucose values were higher at 1-hour [median 7.7 (interquartile range: 6.3-9.2) vs 7.5 (6.3-8.7)], and 2-hour [6.3 (5.8-7.7) vs 6.2 (5.3-7.2)], but lower at 0-hour [4.2(4.0-4.5) vs 4.3 (4.1-4.6)] ($p>0.05$). All these differences were not statistically significant.

Conclusions

Glucose feedback from CGM wear in the first to the third trimester of pregnancy without personalized patient education failed to alter GDM rate.

APMCH009 Integrated Variety Autonomy Setting Timing feeding practices in infants and toddlers' study (I-VAST)

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Background

Early feeding practices, including breastfeeding, a diverse diet, and delaying the introduction of sugary beverages and juices, exert a lasting impact on the risk of obesity later in life. Our local studies have shown how dietary choices of young children are profoundly influenced by the knowledge, beliefs, and behaviors of their caregivers, particularly parents. Yet, there is limited understanding of how these feeding practices can be effectively modified.

Objectives

This study aims to delve into various aspects: it examines maternal knowledge, beliefs, and actions related to early child feeding practices; identifies sources of information and other factors that shape mothers' approaches to feeding; and provides insights into enhancing the quality of early feeding guidance provided by healthcare practitioners.

Methods

A total of 1073 parents of children ages below 3 years participated in a parent-reported survey. The survey questions consisted of baseline characteristics of the child, feeding and eating practices in the domain of variety, autonomy, setting and timing including knowledge, attitude and practices of caregivers. Data was collected separately for three age groups: 1) 0-<7 months 2) 7-<13 months 3) 13-<36 months. Descriptive statistics were used to present the data collected.

Results

The mean age of the caregivers in this sample is 34.7 (SD: 5.8) years, with a majority of Chinese ethnicity and a university-level education. The infants in this study, in the age group of 0-<7 months, were on average 2.9 months old. Those in the age group of 7-<13 months were on average 8.7 months old, and those in the age group of 13-<36 months were on average 23.4 months old. At least one in five children below the age of one were not offered foods from all four major food groups. Across all age groups, approximately 30% were not introduced to a variety of textures during mealtimes. The proportion of children with daily consumption or a few times a week of sugar-sweetened beverages start at 5% below the age of 1 year, and increase to 20% by age 13-<36 months. Regarding autonomy, 1 out of 10 children aged between 12-<36 months old were still not able to self-feed with hands or utensils. In the domain of meal timings, 37.8% parents of children aged 7- <13M, and 23.9% parents of children aged 13 - <36M do not provide milk or food at regular timings. Out of the 280 parents who required a special setting to feed children, with close to 40% relying on the use of screentime. Overall, a higher proportion (20.7%) of parents perceive their child to be underweight and not eating enough compared to those who perceive their child to be overweight and overeating (7.4%). The proportion of parents who struggle to get the child to eat and perceive mealtimes to be difficult increased with age (9.9%, 15.5% to 28.8%).

Conclusions

Child eating behaviours and caregiver feeding practices in Singapore are sub-optimal which indicates the need for Guidelines for Feeding and Eating in Infants and Young Children.

APMCH010 IADPSG Criteria of Gestational Diabetes- Is it Optimized Across Ethnicities?

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Background

Gestational Diabetes Mellitus (GDM) impacts ~20% of Asian pregnancies, posing significant maternofetal risks. While the International Association of Diabetes and Pregnancy Study Groups (IADPSG) GDM criteria is widely used for GDM diagnosis, research suggests ethnic differences in insulin regulation, as indicated by distinct oral glucose tolerance test (OGTT) phenotypes.

Objectives

Our study examines the association between three ethnic groups (Chinese, Malay and Indian) and unique OGTT phenotypes defined by the proportions of exclusively abnormal 0-h, 1-h, and 2-h plasma glucose timepoints in those diagnosed with GDM in a multi-ethnic Asian population.

Methods

We retrospectively examined 3,027 patients at KK Women's and Children's Hospital in 2019, excluding those with pre-existing diabetes. GDM was defined using the IADPSG criteria at 24-28 weeks. Adjusted multivariate analyses using a multinomial logistic regression with robust variances was used to estimate the relative risk ratios (RRR) between the ethnic-specific relative risk ratios and OGTT phenotypes, accounting for maternal age, parity, and first-trimester body mass index as potential confounders.

Results

GDM prevalence was highest among Indians (21.5%), followed by Chinese (18.4%) and Malays (14.2%). Compared to Malays, the Chinese and Indians were significantly associated with a higher risk of surpassing the OGTT threshold at 0-hour with a RRR of 2.33 [95% CI: 1.01-5.38, p <0.05], and RRR of 3.05 [95% CI: 1.23-7.56, p<0.05] respectively, with Indians being at the highest risk. Only the Chinese ethnic group was associated with an RRR of 2.88 [95% CI: 1.51-5.47, p<0.01] for surpassing the OGTT threshold at 2-hour, compared to the Malays. There were no statistical significance associated with the 1-hour OGTT phenotype.

