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CONTENTS

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Obstetric Admissions to the Intensive Care Unit in a Tertiary Centre

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ABSTRACT

Introduction: *Obstetric complications relating to pregnancy, delivery and the puerperium can result in severe maternal morbidity and mortality. Understanding risk factors for obstetric WICU admissions may identify high-risk pregnancies and early intervention can improve maternal outcomes.*

Aims and objectives: *The primary aim of this study was to assess facility-based incidence, case fatality rate and risk factors for obstetric Women's Intensive Care Unit (WICU) admission.*

Methods: *Retrospective review of all WICU admissions for one year between January 2009 and December 2009 at KK Women's and Children's Hospital (KKH). Maternal characteristics and all variables concerning pregnancy and delivery were recorded, together with specific data associated with the ICU stay, including indication for admission and major interventions.*

Results: *There were 67 obstetric WICU admissions, with a hospital-based incidence of 5.6 per 1,000 deliveries. The vast majority of these admissions were postnatal. There was no maternal mortality during the period under review. The most frequent indications for postnatal WICU admission were hypertension during pregnancy (42.6%) followed by major obstetric haemorrhage (39.4%). The other factors associated with a higher risk for WICU admission, and hence severe maternal morbidity, were maternal age above 30, parity above two, and gestational age below 37 weeks.*

Conclusion: *Hospital-based incidence of WICU admission was 5.6 per 1,000 deliveries. Hypertension during pregnancy, major obstetric haemorrhage, maternal age above 30 and parity above two appear to be significant risk factors for WICU admission.*

Keywords: ICU. Perinatal. Maternal morbidity.

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INTRODUCTION

Obstetric complications relating to pregnancy, delivery and the puerperium can result in severe maternal morbidity and mortality. The Women's Intensive Care Unit (WICU) is a specialized facility in KK Women's and Children's Hospital where complicated cases are monitored in a high-dependency and intensive care setting through a multidisciplinary approach involving obstetricians, intensivists, obstetric physicians and other sub-specialists.

The primary aim of this study was to assess facility-

base incidence, case fatality rate and possible risk factors for bstetric WICU admission.

MATERIALS AND METHODS

The Women's Intensive Care Unit record log books were searched to identify all cases of obstetric intensive care admissions at KKH between 1 January 2009 and 31 December 2009. The history, examination, ultrasound results at presentation and discharge were reviewed, together with labor and operation notes, if any. Each case was assigned a unique Escrow number, and the corresponding patient's name and personal particulars were entered into a separate Excel database so as to maintain patient anonymity.

We recorded maternal characteristics (age, parity, and ethnicity), indication for admission, and major interventions. Our definition of major obstetric haemorrhage included one or more of the following: estimated blood loss of more than 1500 ml, need for blood transfusion, need for uterine packing, performance of uterine artery ligation, and Cesarean hysterectomy.

When more than one indication for WICU admission was present on admission, the case was classified according to the most serious condition, and secondary indications were recorded for future reference.

Parity was calculated including the current delivery. Any clinically significant pregnancy-associated conditions diagnosed prior to the patient's current hospital admission and WICU admission were considered significant antenatal events.

Denominator data for the number of births in KKH and reference values for possible risk factors for obstetric WICU admission were obtained from an electronic birth registry in KKH.

The case fatality rate was calculated by dividing the number of deaths by the total number of WICU admissions. Odds ratios and confidence intervals compared with the general pregnant population were calculated. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS 17.0).

RESULTS

Sixty-seven obstetric WICU admissions were identified during the 1-year period and reviewed. One woman was readmitted, after she developed peripartum cardiomyopathy and sepsis following her first discharge from the WICU. Case notes for all sixty-seven admissions were traced and reviewed. The characteristics of women admitted are shown in Table 1. The hospital-based incidence of obstetric WICU admissions was 5.6 per 1000 deliveries.

Patient Characteristics: The mean age of women admitted was 32.3 years, with the majority falling within the age group of 30-34 years of age (37.3%).

Ethnicity of women admitted was as follows: 48.5% Chinese, 24.2% Malay, 15.2% Indian, and 12.1% "Others". Of the eight women classified under "Others", two were Vietnamese, two were Thai, two were Burmese, one was Filipino and one was German.

The majority of women admitted (75.8%) had no previous medical problems, and only 24.2% had at least one chronic disease.

Admission Characteristics: The most frequent indication for postnatal WICU admission was hypertension during pregnancy (42.6%), with pre-eclampsia and eclampsia contributing 32.8% and 9.8% respectively of all obstetric WICU admissions (Table 2). Major obstetric haemorhage (39.4%) was the next most frequent indication, occurring mainly as a delivery complication of cases with known placenta previa / adhesions. Amongst the six antenatal admissions, three (50.0%) were for severe pre-eclampsia, two for cardiomyopathy (33.3%) and one was for suspected pulmonary embolism with haemoptysis.

Of all the cases admitted to the WICU, 23.9% required assisted ventilation, 11.9% received massive transfusions, and 4.5% required inotropic support. Mean duration of WICU stay was 2.9 days. Only four

women stayed more than four days (6.0%).

Pregnancy Characteristics: Majority (63.6%) of women admitted experiencing at least one significant antenatal event prior to their current KKH admission. The specific antenatal events experienced are recorded in Table 3.

The mean gestational age on admission to WICU was 33.3 weeks, with 38.8% of women beyond 34 weeks amenorrhoea upon admission to WICU.

31.1% of the women admitted were primiparous, 29.2% were para 2, 23.9% were para 3, and 15% were para 4 and above.

Upon WICU admission, 24.2% of the women were previously unbooked at KKH. Only 3 women (4.5%) were totally unbooked and had received no formal antenatal care throughout their whole pregnancy. For those 13 women who were unbooked at KKH but transferred for complications in pregnancy, 12 had been followed up with a private obstetrician previously and one had been followed up at another restructured hospital. The remaining 50 women (75.8%) had all been seen at KKH prior to their WICU admissions. Of these, 12 women had booking visits only in their third trimester, although 9 of these 12 women had actually been followed up by a private obstetrician and requested to be transferred to KKH for their antenatal care and deliveries due to complications in their pregnancy, such as placenta previa major (77.8%) and fetal anomalies (22.2%). In total, 22 WICU cases (33.3%) had been transferred to KKH for management of pregnancy complications. The remaining three women were late bookers who had received no formal antenatal care throughout the first and second trimesters of their pregnancy.

Of the 64 women who eventually delivered during their admission to KKH, 90.6% were delivered via Caesarean section (Emergency, Crash or elective). 62.5% were Emergency Caesarean sections, 15.6% were crash Caesarean sections, and 12.5% were elective Caesarean sections. The remaining 6.3% delivered via normal vaginal delivery, and 3.1% delivered via assisted vaginal delivery.

Outcome: Following WICU discharge, most women (73.1%) were discharged to a step-down Post-Operative Area. 17.9% were transferred directly to a general ward, 3.0% were transferred to another government hospital for sub-specialty care (e.g. cardiac or renal support), 3.0% were discharged to the delivery suite and 3.0% were discharged home. At routine postnatal follow-up, 67.2% were well with no complaints. 10.4% reported minor complications still requiring follow up, 16.4% defaulted on their appointments and 6.0% were lost to follow up.

DISCUSSION

KKH manages over 30% of all deliveries in Singapore, with over 12,000 deliveries in 2009. As all obstetric WICU admissions were enrolled and reviewed, our study is quite representative of the critically ill obstetric population in Singapore.

The obstetric WICU admission incidence of 5.6 per 1000 deliveries is slightly above the incidence of 2-4 per 1000 deliveries, as reported by Zeeman [1]. We practice a low threshold for WICU admission, and all women who are perinatally unstable are transferred to the WICU for monitoring and co-management by trained intensivists. Likewise, we feel it is appropriate to use WICU admission as an approximation for severe maternal morbidity. There was no case fatality rate in our series. This may reflect that referral to a tertiary centre, and a low threshold for admitting critically ill obstetric patients for aggressive WICU monitoring and appropriate interventions significantly reduces multiple organ failure and maternal mortality [1, 2].

In comparison to a similar case series [7] performed ten years earlier in our centre, we note that the incidence of WICU admissions has decreased only slightly, from 7.5 per 1000 admissions, to 5.6 per 1000 admissions. More significantly, there has been a shift in the main causes of obstetric morbidity - in Quah's study, hypertension and haemorrhage were responsible for 50% and 24% of obstetric admissions respectively. This translates to a 64% increase in severe maternal haemorrhage, and a 15% decrease in hypertension as major contributors to maternal morbidity within the same population of patients

over the course of ten years. This is in line with published results from other developed countries, which found a 64% decline in eclampsia rates in Canada from 2003 to 2007 [8], and increases of 46% to 297% in severe postpartum haemorrhage observed from 2000 to 2009 in British Columbia [9]. We attribute the drop in severe hypertension to earlier detection and intervention during the antenatal period, and the rise in WICU admissions due to postpartum haemorrhage to be due to more cases of previous Cesarean sections with adherent placentas and more aggressive monitoring and intervention postnatally [10-13]. Our study has also demonstrated a drop in maternal mortality in intensive care unit admissions from 1.3% in 1998 to 1999 [7] to 0% in 2009. Thus, whilst hypertension and major obstetric haemorrhage continue to be leading causes of maternal morbidity and mortality worldwide [1, 4-6], our data shows that recent improvements in combined obstetric and intensive care may have helped to reduce and prevent maternal mortality from such high-risk pregnancies.