Conclusions

In summary, accumulating evidence suggests inter-ethnic differences in glucose metabolism which might be responsible for the heterogeneity in OGTT phenotypes, which calls for an ethnic-sensitive diagnosis criteria.

APMCH011 Integrated Hyperglycaemia Incentivised Postnatal Surveillance Randomised Controlled Trial Preliminary Study: Impact of a diet and physical activity program coupled with wearable device use on anthropometric measures, and lifestyle behaviours in patients with a history of gestational diabetes (GDM)

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Background

Gestational Diabetes Mellitus (GDM) is a prominent predisposing factor in the development of Type 2 Diabetes Mellitus.

Objectives

Using a preliminary study, we aim to investigate the effects of a diet and physical activity lifestyle intervention on anthropometric measures and lifestyle behaviours in postpartum women with a history of GDM.

Methods

A two-armed unblinded randomised controlled trial (RCT) was conducted in 120 post-partum women who were previously diagnosed with GDM. Participants were assigned randomly into an intervention group or standard care group. The primary outcome variables were changes in anthropometric measurements, physical activity, and dietary habits between both groups (n=33 intervention, n=34 scheduled care).

Results

Changes from baseline to the 6-month timepoint shows that the intervention group had significant reductions in all anthropometric parameters, particularly for weight (p=0.03). Conversely, the scheduled care group showed an increase in all measures, though insignificant. Both groups showed significant increases in total physical activity as measured in MET-minutes/week (intervention group p=0.01, scheduled care group p=0.01). Intervention group reported improvement in dietary habits as measured by 6P assessment tool from baseline to 3 months, but showed regression by 6 months.

Given the limited sample size, the intervention group did not exhibit any significant differences in weight, BMI, waist circumference, body fat percentage and total physical activity at the 6-month follow-up compared to the scheduled care group.

Conclusions

Early lifestyle interventions supported by wearable devices in this study size and duration do not seem to have a statistically significant impact on anthropometric measures and physical activity among postpartum women with a history of GDM. Sustained dietary habit changes proved challenging to inculcate. Further exploration into factors influencing barriers to adoption in Singapore is pivotal in crafting suitable intervention measures.

APMCH012 A pilot model of early support from onset of marriage to improve maternal and child health outcomes and achieve resilient & inspiring families in Singapore

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Background

Marital stability serves as a crucial foundation in building a strong family, with maternal and child health pivotal in the first 1000 days of life. Currently, there are no known focused programs available to support couples from the onset of marriage and onwards their family journey, hence Project Achieving Resilient and Inspiring Families (ARIF) was piloted.

Objectives

Project ARIF, comprising of KKH team of specialised clinicians, nurses, and social workers and Singapore's Muslim marriage solemnisers (Naib Kadis – NKs), aimed to holistically enhance maternal and child health by providing socio-religious and medical support to newlyweds. With increased literacy in maternal and child health, better developmental outcomes and stronger families can be achieved.

Methods

Couples who have been risk-stratified by social and medical needs, received targeted interventions (eg: counselling, referrals) from KKH team and Naib Kadis.

Resource centres and culturally tailored printed and digital materials, were also established to provide reliable maternal and child health information for couples to independently refer and learn. Additionally, pregnancy monitoring, advisory sessions, health, and developmental monitoring were implemented for expectant mothers and newborns.

Results

In Phase 1 of ARIF (September 2020 – August 2022), 2188 solemnised couples received educational resources and were invited to maternal and child forums. Of these, 64.7% enrolled into ARIF, where 19.5% of them were identified to be of higher needs and received tailored support. Mean satisfaction scores (3.72- 4.89) on knowledge, confidence, and support-seeking behaviour were high. Positive feedbacks were gathered. Phase 1 concluded with 39 pregnancies reported and a low dropout rate of 0.85%.

Conclusions

From the results, early support and interventions helped to boost couple's confidence in building a family, hence potentially influencing the well-being of maternal and child. Whilst a formal analysis is needed to assess outcomes, it is hoped that ARIF can be replicated for other communities to achieve inspiring and resilient families.

APMCH013 Trends in patient-reported outcomes from pregnancy to 18 months after delivery: a study of first-time mothers in Singapore

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Background

There is currently a lack of sustainable community maternal and child health programmes in Singapore that provide guidance to first-time mothers. First time mothers are concerned about optimal outcome of the pregnancy and how to best to care for the baby.

Objectives

The Community enabled Readiness for first 1000-Days Learning Ecosystem (CRADLE) is an programme which aims to establish a self-learning eco-community of first-time mothers, from pregnancy to early childhood, to improve maternal experience and health outcome during pregnancy and parenting self-efficacy (PSE).