The mean age of patients admitted as well as the percentage of patients who were free of chronic medical conditions is comparable with similar patient characteristics in the largest cohort study of WICU admissions, conducted in the Netherlands (32years vs. 32.3 years, and 75.8% vs. 72.0%). The average length of stay of 2.9 days is also comparable with the Dutch study [3].

Maternal age of 30 and above increases the risk of WICU admission, and hence severe maternal morbidity. A younger maternal age appears to be protective against WICU admission. Parity above two is a risk factor for WICU admission, and is consistent with the increasing risks of antenatal and delivery complications associated with increasing parity.

A woman's risk of being admitted to WICU appears to be higher if her gestational age is below 37 weeks on admission to WICU or at delivery directly prior to WICU admission. This is because timely delivery in an elective or emergency setting is important in managing pre-eclampsia / eclampsia and delivery complications from known cases of placenta previa / adhesions [1].

Delivery via Caesarean section (either elective or emergency) is associated with a higher risk of severe maternal morbidity. This is probably confounded by the fact that Caesarean delivery is the mode of choice for most potentially unstable high-risk pregnancies and deliveries. Ideally, the indications for Caesarean delivery in the women enrolled in this study should have been analyzed in order to further exclude cases which were delivered via Caesarean section for reasons which were not absolutely medical.

Interestingly, whilst ethnicity could be identified as affecting an obstetric patient's risk of WICU admission in other Western and Asian studies [1, 7], women of different ethnicities in our study did not have significantly different risks of WICU admission and hence maternal morbidity. The main limitation of this study is the relatively small sample size, contributed by the relatively low number of absolute births (39,570 in 2009) in Singapore, as compared to other countries.

CONCLUSION

The hospital-based incidence of WICU admission was 5.6 per 1,000 deliveries, with no case fatality. A low threshold for admitting critically ill obstetric patients for aggressive WICU monitoring and appropriate interventions may reduce multiple organ failure and maternal mortality. Hypertension during pregnancy, major obstetric haemorrhage, maternal age above 30 and parity above two appear to be significant risk factors for severe maternal morbidity.

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Table 1: PATIENT CHARACTERISTICS

	n	%	*n*	%	ODDS RATIO	Confidence Interval
			Control, n=11903			
Age (years) *n*=66						
Below 20	0	0.0	449	3.8		
20 – 29	17	25.8	5372	45.1	**0.4218**	0.243 - 0.733
30 – 34	25	37.9	3695	31.0	**1.355**	0.822 - 2.231
35 – 39	21	31.8	1969	16.5	**2.354**	1.399 - 3.961
40 and above	3	4.5	418	3.5	**1.308**	0.409 - 4.183
Ethnicity (*n*=66)						
Chinese	32	48.5	5526	46.4	**1.154**	0.711 - 1.872
Malay	16	24.2	3229	27.1	**0.860**	0.489 - 1.512
Indian	10	15.2	1406	11.8	**1.333**	0.679 - 2.619
Others	8	12.1	1742	14.6	**0.833**	0.397 - 1.751
Chronic disease (*n*=66)[a]						
No chronic disease	50	75.8				
One or more chronic diseases	16	24.2				
Asthma	7	10.6				
Hypertension	3	4.5				
Cardiovascular disease	3	4.5				
Seizures	2	3.0				
Diabetes	2	3.0				
Others[b]	6	9.1				

[a] Numbers do not add up to the total as some women suffered from more than one chronic disease.
[b] Anaemia, Thyroid disease, Migraines, Gastritis.

Table 2: WICU ADMISSION CHARACTERISTICS

	n	%
Length of Stay (Days) *n*=66		
1 day or less	12	17.9
2	35	52.2
3	11	16.4
4	5	7.5
5 to 10	2	3.0
10 to 20	1	1.5
More than 20	1	1.5
Major WICU Interventions (*n* =67) [a]		
Assisted Ventilation	16	23.9
Massive Transfusion	8	11.9
Inotropic Support	3	4.5
Diagnosis (*n*=67)		
Postnatal Cases (n=61)		
Hypertension During Pregnancy	26	42.6
Eclampsia	6	9.8
Severe Pre-Eclampsia	20	32.8
Major Obstetric Haemorrhage	24	39.4
Cardiomyopathy	6	9.8
Sepsis / Infection	2	3.3
Others	3	4.9
Antenatal Cases (n=6)		
Severe Pre-Eclampsia	3	50.0
Cardiomyopathy	2	33.3
Haemoptysis	1	16.7

[a] Numbers do not add up as some women required more than one major intervention.

Table 3: PREGNANCY CHARACTERISTICS

	n	%	*n*	%	ODDS RATIO	Confidence Interval
			Control, n=11903			
Gestational Age on Delivery / WICU Admission (*n*=66)						
23 – 26 weeks	4	6.1	45	0.4	**17.001**	5.934 - 48.710
>26 – 30 weeks	9	13.6	107	0.9	**17.407**	8.403 - 36.060
>30 – 34 weeks	12	18.2	347	2.9	**7.401**	3.924 - 13.959
>34 – 37 weeks	25	37.9	2889	24.3	**1.903**	1.155 - 3.134
>37 weeks	16	24.2	8515	71.5	**0.127**	0.072 - 0.224
Parity (*n*=66)						
1	20	30.3	5102	42.9	**0.580**	0.342 - 0.981
2	20	30.3	4054	34.1	**0.842**	0.497 - 1.425
3	16	24.2	1779	14.9	**1.821**	1.035 - 3.205
4	6	9.1	639	5.4	**1.763**	0.759 - 4.095
5	4	6.1	215	1.8	**3.507**	1.265 - 9.727
6 or more	0	0.0	114	1.0		
Mode of Delivery (*n*= 64)						
Caesarean Section	58	90.6	3595	30.2	**5.820**	2.507 - 13.508
Emergency (including crash)	50	78.1	2387	20.1	**14.238**	7.858 - 25.796
Elective	8	12.5	1208	10.1	**1.265**	0.602 - 2.659
Normal Vaginal Delivery	4	6.3	7664	64.4	**0.0369**	0.013 - 0.102
Assisted Vaginal Delivery	2	3.1	627	5.3	**0.580**	0.142 - 2.377

Significant Antenatal Event (*n*= 64) [a]

No Significant Antenatal Event	24	36.4
One or More Significant Antenatal Event(s)	42	63.6
Hypertension	19	28.8
Placental Abnormalities	14	21.2
Placenta Previa Major	7	
Placenta Accreta	5	
Placenta Increta	1	
Placenta Percreta	1	
Diabetes	6	9.1
Multiple Gestation (Twins / Triplets)	4	6.1
Others [b]	3	4.5

Booking Visit (*n*=66)

Booked at KKH prior to WICU Admission	50	75.8
Booked in First Trimester	24	36.4
Booked in Second Trimester	14	22.2
Booked in Third Trimester	12	18.2
Unbooked in KKH prior to WICU Admission	16	25.2
Booked with Private Obstetrician	12	18.2
Booked at Other Restructured Hospital	1	1.5
Totally Unbooked	3	4.5

[a] Numbers do not add up to the total as some women experienced more than one significant antenatal event

[b] Respiratory symptoms, threatened miscarriage

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Elective Caesarean Delivery between 37 and 38 weeks: An Audit of Indications in a Tertiary Referral Centre

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ABSTRACT

Introduction: *The guidelines of the National Institute for Health and Care Excellence (NICE) and American Congress of Obstetricians and Gynecologists (ACOG) recommend against routine elective caesarean deliveries before 39 weeks of gestation due to increased risk of neonatal respiratory morbidity. However, maternal requests for delivery prior to 39 weeks have been documented in some centres. In Asian populations, these requests are associated with beliefs about auspiciousness of time of birth. The objective of this study is to examine indications of early term elective caesarean deliveries performed in KK Women's and Children's Hospital (KKH).*

Methods: *This is a retrospective audit of elective caesarean deliveries performed between 37+0 and 38+0 weeks of gestation, from 1 January 2015 to 31 July 2015 in KKH. Data was extracted from the Trusted Care dashboard, a care pathway for caesarean delivery in KKH. Ninety women were listed for an elective caesarean section during the study period.*

Results: *Of our study population, majority of women (88%, n=79) underwent elective caesarean delivery as planned. The most common indication for elective caesarean section as the mode of delivery was a history of prior caesarean section (38%, n=30). The most common reason for scheduling delivery prior to 39 weeks was poorly controlled medical conditions (19%, n=15). Maternal request to bring forward the time of delivery was noted in 15% of pregnancies (n=12).*

Conclusion: *In this audit, majority of early caesarean deliveries were justified. By raising awareness, we hope to further diminish early term caesarean delivery driven by maternal request.*

Keywords: early term caesarean delivery, indications for caesarean delivery, timing of delivery, antenatal corticosteroids.

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INTRODUCTION

The recognition that rate of caesarean delivery has escalated tremendously, in Singapore (1) and around the world (2), has generated extensive study of factors contributing to the trend and, more importantly, of how outcomes of a procedure that has made its way in to common practice can be optimised. One element in the enhancement of outcomes is the timing of elective delivery. This is an area of growing interest in light of recent evidence suggesting that the gestational period between 37+0 and 41+6 weeks, previously known as 'term', is in fact a window wide enough to encompass

distinct phases of gestation that confer significantly different neonatal morbidity risks from delivery (3, 4).

Taking into account the emerging evidence, the American Congress of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (5) recommend that expression 'term' be substituted, as proposed by a working group (6), to 'early term' (37+0 to 38+6), 'full term' (39+0 to 40+6), 'late term' (41+0 to 41+6). Furthermore, the National Institute for Health and Care Excellence (NICE) and the ACOG recommend, in guidelines, that routine elective caesarean deliveries, short of maternal or fetal indications, not be performed before 39 weeks of gestation, in view of the increased of neonatal morbidity with decreasing gestational age (7, 8).