Methods

This randomised controlled trial enrolled 548 pregnant women in early pregnancy. Participants are randomly assigned to receive either (1) routine care, (2) regular behavioural nudges through short text messages and social media engagement, or (3) continuity of care involving one-on-one engagement with midwives from pregnancy until six months post-delivery. All participants are followed-up from the time they were recruited until their child reached two years of age. Information on physical and mental health, and patient-reported outcome measures (PROM) were collated at regular intervals. The study end date is Dec 2024 when all births would have reached 2 years of age.

Results

This is an interim analysis. We report the findings from 513 participants during the antenatal phase and 409 at 6 weeks, and 229 at 18 weeks post-delivery respectively. Responses for each domain were scored on a T-score metric with a mean of 50 and a standard deviation of 10 based on the original PROMIS reference sample of US adults. At ≤ 28 weeks of pregnancy, participants' physical health was at 47.0, compared to 46.0 in the third trimester. The six-month post-delivery time point showed an increase [T-score 48.3, p-value 0.0001] followed by 48.2 at 18-month post-delivery. Mental health scores at ≤ 28 weeks gestation were 49.1 and 49.2 in the third trimester respectively. There appeared to be a drop in mental health scores, 47.8 at 6 months after delivery, and 48.1 at 18 months post-delivery.

Conclusions

CRADLE seems to have positive impact on physical health and parenting self-efficacy for first-time mothers. However, the lower scores in mental health is a concern. More data will be collected to provide a more conclusive finding.

APMCH014 An Internet-Based Social Media Platform to Address Questions from First-Time Parents: A Case Study

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Background

Pregnancy is a period of profound self-upheaval during which major social-emotional changes occur in preparation for childbirth and parenthood, as well as significant physical changes to accommodate a developing foetus. While previous research has investigated parenting self-efficacy (PSE), little research has delved into how first-time parents seek professional advice through online media engagement, which may open up new avenues for building a self-learning eco-community.

Objectives

This case study examines how The Community enabled Readiness for First 1000-Days Learning Ecosystem (CRADLE) programme in Singapore facilitates first-time parents learn practical and individualised information about pregnancy and early parenting by drawing on multiple sources of qualitative data.

Methods

The objectives of this study were accomplished by employing a case study research design. The authors collected multiple qualitative data, including written questions parents posted on social media platforms, digital nudges, and readings posed on online social media, in order to obtain specific, contextual, and in-depth knowledge of a specific group of first-time parents (i.e., n=181) who had been exposed to internet-based social media platforms of CRADLE. The textual data was systematically coded using five qualitative content analysis (QCA) procedures, which included familiarising oneself with the data, selecting a coding frame using a concept-driven deductive approach, defining subcategories, coding the data twice, and comparing the QCA results with the original data.

Results

According to the findings, first-time parents were actively involved on the CRADLE social media platforms. Findings revealed that parents can use these platforms and digital nudges to improve communication and information access during pregnancy. The analysis of their questions revealed six key themes: (1) unpleasant pregnancy side effects, (2) foetal development, (3) food and nutrition, (4) pregnancy exercises, (5) concerns about labour and delivery complications, and (6) cord-blood donation.

Conclusions

Better access to information and educational resources, easing of parental concerns, and tracking of PSE make CRADLE a beneficial programme that may potentially help this population's wellbeing.

APMCH015 Acceptability of the Healthy Early Life Moments in Singapore: A preliminary analysis in preconception women with overweight and obesity

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Background

The Healthy Early Life Moments in Singapore (HELMS) is an integrated lifestyle intervention designed to initiate services before pregnancy and extend throughout the pregnancy and postpartum periods. HELMS targets women with overweight and obesity to improve their metabolic and mental well-being, ultimately optimising early childhood health outcomes.

Objectives

This study aimed to explore the experiences of participants upon completing the preconception phase of HELMS and to identify potential areas for improving interventions.

Methods

This single-centre study, conducted at KK Women's and Children's Hospital in Singapore, involved preconception women aged 21-40 years with a BMI between 25-40 kg/m². Participants self-administered an evaluation questionnaire at the end of the preconception phase, covering general experiences, insights, and the use of various HELMS components.

Results

Preliminary analysis of 52 participants showed high satisfaction (94%) and strong support for preconception information and education (98%). Ninety-four percent expressed a likelihood of recommending HELMS to women planning a pregnancy, while 92% reported improved knowledge of healthy eating and lifestyle. Additionally, Ninety-six percent expressed motivation for positive lifestyle changes, with 88% feeling well-supported by health professionals. Doctor consultations, blood glucose and lipid profile screening, and prescribed supplements were reported as the most helpful aspects based on participant feedback. Online educational resources were rated moderately helpful, while the menstrual tracker was considered the least helpful component.

Conclusions

The HELMS preconception modules are considered well-accepted by women with overweight and obesity attempting to conceive. To enhance effectiveness and scalability, in-depth interviews are recommended for a comprehensive evaluation, providing insights for refining strategies and ensuring long-term sustainability.

APMCH016 Head Circumference Measurement Matters!

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Background

Clinics have been purchasing their measuring tapes separately and resulted in different types and quality of measuring tapes being used for the measurement of head circumference in children. Head circumference measurement is an important part of growth assessment to monitor head growth and brain development. Measurement is plotted on a growth chart over time in the health booklet to determine whether a child has age-appropriate growth or deviation from normal head size. Inaccurate head circumference measurement can be due to excessive movement, measurement technique and poor quality of the measuring tape.

Objectives

The project aimed to standardize the use of the same type and quality of measuring tape used across all SingHealth Polyclinics.

Methods

To promote the use of the same type and quality of measuring tape used in the clinics, group purchase was carried out. The measuring tapes were purchased and distributed to all clinics. Positive feedbacks were received from nurses. There is standardisation of measuring tape used across all SHP clinics. Individual tape purchase by clinics is eliminated, reducing nurses' time in sourcing new measuring tapes.

Results

Adherence to proper measurement technique is achieved for accurate measurement of head circumference.

Conclusions

The measuring tapes of better quality, durability and flexibility used by the clinics played an important role in the accurate measurement of head circumferences of infants and children. The group purchase of measuring tapes has improved nurses' satisfaction and achieved economy of scale for the clinics.

APMCH017 Reminders for Efficiency

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Background

The Developmental Checklists highlight potential developmental delay and Child Safety Checklist identifies safe and child-friendly environment for the child. Parents are to complete both checklists in the child health booklet, assessing the child's personal social, fine motor-adaptive, language and gross motor skills, and safety at recommended touchpoints before polyclinic visit. Despite constant verbal reminders by nurses, caregivers continue to miss out the completion of assessment checklists. This has resulted in extended wait time for subsequent patients in the queue.

Objectives

This project aimed to remind caregiver to complete the relevant child developmental assessment checklists before visiting polyclinic.

Methods

PDSA 1:

Reminder slip with 3 reminder points was created as a visual aid on desktop screen for nurses.

PDSA 2:

Use of reminder sticker with QR code was developed for patient's direct access to patient education materials.

PDSA 3:

The significance of child development assessment was highlighted, with reminder sticker on the health booklet.

The reminder stickers were printed and distributed to all clinics. Nurses opined they were timely reminders to caregivers to complete the checklists prior to next visit and to bring child's health booklet at the next appointment.

An electronic direct mail was disseminated to nurses to raise awareness about pasting the reminder stickers on the health booklets.

The formal reminder message to parents included the following:

1. Bring Health Booklet
2. Complete age- appropriate Developmental Assessment Checklist
3. Complete age- appropriate Child Safety Checklist

Short message service (SMS)/ Push notification (PN) was sent to parents as reminders.

Results

Nurses have more time to provide important education to caregivers on their children's developments and safety.

This has smoothened the service process and increased nurses' satisfaction.

Conclusions

The reminder sticker and SMS/ PN has effectively reminded caregivers to bring health booklet and fill the checklists essential for developmental assessment.

APMCH018 Visual Learning in Child Vaccination Training

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Background

Current SHP childhood vaccination training does not include video on the positioning of child during vaccination. Nurses and caregiver face challenges in holding a child securely to prevent child from moving their limbs during injection. There were 3 cases of accidental scratch from the needle during vaccination process between Nov 2021 and Apr 2022. Nurses will need to learn the skills of holding a child during vaccination to ensure safety of infant and caregiver, and to gain cooperation from caregiver.

Objectives

This project aims to improve child safety by enhancing nurses' knowledge and skills in positioning of child during vaccination.

Methods

An educational video with a duration of 4 min 38 seconds was developed to train existing and new nurses to acquire the knowledge and skills in safe and proper positioning of child during vaccination. The safety aspect of positioning a child during vaccination was emphasized. The video includes the correct way of patient identification, selection of right needle size and location of correct anatomical site for vaccination. Post vaccination, patient education advise was highlighted.

The video was added to childhood vaccination training and uploaded to Infopedia for all nurses to review as refresher training.

Results

The video has helped to standardise practices across all clinics. The incidences of accidental needle scratch injury have reduced from 3 to 0 over a period of 6 months.

Conclusions

The video increased the confidence and improved the competency of vaccination trained nurses in proper positioning of child with cooperation from the caregiver.