It is concerning then that in spite of existing recommendations, elective caesarean deliveries performed before 39 weeks of gestation have been associated with requests arising from beliefs about auspiciousness of time of birth (9).

As non-maleficence is a core tenet of medical ethics and healthcare is a negative right, institutions have a duty to examine indications for early elective caesarean deliveries and implement the necessary to ensure that all early term elective caesarean deliveries are clinically justified. Therefore, the objective of this study is to perform an audit of indications and outcomes of early term elective caesarean deliveries performed in KK Women's and Children's Hospital (KKH) and propose recommendations for practice improvement.

METHODS

KK Women's and Children's Hospital (KKH) is a tertiary referral hospital in Singapore that sees approximately 12 000 deliveries annually. A retrospective audit of elective caesarean deliveries performed between 37+0 and 38+0 weeks of gestation, from 1 January 2015 to 31 July 2015 was conducted. The authors focused on this narrower and earlier gestational period of 37 to 38 weeks as opposed to the wider early term window of 37 to 39 weeks because this earlier period is of greater concern in view of the association of earlier delivery with progressively higher risk of neonatal complications (3, 4). Furthermore, the data from another institution's experience of reducing non-indicated early elective caesarean deliveries showed greater improvement in neonatal outcomes in delaying delivery from 37 to 39 weeks, compared to delaying delivery from 38 to 39 weeks (10).

Data was extracted from the TrustedCare® dashboard, a care pathway model for initially introduced for elective caesarean delivery KKH in 2014 and subsequently expanded to encompass all caesarean sections. Developing Trusted Care involved redesigning the entire process of elective caesarean section, from listing of the surgery to discharge, with the aim of optimizing clinical outcomes as well as enhancing patient safety, operational efficiency and financial sustainability through the standardized practice of evidence -based principles.

A datasheet of study variables was designed for data collection. This included information on demographic characteristics; past obstetric, gynaecological as well as any other medical or surgical history; and details of index pregnancy including antenatal history, indication for listing, administration of antenatal corticosteroids, eventual mode of delivery and neonatal outcomes in the immediate post-operative period. Statistical analysis was performed using Microsoft Excel 2013 (Microsoft Inc, Redmond, WA, USA).

RESULTS

Demographics

A total of ninety women were listed for an elective caesarean section during the study period. Of these, majority (88%, n=79) underwent elective caesarean delivery as planned while the remaining required an emergency caesarean delivery (10%, n=9) or an urgent caesarean delivery (2.2%, n=2) (Fig. 1).

Among the women who underwent elective caesarean delivery, median age of women at the time of delivery was 34 years. With regard to obstetric history, 35% of them were nulliparous (n=28), 29% were para one (n=23) and the remaining 35% were para two or more (n=28). Regarding the racial distribution, 51% of women were of Chinese origin (n=40), 18% of Malay origin (n=14), 15% of

Indian origin (n=12) and the remaining 16% of women were of other origins (n=13). Dating had been performed during the first trimester for most pregnancies (91%, n=72) while the remaining pregnancies had been dated during the second trimester (9%, n=7).

Indications of urgent and emergency caesarean delivery

In this audit, 12.2% (n=11) of women who were listed for early term elective caesarean delivery had required an urgent or emergency caesarean delivery instead. The documented reasons for the shift to urgent/emergency caesarean delivery in this subgroup were: labour (55%, n=6), pre-eclampsia (18%, n=2), labour with non-reassuring fetal status (9%, n=1), premature rupture of membranes (9%, n=1), placental insufficiency (9%, n=1).

Elective caesarean delivery: Indications for caesarean section as the mode of delivery

Fig. 2 shows an overview of the primary indications of opting for caesarean section as the mode of delivery among the 79 women who had an elective caesarean delivery in this audit.

Of the 79 women who had an elective caesarean section in this audit, 57% of women (n=45) had a previous caesarean section; in two-thirds of these women (n=30), the previous caesarean section was the primary reason for a repeat caesarean section as the mode of delivery while in the other one-third (n = 15), there were multiple indications and therefore other considerations (e.g. poorly controlled medical conditions) took priority as the primary indication for caesarean section as the mode of delivery.

Among the women (n=30) who had a repeat caesarean section primarily because of the prior section, more than half (n=17) had only one prior caesarean section and had opted for an elective repeat caesarean section (ERCS) while the rest had more than one prior caesarean section (n=7) or had a history of a complicated caesarean section (n=5) or had a history of Fenton's repair and opted for an ERCS (n=1). In 2.5% of women (n=2), the indications for caesarean section as the mode of delivery were 'soft' – these were instances of maternal request for caesarean section as the mode of delivery. These deliveries were performed at 37+2 weeks of gestation and 37+5 weeks of gestation. Table I provides further information of the indications for caesarean section as the mode of delivery in the 79 pregnancies.

Elective caesarean delivery: Indications for scheduling delivery between 37 and 38 weeks of gestation

Fig. 3 shows an overview of the indications for scheduling the time of delivery between 37 and 38 weeks of gestation among the 79 women who had an elective caesarean delivery in this audit. Majority of deliveries (76%, n= 60) could be justified for being scheduled between 37 to 38 weeks. The most common indication was poorly controlled medical disorders (19%, n=15).

The remaining 24% of deliveries (n=19) could not be clinically justified for being scheduled between 37 to 38 weeks: maternal request influenced the timing of delivery in 15% of pregnancies (n=12) while no obvious reason for timing of delivery could be found in 9% of pregnancies (n=7) on retrospective case-note review, related likely to paucity of documentation by the medical professional. In this audit, we focus our attention to the cohort of women in whom maternal request (n=12, 15%) influenced the timing of delivery.

Table II provides further information of the indications for scheduling caesarean between 37 and 39 weeks in the 79 pregnancies.

Maternal request for scheduling the time of clinically indicated elective caesarean delivery

Maternal request influenced the timing of delivery in 15% of pregnancies (n=12). The median age of these women at the time of delivery was 34 years; 59 % of women were of Chinese origin (n=7), 8% of Malay origin (n=1), 8% of Indian origin (n=1) and the remaining 25% of women were of other origins (n=3). Lack of documentation precluded deeper analysis of perceptions, beliefs or motivations that gave rise to these requests. Postulated reasons for these requests – beliefs about auspiciousness of time of birth and misconceptions about the term period as well as safety of marginally early deliveries - are expounded in the discussion below.

Administration of antenatal corticosteroids in early term elective caesarean delivery

Of the 79 women who underwent a planned elective caesarean section, 23% (n=18) of women received a single course of antenatal corticosteroids. Of the 15% of women (n=12) whose timing of elective caesarean section was brought forward by maternal request, a quarter (n=3) received a single course of antenatal corticosteroids – one woman received it within the week preceding the delivery while the other two women received it at the time they were admitted for threatened preterm labour and hence these were administered at much earlier gestations (23+5 and 27+5 weeks).

Outcomes of early term elective caesarean delivery

Of the 88 neonates in this audit, the majority (83%, n=73) received care at the ward nursery while the rest received care at the Special Care Unit (SCN) (12.5%, n=11) or the Neonatal Intensive Care Unit (NICU) (4.5%, n=4) in the immediate perinatal period.

Among the 14 neonates born to the women in whom time of delivery was brought forward by maternal request, the majority (93%, n=11) received care at the ward nursery while one neonate (7%) received care at the SCN in the immediate perinatal period. There were no admissions to the NICU.

DISCUSSION

In this audit population, 76% of elective caesarean deliveries were brought forward from the guideline-directed 39 weeks to 37-38 weeks for clinical indications. The most common clinical indication was poorly controlled diabetes mellitus and hypertensive disorders. This finding reflects the ongoing metabolic crisis in developed countries like Singapore. Based on the International Association of the Diabetes and Pregnancy Study Groups (IADPSG) criteria, the incidence of gestational diabetes in Singapore is 25.1%, a figure higher than the average 17.8% among the 15 centres that participated in the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Study (11).

This audit also found that 15% of caesarean sections (n=12) were brought forward from guideline-directed 39 weeks to 37-38 weeks to fulfil maternal request. While this is fewer than the group in which scheduling was clinically indicated, it is remains imperative to curb deviance from evidence-based practice. This is because larger studies have consistently revealed adverse outcomes of early elective caesarean delivery. This includes neonatal respiratory morbidity, neonatal intensive care unit (NICU) admissions and other composite neonatal outcomes (12), as well as healthcare costs (13). The reverse (i.e. reduction in adverse outcomes by delaying elective caesarean section to 39 weeks) has also been demonstrated in the literature. A centre in the United States found a significant reduction in admissions to the NICU after implementation of guidelines to minimise non-indicated caesarean deliveries prior to 39 weeks (14).

The retrospective nature of this audit resulted in a reliance on case-note documentation of factors influencing timing of delivery. This meant that the authors were unable to explore the perceptions, beliefs and motivations that gave rise to requests for earlier delivery, for which a prospective study could elucidate. The retrospective nature of the audit also limited the analysis of 9% of caesarean deliveries (n=7) where no obvious reason for bringing forward time of delivery could be found. Scheduling these 9% of deliveries prior to 39 weeks could have been the result of undocumented maternal request or undocumented obstetrician preference. This finding brings to light the scope for improvement in documentation in our centre. One conceivable method to encourage documentation would be for caesarean delivery listing forms to include indications of timing of delivery (where it is performed prior to 39 weeks) as a separate field from indications of caesarean section as the mode of delivery.