APMCH019 A Real-Time Preconception Model of Care for Maternal & Child Health

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Background & Objectives

The preconception period is crucial for optimizing gamete function and early placental development, to maximize conception success and long-term maternal-child health. Currently, the maternal-child health system is ill-equipped for this with a lack of preconception services and consequently, global fertility rates continue to fall and mothers embark on their pregnancy journey in poor health. There is a pressing need to implement a comprehensive community-level preconception care program that

integrates medical, fertility, and lifestyle interventions to enhance immediate fertility and improve long-term maternal and child health outcomes.

Methods

Drawing from recent evidence on fecundability lifestyle risk factors, the effectiveness of current preconception interventions, and the application of mobile health (mHealth) technologies for health optimization, we propose a novel couples-based preconception intervention framework.

Results

The programme starts with a self-evaluation of the couple's medical, fertility, and lifestyle factors, including physical, sexual, metabolic, and mental health. This self-assessment yields a tailored risk score that informs subsequent management strategies and prompts specialist referrals if necessary. Tiered management is delivered through an mHealth application, providing anticipatory guidance based on evidence-based recommendations. This guidance is designed to increase awareness, set targeted health goals, and encourage continuous engagement in beneficial health behaviors, such as diet, exercise, mental health, sleep hygiene, micronutrient supplementation, and sexual health practices. Ongoing engagement is achieved with personalized nudges and gamification features to promote motivation for change. These interventions are grounded by theoretical frameworks for behavioural change, including the health belief model and theory of planned behaviour.

Conclusion

We propose a novel digital preconception care model incorporating self-assessment with real-time feedback and tiered management function to optimize reproductive health of couples prior to conception. This model forms a reference framework of content for future preconception care intervention delivery in the community setting.

APMCH020 Ethnic differences in feeding and eating practices in infants and young children in Singapore

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Background

Research has shown that babies who experience quick weight gain during their initial year or have a higher weight status are at an increased risk of developing obesity in the future. It is crucial to gain insight into the feeding practices and physical activity patterns in infants that could contribute to excessive weight gain. This understanding, taking into account factors such as ethnicity is essential for the development of effective interventions aimed at preventing obesity.

Objectives

This study aims to examine the association between unfavorable feeding practices such as engaging in screen viewing time (SVT) during mealtimes, and the consumption of sugar sweetened beverages (SSBs) and processed foods across three ethnic groups in an Asian Singapore population.

Methods

A total of 1073 parents of children ages below 3 years participated in a parent-reported survey. The survey questions consisted of baseline characteristics of the child, feeding and eating practices in the domain of variety, autonomy, setting and timing of caregivers. Data was collected separately for three age groups: 1) 0-<7 months 2) 7-<13 months 3) 13-<36 months. Descriptive statistics were used to present the data collected.

Results

The mean age of the caregivers in this sample is 34.7 (SD: 5.8) years, with a majority of Chinese ethnicity and a university-level education. The infants in this study, in the age group of 0-<7 months, were on average 2.9 months old. Those in the age group of 7-<13 months were on average 8.7 months old, and those in the age group of 13-<36 months were on average 23.4 months old. In the age group of 7-<13 months of age, children of Indians caregivers were observed to be more likely to have meals while concurrently engaging in SVT ($p=0.02$). Within this same age range, the Malay caregivers were found to have a higher likelihood of providing processed or packaged food to children ($p<0.001$). There were no associations between ethnicity and the consumption of SSBs in this age group. Among older children aged 13 to less than 36 months, caregivers of Malay ethnicity were found to have a higher likelihood of providing processed or packaged food, as well as sugar-sweetened beverages, at least once a week to a few times a week ($p<0.05$) to their children. There were no significant associations between ethnicity and SVT during meals in this age group. There were no significant differences in these practices in infants amongst the ethnic groups.

Conclusion

In summary, feeding practices and child eating behaviors associated with childhood obesity differed based on race/ethnicity. This highlights the significance of implementing early interventions that are tailored to specific ethnic groups.

APMCH021 Developing an instrument for infant feeding and lifestyle evaluation: Content validation and a cross-sectional assessment of current caregivers' practices

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Background

The first 1000 days of a child's life is a period of rapid growth and neurodevelopment, influencing lifelong cardiometabolic health. There is lack of an integrated assessment tool for caregivers to understand and cultivate healthy eating and lifestyle habits in children.

Objectives

Our primary aim is to develop and validate a self-assessment tool, entitled Feeding, Lifestyle, and Activity Goals (FLAGs), for caregivers to identify lifestyle behaviour problems and abnormal feeding/eating patterns in children aged 0 – 2 years. Our secondary aim is to conduct a pilot assessment, evaluating current child feeding and lifestyle practices.

Methods

Our questionnaire was developed by domain experts after review of contemporary evidence. Content validity index (CVI) was determined by domain experts and 198 caregivers recruited between January – May 2023. They evaluated the assessment tool on a 4-point scale based on relevance (CVIR), clarity (CVIC), simplicity (CVIS), and ambiguity (CVIA), with scale CVI (S-CVI) > 0.7 considered as acceptable.

Results

S-CVI was high among experts and caregivers, (S-CVIR: 0.99; S-CVIC: 0.97; S-CVIS: 0.99; S-CVIA: 0.95, and S-CVIR: 1.0; S-CVIC: 0.87; S-CVIS: 1.0; S-CVIA: 0.97, respectively), reflecting high content validity. Participants' FLAGs responses provided cross-sectional assessment of current feeding and lifestyle practices of the cohort. 50.4% of children were not introduced to complementary feeding in a timely manner (i.e. too early/late), and only 52.3% of those above 1-year-old were eating same food as their family. 30.5% had nocturnal feeding after 9 months old. 33.3% of children had inappropriate or excessive screen time. 53% did not meet daily recommended age-appropriate physical activity.

Conclusion

This study illustrates high content validity indices of the FLAGS questionnaire. A cross-sectional assessment of caregivers' practices reveals worrying findings that caregivers are not putting healthy feeding, lifestyle, and activity recommendations into practice. Thus, there is an unmet need to develop an accessible educational tool based on current evidence-based recommendations.

APMCH022 Improving quality of lactation support for postnatal mothers in the primary care setting

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¹Punggol Polyclinic - Nursing, SingHealth Polyclinics, Singapore

Background

Breastfeeding is a common challenge faced by all mothers. As part of the IMCWH programme, all mothers accompanying their infants (0-6 months) were screened for breastfeeding issues and those who require lactation support are referred to the Tier 2 clinic for assistance and counselling by a trained nurse. Poor latch (35%) and breast engorgement (31%) are main reasons patients were referred. Nurses shared that existing materials for lactation support can be further enhanced.

Objectives

Enhance the quality of lactation support for all mothers in tier 2 clinic through improvements in existing resources.

Methods

A PDSA approach was adopted.

- Plan:
 - Gather feedback on knowledge gap.
 - Standardization in screening during child's 0-6 months visit.
- Do:
 - Gave out breastfeeding pamphlet to all mothers.
 - Acquired breastfeeding accessories to assist in education.
 - Involve spouse during sessions.
 - QR code for breast massage video.
- Study:
 - Analyze post-intervention findings.
 - Identify improvement areas from feedback.
- Act:
 - Monitor feedback from mothers and nurses.

Results

- 13.6% of mothers returned to continue to seek nurses' support.
- All feedback by mothers revealed that the support has been 'helpful' to 'very helpful'.
- Nurses feedback that accessories have facilitated the sessions more effectively.
- Viewership for YouTube video increased significantly from 6519 - 8414 views.

Conclusion

Lessons from this project serve as important considerations when replicating a similar lactation support service in primary care clinics. Lactation support is not only individualized but must take on a practical and hands on approach where diversifying support materials is needed. In addition to providing mothers with written materials, the tier 2 clinic needs to be equipped with accessories to provide a more holistic education and care for the mothers. This project has also highlighted the importance of spousal role in their partner's breastfeeding journey to care for and work with the mother, baby and father as a family nexus.

APMCH023 Compassionate CARE for Young Mothers: Exploring the Impact of a Specialised Multidisciplinary Antenatal Clinic on Adolescent Pregnancy Support and Empowerment

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Background

The multifaceted challenges faced by pregnant adolescents underscores the necessity for thoughtful, tailored interventions. Our study delves into the intricate needs and concerns of adolescent pregnant mothers aged 21 years and under, and investigates the role of a specialised antenatal clinic - namely KK Women's and Children's Hospital's Clinic for the Adolescent Pregnant (CARE) - in addressing them.

Objectives

By evaluating the effectiveness of existing interventions and identifying potential gaps, we aim to develop more targeted interventions for pregnant adolescents and their offspring.

Method and Results

Based on insights from 52 distinct responses, patients' foremost concerns are financial issues, complications during pregnancy and childbirth, and lack of confidence in parenting. The need for support is greatly emphasised, with financial assistance taking precedence, followed by emotional support and guidance on family planning.

Majority of patients commend CARE clinic for providing exceptional emotional support, excellent medical care, and having compassionate, friendly staff. Significantly, 98% of participants express willingness to recommend CARE clinic to others facing similar circumstances.

Identified areas for improvement include provision of financial advice and more counselling for partners and families. While CARE clinic is heavily subsidised, the main obstacles hindering attendance remain centred on financial limitations, as well as time constraints. Thus, future considerations may involve offering financial counselling and providing comprehensive information on available financial assistance programmes. Additionally, accommodating the schedules of young mothers through more flexible clinic hours and virtual consultations could help overcome time constraints.