In the literature, maternal request for caesarean section as the mode of delivery is a topic that has been the subject of a plethora of studies and the subject of heated debate for decades. Studies have found that the reasons for request for caesarean section as the mode of delivery range from fear of a loss of control and pain during labour to misconceptions about safety of caesarean delivery, from cultural and social reasons to obstetrician preference (15-17). A less studied area is reasons for maternal request for bringing forward time of

elective caesarean delivery. Two reasons discussed in the literature that the authors believe are relevant to our population are cultural beliefs and misconceptions about the safety of early deliveries.

A study in Taiwan found that Chinese cultural beliefs about auspiciousness increase the likelihood of scheduling an elective delivery before 39 weeks (9). A Californian cohort study also echoes this finding among Chinese Americans (18), suggesting that cultural influences persist despite resettlement to other countries. This is a pertinent finding given that a considerable population of women in our audit were of Chinese origin and that Singapore is home to a considerable immigrant population.

The second factor influencing maternal request that may apply to our population is misconceptions about the safety of what is perceived by patients to be marginally early delivery. Surveys among women in the antepartum and postpartum period have revealed misconceptions about the earliest time for safe birth should there be no other complications requiring early delivery (19, 20). A study among 650 American mothers found that 50% and 40% respondents believed 34-36 weeks and 37-38 weeks (respectively) was the earliest time for safe birth should be no complications requiring early delivery (19). Similarly, a study among 784 Australian mothers found that 57% of respondents believed 37-38 weeks was the earliest time for safe birth (20). These misconceptions are important to correct, as the increasing discomforts of pregnancy in later gestations combined with these misconceptions may encourage maternal request to bring forward time of delivery.

To reduce maternal request for earlier delivery in our context, the authors believe that efforts to improve patient education is necessary. Ideally, discussions on mode of delivery could start from early pregnancy and continue through the pregnancy journey. It may also be supported by patient education tools such as leaflets and other decision aids. In approaching requests, the use of the term 'maternal request', although representative of the fact that the expectant mother is the patient who expresses the request, neglects the paternal, familial and societal influences culminating in the request. Approaching requests in a non-biased and objective manner should instead be encouraged as this may allow the obstetrician to discover the motivation and external influences culminating in the request and therefore facilitate patient-centred education.

A discussion on the term period and explaining the basis of recommendations of international guidelines to schedule elective caesarean delivery at 39 weeks may also be undertaken.

Pertinent concepts for patient education could include the continuing nature of fetal lung development in the term period (21), that elective caesarean delivery, relative to the process of labour and normal vaginal delivery, is less supportive of the physiological changes that facilitate the fetal lung transition from intrauterine to extrauterine environment (22), and how both of these concepts culminate in the trend of increasing risk ratio of neonatal respiratory morbidity (elective caesarean deliveries versus normal vaginal deliveries) with decreasing gestation, even in the 'term' period (23).

To complete the discussion on scheduling delivery at 39 weeks, obstetricians may also briefly outline plans for urgent delivery should labour commence prior to 39 weeks. This is because up to a tenth of women scheduled for elective repeat caesarean sections enter labour prior to 39+0 weeks (24).

In the literature, more categorical initiatives to reduce elective caesarean delivery prior to 39 weeks of gestation have been found to be successful. A comparative study of three approaches across 27 centres in the United States found that formal categorical hospital policies were more successful compared with softer measures of physician education, or review and evaluation by a local committee (25). However, such hard-stop measures come with practical challenges. In our context, where the clinical indications for scheduling delivery prior to 39 weeks are wide-ranging and complex (Table II), it is imperative that institutional policies do not inadvertently deter the listing of women for early term delivery where it is indicated. The authors of the aforementioned comparative study in the United States also later conceded that one of their challenges in crafting hard-stop measures was including provision for justifiable maternal or fetal indications for early term delivery. Questions like how poorly controlled diabetes or

hypertension must be to justify earlier delivery highlight the difficulties in comprehensively defining justifiable clinical indications for scheduling elective caesarean delivery prior to 39 weeks (26). Furthermore, categorical policy may not be suited to addressing the heterogenous reasons for requests for early delivery that we have postulated in our population.

Lastly, in this audit we also examined the frequency of antenatal corticosteroid administration. Antenatal corticosteroids expedite the development of fetal lung maturity and therefore reduce the rate of neonatal respiratory morbidity resulting from early delivery. While corticosteroids is well-established to decrease the rates of neonatal morbidity in the context of pre-term delivery (27), the data on benefits of administering antenatal steroids in the term period is only emerging. A Cochrane review on the topic included only 1 major randomised controlled trial, the antenatal steroids for term caesarean section (ASTECS) trial, that bears evidence of neonatal morbidity reduction from antenatal steroid administration for delivery at 37, 38 and 39 weeks (28). However, the trial also concedes that delaying elective delivery to 39 weeks of gestation is more effective in reducing morbidity outcomes than antenatal steroid administration (29). The RCOG guideline also acknowledges the paucity of data on safety of antenatal corticosteroids in the context of delivery after 36+0 weeks of gestation; the administration of antenatal corticosteroids caesarean delivery in this context remains grade C recommendation in the guideline (24). In KKH, the use of antenatal corticosteroids for early term caesarean delivery is individualised – this explains why one quarter of women who underwent early term elective caesarean in this audit delivery received antenatal corticosteroids.

In conclusion, three-quarters of the early term elective caesarean deliveries in this audit were justified. Maternal request was found to influence timing of delivery in a smaller proportion of early term caesarean deliveries. We believe that greater clinician efforts towards patient-centred engagement and education will be able to narrow the chasm between request and evidence, placing women and their obstetricians on the same page.

Conflicts of Interest

The authors declare no conflict of interest.

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Fig. 1. Mode of delivery

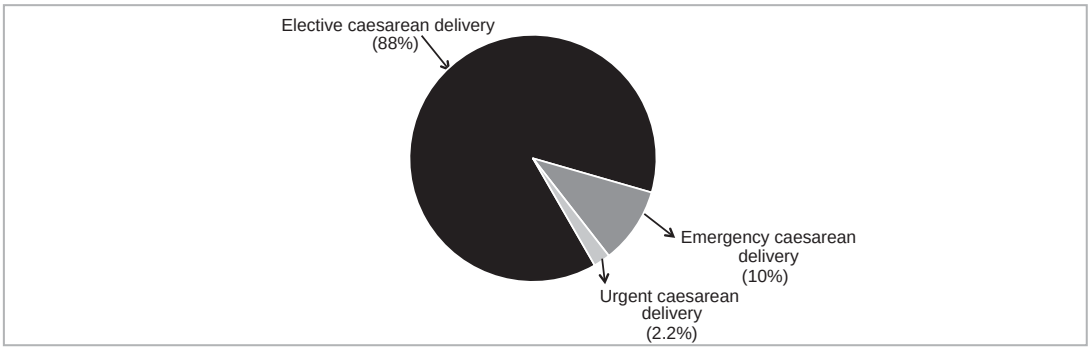

Fig. 2. Primary indication for caesarean section as the mode of delivery

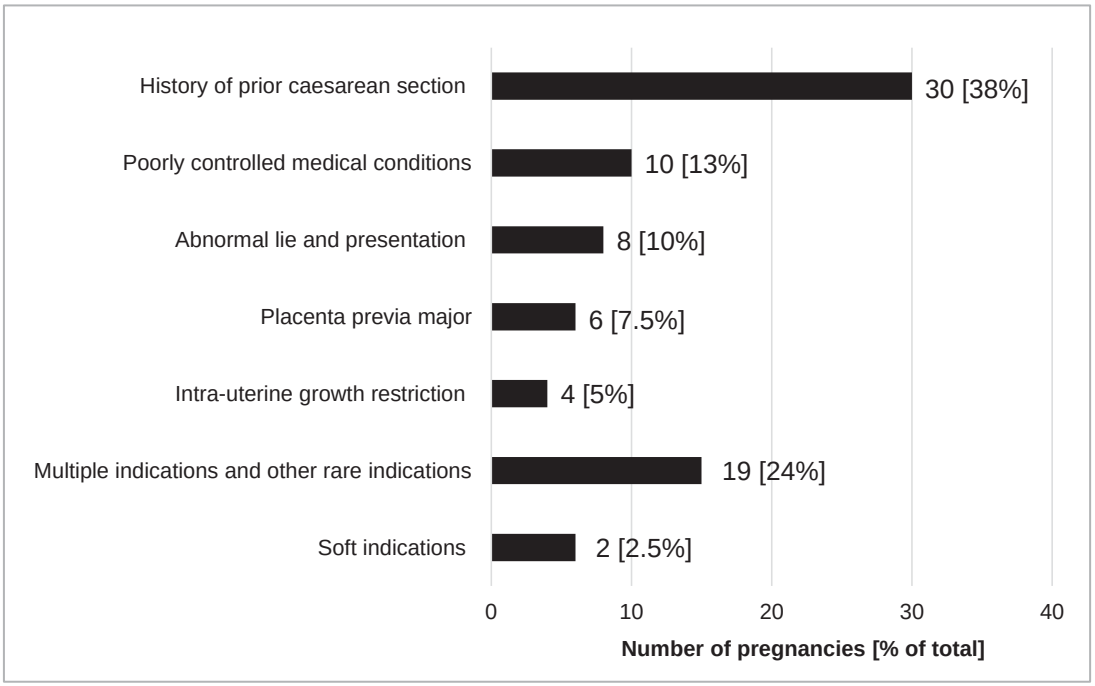

Fig. 3. Indications for scheduling elective delivery between 37 to 38 weeks of gestation

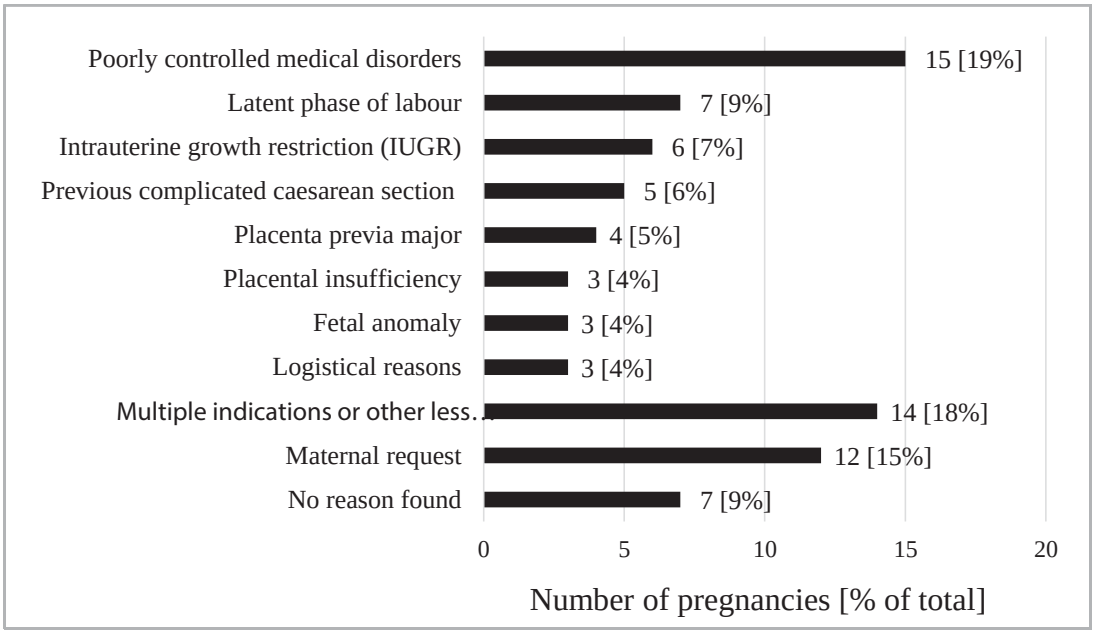

Table I. Details of indications for caesarean section as the mode of delivery

Indication	Number of pregnancies (% of total)
History of prior caesarean section:	**30 (38%)**
Woman with one prior caesarean section opting for elective repeat caesarean section (ERCS)	17
More than one prior caesarean section	7
History of complicated caesarean section (uterine tear, extended caesarean, inverted T incision, classical caesarean section)	5
ERCS in woman with prior history of Fenton's repair	1
Poorly controlled medical conditions:	**10 (13%)**
Type 1 diabetes mellitus on insulin	1
ERCS in women with type 2 diabetes mellitus on insulin	3
Gestational diabetes (GDM) on insulin	1
ERCS in women with GDM on insulin	2
Pre-eclampsia	1
ERCS in woman with pre-existing hypertension	1
Pregnancy-induced hypertension	1
Abnormal presentation or lie opting for caesarean section:	**8 (10%)**
Singleton breech pregnancy	3
ERCS in women with singleton breech pregnancy	2
Dichorionic diamniotic (DCDA) twin pregnancy (both twins breech)	1
Transverse lie	2
Placenta previa major	**6 (7.5%)**
Intra-uterine growth restriction	**4 (5%)**
Singleton	2
DCDA twins	2
Multiple indications & other less common indications	**19 (24%)**
Soft indications: Maternal request for caesarean section	**2 (2.5%)**

Table II. Details of indications for scheduling caesarean delivery between 37 and 38 weeks

Indication	Number of pregnancies (% of total)
Poorly controlled medical disorders:	**15 (19%)**
Type 1 diabetes mellitus on insulin	1
Type 2 diabetes mellitus on insulin	3
Gestational diabetes (GDM) on insulin	3
GDM on insulin with fetal anomaly	1
GDM on insulin with history of term stillbirth	1
Pre-eclampsia	1
Pre-existing hypertension with history of abruption complicated by stillbirth	1
Pregnancy-induced hypertension (PIH)	2
PIH with placental insufficiency	1
Type 2 diabetes mellitus on insulin, pre-existing hypertension	1
Latent phase of labour	**7 (9%)**
Breech presentation	1
Multiple prior caesarean sections	3
Singleton cephalic pregnancy in a woman with one or no prior caesarean section	3
Intrauterine growth restriction (IUGR)	**6 (7%)**
Previous complicated caesarean section (uterine tear, extended section, inverted T incision, classical caesarean section)	**5 (6%)**
Placenta previa major with caesarean delivery scheduled close to 38 weeks of gestation	**4 (5%)**
Placental insufficiency	**3 (4%)**
Fetal anomaly	**3 (4%)**
Logistical reasons	**3 (4%)**
Multiple indications or other less common indications:	**14 (18%)**
History of myomectomy	2
History of myomectomy with PIH in index pregnancy	1
Multiple previous caesarean sections	2
Difficult previous caesarean section	2
Placental previa major scheduled close to 38 weeks with placental insufficiency	1
IUGR in IVF pregnancy	1
Cholestatic jaundice in pregnancy	1
Marked anxiety of expectant mother, in view of high nuchal translucency measurement and history of Fenton's repair	1
Large fibroid, advanced maternal age, IVF pregnancy	1
Rhesus negative mother with rising anti-D titres	1
History of prior pregnancy with early term labour	1
Maternal request	**12 (15%)**
No reason found	**7 (9%)**

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Chlamydia Infection in Pregnant Women with Preterm Premature Rupture of Membranes (PPROM) and Preterm Labour (PTL)

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ABSTRACT

Introduction: *Genital chlamydia infection is caused by Chlamydia trachomatis, an obligate intracellular bacterium. Genital chlamydia infection is known to result in serious problems, which include preterm premature rupture of membranes (PPROM), preterm labour (PTL), stillbirth, pelvic inflammatory disease, tubal factor infertility and neonatal infections such as conjunctivitis and pneumonia. This study aims to investigate the occurrence of genital chlamydia infection in pregnant women with PPROM and PTL in KK Women's and Children's Hospital (KKH) and identify risk factors for this group of women, in working towards formulation of a screening protocol.*

Methods: *This is a cross-sectional, prospective, single-centre study conducted at KKH on 83 consecutive pregnant women gestational age between 22 +0 weeks to 36 +6 weeks, age between 21 to 45 years, admitted to the labour ward with PPROM, defined by definite pool of liquor seen on speculum examination, positive AmnicatorTM test and/or Actim® PROM test; and PTL, defined by regular painful contractions with cervical changes. Women on antibiotics for any reason in the last one month, those diagnosed with fetal anomalies and/or placenta praevia were excluded from this study. A urine sample was collected for chlamydia polymerase chain reaction (PCR) analysis and these women were asked to complete a questionnaire to obtain information on socio-demographic and sexual history. Data collected was analysed using SPSS version 17.0.*

Results: *Out of the 83 women included in this study, 32.5% were diagnosed with PPROM alone, 62.7% with PTL alone whilst 4.8% of women were diagnosed with both PPROM and PTL. This study showed that there were no cases of genital chlamydia infection in our study population. Amongst our study group, 79.5% of women had post-secondary education and 97.6% of women were married, 97.6% had only one sexual partner in the year prior to their current pregnancy and 94.0% had never had history of STI.*

Conclusion: *Our study showed no genital chlamydia infection in women with PPROM and PTL. We should consider screening only high-risk women, such as those who are young, single and with multiple sexual partners. A larger study with a control group will provide more information to formulate a screening protocol.*

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INTRODUCTION

Genital chlamydia infection is caused by *Chlamydia trachomatis*, an obligate intracellular bacterium. It is prevalent in 4.2% of females and 2.7% of males globally[1]. It is also one of the most common sexually transmitted infections (STI) in Singapore[2]. The prevalence of genital chlamydia infection in pregnant women ranges from 2-35%[3] in the

American population, being highest amongst those age 15 to 25 years. For pregnant women with preterm premature rupture of membranes (PRROM) and preterm labour (PTL), the prevalence is variable across studies[4-6].

Genital chlamydia infection results in decreased quality of life and serious morbidity. It increases the risk of pelvic inflammatory disease[7,8], chronic pelvic pain[7], ectopic pregnancy[8] and tubal factor infertility[9]. It is also known to increase the risk of acquiring or transmitting human immunodeficiency virus[10]. During pregnancy, women with genital chlamydia infection can experience complications such as miscarriage[11], low birth weight[12], PPROM[7], PTL[3], chorioamnionitis[7], intrauterine fetal death[12] and postpartum endometritis[7]. Furthermore, it can also cause neonatal infection which includes conjunctivitis and pneumonia[1,7]. These complications are preventable by screening and treatment.

To date, there are no local studies investigating the prevalence of genital chlamydia infection in pregnant women, especially those whose pregnancies are complicated by PPROM and PTL. This study aims to investigate the occurrence of genital chlamydia infections in pregnant women with PPROM and PTL in KK Women's and Children's Hospital (KKH) and identify risk factors for genital chlamydia infection in this population. Furthermore, we aim to provide important local data to formulate a genital chlamydia infection screening protocol for pregnant women in KKH.

METHODS

A cross-sectional, prospective, single-centre study conducted at KKH on 83 consecutive pregnant women, age between 21 to 45 years, who were admitted to the labor ward with PPROM and PTL. These women were only recruited during working hours between 8AM and 5PM on the weekdays due to logistics issue. Recruitment period was between October 2013 and February 2015. We approached 83 eligible pregnant women and all consented to participate in our study.