Conclusion

Conclusively, while CARE clinic excels in medical care and fostering a safe, welcoming environment, there exists untapped potential for growth, particularly in addressing financial concerns and providing greater flexibility. Tailoring services to incorporate more family and partner sessions may also help augment the care provided to patients. Ultimately, these valuable insights position the clinic to better confront evolving challenges and actively respond to the dynamic circumstances of our young mothers.

APMCH024 Understanding The Needs and Concerns of Adolescent Single Mothers in Singapore

Ilyia Natasha Amir Singh¹, Samantha Rachel Yeo Mei-e¹, Natasha Nabila binte Muhamad Nasir¹, Suzanna Sulaiman¹

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Background

Adolescent pregnancy remains a major public health concern globally due to adverse effects on both mother and child. Thus, it is important to implement and critically evaluate antenatal health programmes. Singapore's KK Women's and Children's Hospital Clinic for the Adolescent Pregnant (CARE) aims to provide multidisciplinary, specialist antenatal services for adolescent mothers.

Objective

Our study aims to investigate the primary concerns of CARE patients, to identify potential and existing gaps in adolescent antenatal care.

Methods and Results

We administered a questionnaire pertaining to specific medical, social, and emotional concerns. 51 discrete responses from adolescent mothers aged 18.5±1.54 years were obtained, which ranked financial constraints as the foremost concern, followed by feelings of guilt. Other significant concerns include mental health, lack of support and domestic violence.

Conclusion

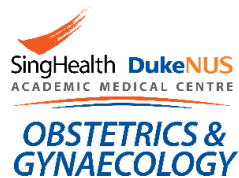
Thus, this has strongly reiterated the importance of multidisciplinary care in tackling the wide range of issues in adolescent pregnancy, and the need to fortify united community support for this vulnerable group.

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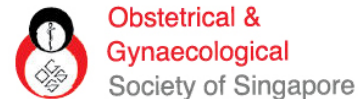
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Key Opinion Leaders: Prof Eric A. Finkelstein
Prof Truls Ostbye

Key Members: Dr Lim Wai Yee
A/Prof Tan Lay Kok
A/Prof Tan Thiam Chye
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Dr Tippi Mak

Research Theme 2: Collaborative Research Platform for Early Intervention for Infant and Children with High Risk of Metabolic Diseases

Theme Leaders: A/Prof Fabian Yap
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Dr Karen Ng

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Key Members: Prof Victor Samuel Rajadurai
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Research Theme 3: Innovative & System Research Platform for Enhancing Health Outcome in Women and Children with High Metabolic Risks

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Key Opinion Leaders: Prof David B. Matchar
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Research Theme 4: Qualitative Research Platform for Maternal-Child Adjustment and Patient Activation in Women and Children with High Metabolic Risks Diseases

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Research Theme 5: Collaborative Research Platform of Bio-Psycho-Social Integration for better Maternal and Child Health Outcomes

Theme Leaders: A/Prof Ang Seng Bin
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Research Theme 6: Collaborative Implementation Science Platform for the Optimal Implementation of Programs for better Maternal and Child Health Outcomes

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Dr Han Wee Meng
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Research Theme 7: Combined Registry for Metabolic Diseases (Obesity and Diabetes)

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Prof David B. Matchar
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Key Members: Dr Bee Yong Mong
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The Integrated Platform for Research in Advancing Maternal & Child Health Outcomes (IPRAMHO) has evolved from the original Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children, to focus comprehensively on various pressing issues (e.g., mental health) in maternal and child care, besides metabolic health.