KKH is a tertiary referral centre for obstetrics and gynaecology with over 12,000 deliveries annually. Pregnant women with gestational age between 22^{+0} weeks and 36^{+6} weeks were included in our study. PPROM was defined by definite pool of liquor seen on speculum examination, positive Amnicator™ test and/or Actim® PROM test, whereas, PTL was defined by regular painful contractions with cervical changes. Women taking antibiotics for any reason in the last one month, those with fetal anomalies and/or placenta praevia were excluded from this study.

All eligible women were provided with verbal and written information about genital chlamydia infection in pregnancy study and a written consent was obtained from those willing to participate in the study. A face-to-face interview was conducted by a study investigator for collection of socio-demographic data (maternal age, parity, race, education and marital status) and sexual data (number of sexual partners in the year prior to current pregnancy, number of sexual partners in her lifetime, age of first sexual intercourse and history of sexually transmitted infection (STI)). A urine sample was collected to test for *Chlamydia trachomatis* using the nucleic acid amplification testing (NAAT).

According to our study protocol, patients who were tested positive for genital chlamydia infection were to be treated with a single dose of oral Azithromycin 1g and referred to the Department of STI control (DSC) for contact tracing. In patients with allergy to Azithromycin, Amoxicillin 500mg three times a day dosage, for seven days was to be administered instead. Patients who had not delivered after one month were to be offered a post-treatment early morning urine test to confirm genital chlamydia eradication. In patients who had delivered before one month from diagnostic test, no post-treatment test was indicated.

Data collected were analysed using the SPSS-data entry statistical program (Statistical package for the Social Sciences) version 17.0. This research study was approved by the Singhealth Centralised Institutional Review Board (CIRB).

RESULTS

A total of 83 women were included in the cohort,

where 32.5% of study participants were diagnosed with PPROM alone, 62.7% were diagnosed with PTL alone, and 4.8% were diagnosed with both PPROM and PTL.

The majority of our study population (79.5%) were aged above 26 years and 62.7% were multipara. In our study group, 79.5% of women had post-secondary education and 97.6% of women were married. The majority of women (60.3%) presented between gestational age of 34 and 36 weeks. Table 1 shows the detailed demographic data of the women participating in our study. From sexual history obtained from these women, 97.6% had only one sexual partner in the year prior to their current pregnancy and 94.0% had never had a history of an STI, although interestingly the majority of women participating in the study were sexual active at a relatively young age. Our study showed that 37% (n=31) of the women commenced sexual activity between ages of 16-20, while approximately 36.1% (n=30) became sexually active between ages of 21-24 of age. The details of sexual history are shown in table 2. The results of the urine PCR analyses for chlamydia showed that there were no cases of genital chlamydia infection amongst our study population.

DISCUSSION

The effect of genital chlamydia infections on pregnancy outcomes, particularly PPROM and PTL, remains controversial. In our study, none of the pregnant women with PPROM and PTL aged between 21 to 45 years had genital chlamydia infection. One of the limitations with this study is that we have excluded women age below 21 years due to the difficulty in obtaining consent from their parents for participating in this study. This group of women is known to have a higher chlamydia infection rate. This is shown in an epidemiological study in Hungary, where the chlamydia infection rate in women under 20 years old was 11.41%, as compared to 5.42% in 20-28 year olds and 4.64% in women 29 years and above [13]. Moreover, the majority of our study population was also married in a monogamous relationship and has a high educational level. The negative result in our study might be associated with the exclusion of women with high-risk sexual behavior.

A review of literature revealed several case-control studies which concluded that genital chlamydia infection is not associated with increased risk of PTL [14-17]. This is supportive of our study findings. However, a retrospective case-control study suggested that this might be explained by early treatment [15]. Another case-control study by Cohen et al looking at serum specific antibodies for *Chlamydia trachomatis* also revealed that there was no significant difference in IgG and IgA levels across pregnant women with PPROM, healthy preterm pregnant women, and healthy term pregnant women [18].

In contrary, we also found several studies, which showed an increased risk of chlamydia infection amongst women with PPROM and PTL. A cross-sectional study performed in Brazil showed a 13.9% prevalence of chlamydia infection in women with preterm birth [6]. A population-based retrospective cohort study using Washington State birth certificate data revealed an increased risk of preterm delivery (RR of 1.46) and PPROM (RR of 1.50) in women with chlamydia infections as compared to non-infected women [19]. Several other studies, including one by Rours et al showed that Chlamydia infection was associated with preterm delivery before 32 weeks (OR 4.35) and 35 weeks' gestation (OR 2.66) [20], and another by Andrews et al. showed that genitourinary *Chlamydia trachomatis* infection at 24 weeks' gestation was associated with a 2-fold to 3-fold increased risk of preterm birth [21].

In conclusion, our study showed no genital chlamydia infection in women with PPROM and PTL. We have identified the possibility of bias in this study population where our study subjects were older, married in monogamous relationship and also highly educated, resulting in exclusion of high-risk women. In working towards formulating a screening protocol in KKH, a larger study with a control group will be able to provide us with more information. Perhaps, for cost effectiveness, we only need to screen high-risk women, such as those who are young, single and with multiple sexual partners.

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Table 1 Socio-demographic characteristics

Characteristics	n (%)
Age groups	
21-25 years	17 (20.5)
26-30 years	23 (27.7)
31-35 years	30 (36.1)
36-40 years	12 (14.5)
>40 years	1 (1.2)
Race	
Chinese	41 (49.4)
Malay	23 (27.7)
Indian	8 (9.6)
Others	10 (12.1)
Unknown	1 (1.2)
Education	
Below secondary	2 (2.4)
Secondary	15 (18.1)
Higher education	66 (79.5)
Marital status	
Single	1 (1.2)
Married	81 (97.6)
Divorced	1 (1.2)
Gravidity	
1	31 (37.3)
>1	52 (62.7)
Gestational age at diagnosis	
<28 weeks	6 (7.2)
28-33 weeks	27 (32.5)
34-36 weeks	50 (60.3)

Table 2 Sexual history of the study population

Characteristic	n (%)
Sexual partners in the year prior to pregnancy	
1	81 (97.6)
>1	2 (2.4)
Sexual partners in lifetime	
1	38 (45.8)
2-4	36 (43.4)
>/=5	9 (10.8)
Age at first sexual intercourse	
</=15	4 (4.8)
16-20	31 (37.4)
21-24	30 (36.1)
>/=25	18 (21.7)
History of STI	
Yes	5 (6.0)
No	78 (94.0)

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Pregnancy and Birth Cohorts for Biomarkers, Metabolic and Pregnancy Outcomes Evaluation: A Summary of Pre-conception, Prenatal and Postnatal Cohorts in KK Women's and Children's Hospital

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ABSTRACT

Pregnancy cohort studies are important as they can help us better understand health conditions during pregnancy and later in life after birth. This article summarises the cohorts which are predominantly based in KK Women's and Children's Hospital.

Keywords: Pregnancy, Pre-conception, Birth Cohort, Biobank, Biomarkers

INTRODUCTION

KK Women's and Children's Hospital (KKH), previously known as Kandang Kerbau Maternity Hospital, is celebrating her 160 th anniversary in this year of 2018. As the largest Singapore medical facility in pregnancy and delivery service, KKH has actively promoted pregnancy research over the past 70 years.[1-2] KKH is also involved in significant obstetric practice changing trials, including one of the most renowned international studies - Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study. As one of the 15 study centres worldwide, KKH enrolled 1,787 patients for HAPO data analyses.[3] Furthermore, KKH was involved in the landmark MAGPIE Trial Study, on the use of magnesium sulphate as a prophylaxis for eclampsia.[4] These two international trials have radically changed the clinical management of gestational diabetes and pre-eclampsia worldwide. KKH was also put on the global map for obstetric research as a key collaborator of the international trial of PROGNOSIS ASIA, involving the use and validation of novel serum biomarkers sFlt-1 and PlGF in preeclampsia.[5]

There is now a growing interest in the development and establishment of pregnancy & birth cohorts, in recognition of the importance of the periconceptional, in utero and peripartum environments on later life health outcomes.[6,7] Barker et al in 1993 was the first to develop of the

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concept of fetal programming as an origin of adult disease (the Barker hypothesis).[8] Gluckman et al in 2006 further expanded the developmental origins of health and disease concept, which considers a broad range of exposures during early life and adult diseases.[9] There is also the concept of epigenetics, where heritable changes in gene expression potential not involving changes in DNA, as a result of early life exposures, can lead to adult disease.[10]

Even though there has been a lot of interest in birth cohorts, it is only recently (since 2008) that KKH is involved in large well characterized birth cohorts with bio-banking capability, including for metabolic evaluation and also biomarker discovery, development and validation. We can better understand trans-generational health conditions during pregnancy and later in life after birth, through pregnancy and birth cohorts covering pre-conception, prenatal (antenatal) and postnatal phases. This article summarizes the cohorts which are predominantly conducted in KK Women's and Children's Hospital, which are also distinctive as they comprised our 3 major Asian ethnicities (Chinese, Indian & Malay) in Singapore.

PREGNANCY AND BIRTH COHORTS (PRE-CONCEPTION, PRENATAL AND POSTNATAL PHASES) IN KKH

There are currently 4 significant birth cohorts predominantly based in KKH. They are the Growing Up in Singapore Towards Healthy Outcomes (GUSTO) birth cohort; Singapore PREconception Study of long-Term maternal and child Outcomes (S-PRESTO) pre-conception birth cohort; Neonatal & Obstetric Risk Assessment (NORA) / Pregnancy Events COllaborative Study (PECO) antenatal birth cohorts; and the Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children - BIOMarkers Assessment Study (IPRAMHO-BIOMA) antenatal birth cohorts. All four pregnancy cohort groups with their respective biobanks has strong capabilities for indepth evaluation of metabolic diseases, biomarkers and pregnancy outcomes.

GUSTO

GUSTO, acohort of >1000 mother-child dyads studied from 10 weeks' gestation onwards, is one of the most intensively phenotyped Asian birth cohorts ever conducted. The GUSTO mother-offspring cohort included first-trimester pregnant women aged between 18 and 50 years old residing in Singapore between June 2009 and September 2010. The cohort patients were recruited mainly from KKH (>80% of the antenatal patients) and also from National University Hospital of Singapore (NUH).

It is funded from Developmental Pathways to Health and Disease: Metabolic, Neurodevelopment and Related Outcomes. (NRF2007BMS-TCR003-020). This Translational & Clinical Research (TCR) Flagship programme in metabolic disease, awarded in 2008, focuses on developmental pathways that affect health outcomes across the population. GUSTO is now, globally, one of the most intensively studied perinatal cohorts and allows an assessment of how the perinatal environment affects subsequent metabolic, neurodevelopmental and other phenotypes of mother and child. GUSTO children have been followed up to the age of 8 since the cohort started. GUSTO has a high rate of publications which include those that helped change clinical practice.[11-16]

S-PRESTO

S-PRESTO study comprises >350 pregnancies where women were intensively studied and bio-sampled starting before conception, with a further ~600 similarly studied and sampled women who did not conceive. The study is funded by National Medical Research Council (NMRC/TCR/012/2014). S-PRESTO began recruitment in February 2015, and 1056 patients have been recruited all in KKH since the end of 2017, and 377 pregnancies have resulted. Of these 169 has since delivered. There is an ongoing follow up of this cohort at the moment. Data will be analysed later this year when a significant number of patients have delivered in order to assess outcomes.

NORA / PECO

NORA / PECO are two very similar KKH cohort studies, funded by the NMRC Programme Project Grant (NMRC/PPG/KKH/2010) from 2010-2014 and A* STAR Gap Funding for membrane vesicle-

associated biomarker discovery platform for high risk pregnancy from 2013 to 2015 respectively. NORA and PCEO established a combined antenatal birth cohort and biobank of >1000 patients. All the patients were delivered in KKH and cohorts have been useful for assessing trajectories of biomarkers in pregnancy. The unique feature of both cohorts, is that biosamples were taken at 4 time-points in the antenatal period, allowing norms and trajectories of hormones and biomarkers to be established in our Asian population.[17] It helped established reference standards for various pregnancy hormones & metabolic biomarkers in Singapore.[18-19] The cohort validated novel extracelular vesicles (EV) biomarkers of preeclampsia.[20]

IPRAMHO-BIOMA

This KKH study is funded by (NMRC CGAug16C008) since 2017. Thus far a total of 373 pregnancies (where rotuine OGTT was performed) has been characterised with biobanking of serum and plasma biosamples at 24-28 week time-point during routine OGTT. The study recruitment is still ongoing.

CHALLENGES AND VALUE OF ANTENATAL COHORT STUDIES

There are challenges in conducting cohort studies. Besides the need for appropriate funding and adequate resources, patient engagement and consent are important. In NORA cohort study, only about a third consented to participate among those screened and approached.[21]

Based on GUSTO, NORA & KKH cost effectiveness data on screening for gestational diabetes[16], ourteam initiated a change in a few-decade-old clinical practice of Singapore - implementation of universal/routine GDM screening & adoption of new IADPSG Criteria in both Singapore hospitals KKH & Singapore General Hospital (SGH). This had made significant impact in improving metabolic care for pregnant women. Our unique sets of bio-banked samples and data from GUSTO, S-PRESTO, NORA/PECO & IPRAMHO-BIOMA cohorts are valuable resources for various research studies including those studies on metabolic outcomes, biomarker discovery & validation, and population norms & health.

CONCLUSION

Developmental concepts and hypotheses have provided the rationale for assembling birth cohorts in KKH and the world. Current worldwide interest in trans-generational population metabolic health make it essential for us to invest in and develop good cohort studies, to shed light for improving population health.

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Vaccinations In Pregnancy

Serene Thain

ABSTRACT

This article gives a brief update of vaccinations in pregnancy.

INTRODUCTION

Pregnancy is a period of relative immunosuppression, making pregnant mothers at greater risk of infections, with associated increased morbidity and mortality rates. Also, during the period of early infancy, especially the first 6 months of life where the neonatal immune system is yet able to mount a good immune response, infants have a greater susceptibility to infections and its potentially devastating consequences. In fact, more than 2 million newborns and infants under the age of 6 months die each year worldwide from infection.[1-3] The rationale for antenatal vaccination thus works on a two-pronged approach - protection for the mother from diseases which could potentially have an impact on her health, as well as providing passive protection to the neonate or infant via trans-placental transmission of maternal antibodies to the fetus.

Having recognised the clinical benefits and large reaching impact of antenatal vaccination, the Ministry of Health (Singapore) recently extended the use of Medisave for Vaccines under the National Adult Immunisation Schedule (NAIS) as one of the measures to improve vaccination uptake rates. From 1st November 2017, Singaporeans have been able to use their Medisave for NAIS vaccinations at Medisave-accredited healthcare institutions, such as hospitals, polyclinics, and CHAS GP clinics, and this includes both the influenza inactivated vaccine as well as the tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) vaccine.

This article discusses the above-mentioned two vaccines specifically recommended during the antenatal period of pregnancy with regards to the benefits and rationale for vaccination, contraindications and side effects of these vaccines as well as current recommendations from local and international guidelines.

INFLUENZA AND INFLUENZA VACCINATION IN PREGNANCY

Influenza infection

Influenza is a highly infectious respiratory viral illness that is transmitted person to person through respiratory droplets propelled by coughing and sneezing or via contact with contaminated surfaces. The contagious period is from 1 day before onset of symptoms till 5 to 7 days after onset. Common symptoms include fever, headache, chills, cough, sore throat, muscle aches and generalized malaise and fatigue.

Burden of disease

Locally in Singapore, influenza is commonly seen, with between 1500 and 3500 people experiencing influenza-like illness every week. Most infected people have mild illnesses and will recover within 1 to 2 weeks, but certain populations (e.g. pregnant women, children under 59 months, the elderly, individuals with chronic medical conditions, individuals with immunosuppressive conditions) are at higher risk of morbidity such as the

development of severe illness, an increased need for hospitalization or admission to an intensive care unit, as well as death. The World Health Organisation estimates that worldwide, inter-pandemic influenza (seasonal flu outbreaks that occur between worldwide epidemics) are estimated to result in about 3 to 5 million cases of severe illness, and about 290 000 to 650 000 respiratory deaths in total.[4] A local study done in 2006 estimated the annual influenza-associated all-cause deaths, underlying pneumonia and influenza deaths, and underlying circulatory and respiratory deaths in Singapore to be 14.8, 2.9, and 11.9 per 100,000 person-years, respectively. This translated to an estimated 588 deaths (3.8% of total deaths) due to influenza annually.[5]

Risks of influenza infection

Maternal

Influenza infection in pregnancy is associated with a higher likelihood of developing severe illness, hospitalization and admission to an intensive care unit compared to that of the general population. Mortality rates are also higher in the pregnant patient.

Fetal

There have been reports of influenza infection in pregnancy being associated with an increased risk of obstetric complications such as spontaneous abortion, preterm delivery, low birth weight and fetal death, as well as a potential increased risk of congenital abnormalities for influenza or influenza-related illness in the first trimester. The effect of maternal hyperthermia as a result of influenza illness may also increase the risk of certain birth defects.

Neonatal

Infants less than 6 months old who experience influenza virus infection have the highest rates of hospitalization and death of all children.

Rationale for antenatal influenza vaccination

The efficacy of inactivated influenza vaccine among adults has been demonstrated in various randomized placebo-controlled trials with the outcome of laboratory-confirmed influenza. A recent meta-analysis reported a pooled vaccine efficacy of 59% (95% confidence interval, 51–67%) for the trivalent inactivated influenza vaccine among adults aged 18–64 years.[6] The immunogenicity and safety of the quadrivalent vaccine is similar to that of the trivalent vaccines.[7] Antenatal influenza vaccination thus helps to protect the pregnant mother and reduce the risk of serious maternal medical complications whilst providing passive protection to the neonate via trans-placental transmission of antibodies, especially in the early few months of life.

Inactivated influenza vaccine

The inactivated influenza vaccine is safe in all trimesters of pregnancy, with studies conducted by the Centre for Disease Control and Prevention (CDC) showing no evidence of a link between vaccination and pregnancy complications or adverse fetal outcomes. The vaccine is administered as a single dose repeated yearly with the updated vaccine.

Common side effects experienced after influenza vaccination include soreness, redness or swelling from the shot, fainting, headache, fever, muscle aches, nausea and fatigue. If these side effects occur, they usually begin soon after the shot is administered and can last for about 1 to 2 days. Rarely, influenza vaccines can cause serious problems such as severe allergic reactions. People who have had a severe allergic reaction (e.g. anaphylaxis) after a previous dose or a severe allergy to any of the vaccine components should abstain from getting the vaccine.