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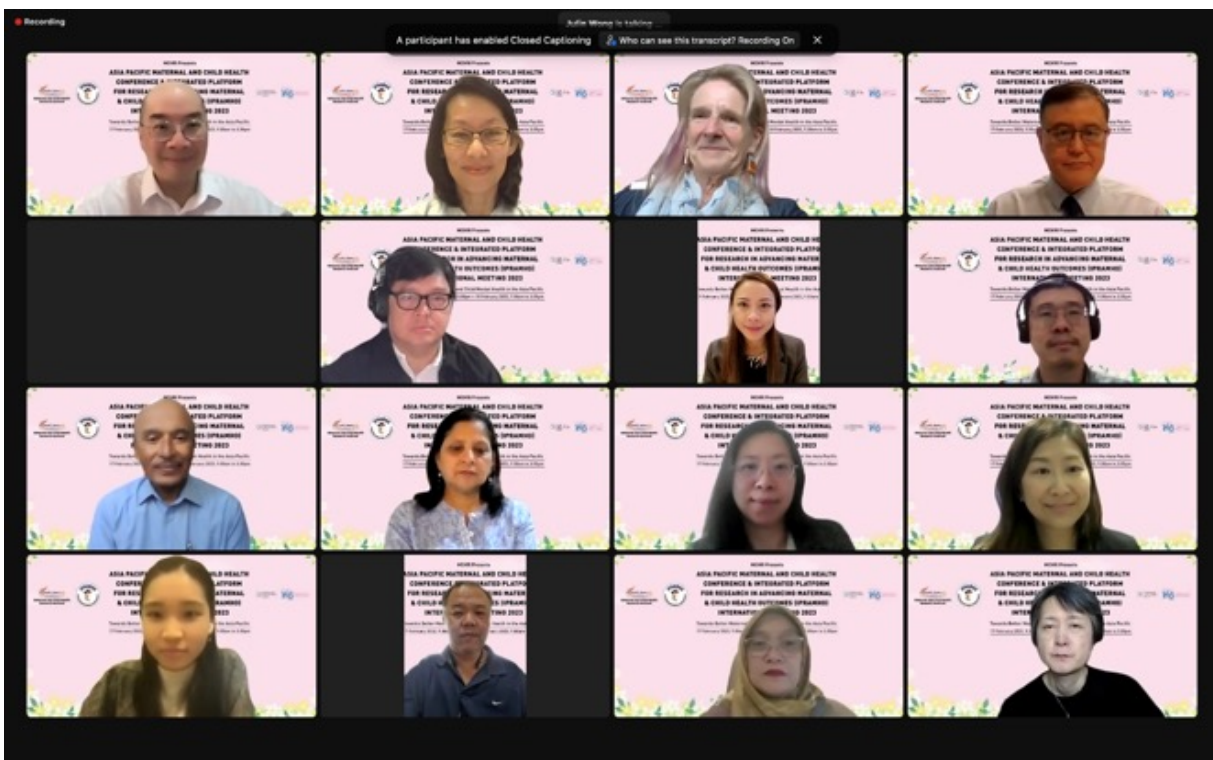
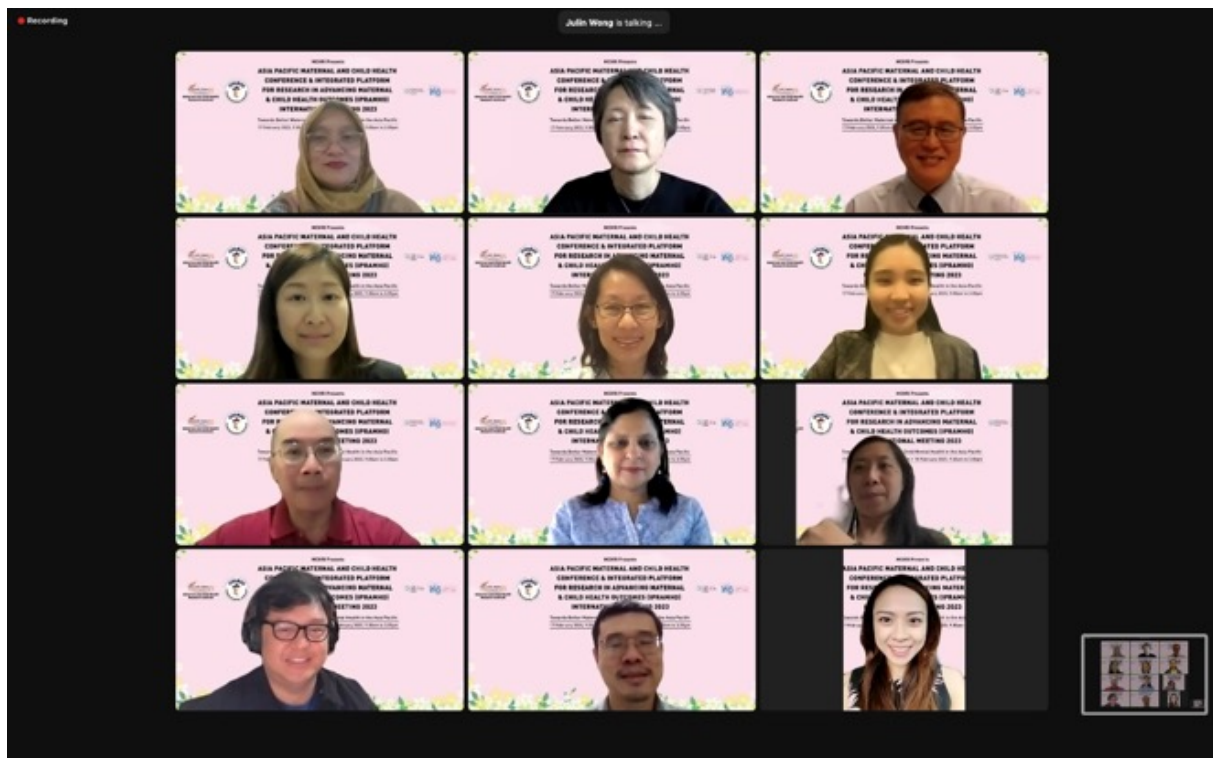
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18 FEBRUARY 2023

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Dr Janil Puthucheary with local experts