Table 1. Current international guideline recommendations

UK (Public Health England)	Inactivated influenza vaccine should be offered to pregnant women at any stage of pregnancy (1 st , 2 nd or 3 rd trimesters), ideally before influenza viruses start to circulate.
CDC Advisory Committee on Immunization Practices and American College of O&G (ACOG)	All women who are pregnant or will be pregnant during influenza season should receive inactivated influenza vaccine, regardless of trimester.
Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)	Influenza vaccination is recommended for all pregnant women regardless of gestation and for women planning pregnancy. Vaccination early in the season and regardless of gestational age is optimal, but unvaccinated pregnant women should be immunized at any time during influenza season as long as the vaccine supply lasts.
Society of Obstetricians and Gynaecologists of Canada (SOGC)	Pregnant women should be offered the influenza vaccine when pregnant during the influenza season.

Table 2. Current local guideline recommendations

Clinical Practice Guidelines on Adult Vaccination (April 2016)	Routine influenza (inactivated) vaccine for pregnant women is strongly recommended.
Ministry of Health (Singapore) National Adult Immunisation Schedule (NAIS)	Women at all stages of pregnancy should receive 1 dose of influenza vaccine annually.

PERTUSSIS VACCINATION IN PREGNANCY

Pertussis infection

Pertussis, also known as whooping cough, is a highly contagious respiratory disease caused tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap) by the bacterium Bordetella pertussis. It is transmitted from person to person usually via coughing or sneezing or via close contact in an enclosed environment. Symptoms usually develop within 5 to 10 days after exposure, but sometimes not for as long as 3 weeks. Pertussis has an insidious onset with catarrhal symptoms that are indistinguishable from those of minor respiratory tract infections. The cough, which is initially intermittent, becomes paroxysmal. In typical cases paroxysms terminate with an inspiratory whoop and post-tussive vomiting can follow. The cough typically persists for 1 to 6 weeks or more.

There has been an increase in the number of reported cases of pertussis since the 1980s worldwide. Several factors may have contributed to this observation, and these include: 1) increased awareness and recognition of pertussis among healthcare practitioners; 2) greater access to and use of laboratory diagnostics; 3) increased surveillance and reporting of pertussis infections to public health departments; 4) waning immunity from vaccines.

Burden of disease

In 2015, the World Health Organization (WHO) reported 142,512 pertussis cases globally, and estimated that there were 89,000 deaths. However, a recent publication modeling pertussis cases and

deaths estimates that there were 24.1 million pertussis cases and 160,700 deaths in children younger than 5 years in 2014 worldwide – numbers significantly higher than what had been reported by the WHO.[8]

Locally, according to the statistics published by the Ministry of Health (MOH), the number of whooping cough cases has more than doubled since 2012 – the number of laboratory confirmed cases of pertussis increased from 24 in 2012[9] to 57 in 2015[10] and to 86 in 2016.[11] More than half of the cases reported in 2015 and in 2016 occurred in infants aged less than six months.

Risks of pertussis infection

Maternal

There is no evidence of pertussis infection in pregnancy being more severe compared to the general population, nor is there any evidence that pertussis infection is associated with increased obstetric complications in pregnancy.

Fetal

There is no evidence of pertussis infection in pregnancy being associated with an increased risk of fetal complications.

Neonatal

Neonates and infants are particularly at risk of serious pertussis infection as they remain vulnerable until they can be vaccinated at 2 months of age. Unvaccinated or incompletely vaccinated infants less than 12 months of age have the highest risk of severe illness including hospitalization and death. In this particular group, about half need treatment in a hospital, most commonly in infants less than 6 months of age.

Of infants with pertussis who need treatment in a hospital, approximately 61% will have apnoea, 23% suffer from pneumonia, 1.1% will have seizures, 1% will die and 0.3% will have encephalopathy as a result of hypoxia from coughing or from toxins.

Rationale for antenatal pertussis vaccination

The main aim of antenatal Tdap vaccination is to provide passive protection to the neonate/infant via trans-placental transmission of antibodies so as to reduce the risks of pertussis infection in infancy and its potential complications discussed above. A CDC evaluation found that Tdap vaccination during the 3rd trimester of pregnancy prevents more than 3 in 4 cases of whooping cough in babies younger than 2 months old, thus protecting babies until they are old enough to receive the pertussis vaccine at 2 months of age.[12] Also, for babies who do acquire pertussis, the infection is typically also less serious if their mother had received Tdap antenatally during pregnancy, with Tdap during the 3rd trimester of pregnancy protecting 9 in 10 babies from infections serious enough to need hospital treatment.[12]

Vaccination is recommended with each pregnancy to provide maximal protection to every infant as vaccine-induced pertussis antibodies wane over time and the protective antibody level required in newborn infants is unknown. The above CDC evaluation found that Tdap given at any point before pregnancy was only 50.8% (95% CI, 2.1%–75.2%) effective at preventing infant pertussis, whereas the overall effectiveness of vaccination between 27–36 weeks' gestation was 78.4% (95% CI,49.8%–90.7%).[12]

Tetanus toxoid, reduced diphtheria toxoid and a cellular pertussis (Tdap) vaccine

The Tdap vaccine is safe for use in pregnancy with studies showing no link between Tdap vaccine administration and increased risk of pregnancy complications such as low birth weight or preterm delivery. The vaccine is administered as a single dose intramuscularly, preferably at the deltoid area. Maternal immune response to the vaccine peaks about 2 weeks after administration.

Common side effects experienced after Tdap vaccination include erythema, swelling, pain and tenderness at the injection site, body ache, fatigue and fever. Rarely, Tdap vaccines can cause serious

problems such as severe allergic reactions. People who have had a severe allergic reaction (e.g. anaphylaxis) after a previous dose or a severe allergy to any of the vaccine components should not receive the vaccine.

CONCLUSION

Antenatal vaccination against influenza and pertussis infection has been shown to be safe, effective and beneficial. There has been heightened awareness of the importance of antenatal vaccination in improving maternal outcomes in pregnancy as well as neonatal outcomes in the first few months of life in recent years, especially what with the marked increase in the incidence of pertussis in the world as well as increasing recognition of the detrimental impact of influenza on pregnant mothers. As obstetricians, we are primarily responsible for the care and health of our pregnant women and their unborn children. It is thus essentialfor us toeducate our patients, promote influenza and Tdap vaccination as an integral component of routine antenatal care, and support them through their decision-making processes to do what is best for them and their babies.

Table 3. Current international guideline recommendations

UK (Public Health England)	All women should be offered pertussis vaccination during each pregnancy, ideally between weeks 16 and 32 of pregnancy to maximize the likelihood that the baby will be protected from birth.
CDC Advisory Committee on Immunization Practices and American College of O&G (ACOG)	Pregnant women should receive a single dose of Tdap vaccine during every pregnancy, preferably at 27 through 36 weeks of gestation. Tdap is recommended only in the immediate postpartum period before discharge from the hospital or birthing centre for new mothers who have never received Tdap before or whose vaccination status is unknown.
Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)	Tdap vaccine is recommended as a single dose during the 3rd trimester of each pregnancy. The optimal time for vaccination is early in the 3rd trimester between 28 and 32 weeks.

Table 4. Current local guideline recommendations

Clinical Practice Guidelines on Adult Vaccination (April 2016)	Pertussis vaccination during the third trimester of every pregnancy is recommended regardless of interval from the last Tdap vaccination.
Ministry of Health (Singapore) National Adult Immunisation Schedule (NAIS)	Pregnant women should receive the Tdap vaccine between the 16 th to 32th weeks of each pregnancy, so as to provide maximal protection to each infant, including pregnancies which are closely spaced (less than 2 years). Tdap can also be considered after 32 nd week of gestation during each pregnancy. Maternal vaccination in this period may afford less protection for infants, but would potentially protect the mother from pertussis infection and thereby reduce the risk of exposure to her infant.

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An Update on Primary Prevention of Cervical Cancer

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ABSTRACT

This article gives an update on primary prevention of cervical cancer.

INTRODUCTION

Cervical cancer is the fourth most common cancer in women in the world with an estimated 528,000 new cases in 2012 and 266,000 deaths annually.[1] It is considered a highly preventable cancer as it is mainly caused by persistent high risk (hr) HPV infection, particularly by types 16 and 18 which account for up to 70% of all cervical cancers. The HPV is a double stranded DNA virus from the papillomavirus family and the infection is limited to the basal cells of stratified epithelium.[2] In most infected individuals, the infections do not cause symptoms and resolve spontaneously but in some, a persistent infection might cause precancerous and cancerous lesions. The discovery of the recombinant expression of L1 in a range of systems in the 1990s that yielded virus like particles (VLPs) that were devoid of the oncogenic viral genome and immunologically similar to the nativevirions led to the development of the prophylactic vaccine.[3]

BIVALENT AND QUADRIVALENT HPV VACCINE

The bivalent (2v) and quadrivalent (4v) HPV vaccines have been in use for the past decade, and has been shown to be safe and highly efficacious in preventing HPV related diseases. For maximal benefit, the vaccine should be given before the onset of sexual activity, as it does not protect against pre-existing HPV infections.[4] More than 200 million doses have been given worldwide with a good safety profile. According to various studies, the proportion of women experiencing severe adverse events such as new autoimmune disorders after vaccination were similar to controls.[5] The European Medical Agency (EMA) completed a review and supported that there is no linkage between HPV vaccination and an increased risk of developing complex regional pain syndrome (CRPS) and postural orthostatic tachycardia syndrome (POTS).[6] Besides cervical cancer, we also know that hrHPV is associated with vulvar and vaginal cancer in women, penile cancer in males, anal and oropharyngeal cancer in both sexes.

THE NONAVALENT HPV VACCINE

The second generation nonavalent (9v) HPV vaccine was FDA approved in December 2014 and is the only HPV vaccine available in the United States today. The vaccine was launched in Singapore in April 2017 and has been approved for use in both young men and women age 9 to 26 years. Several largeinternational trials were undertaken to demonstrate the efficacy, immunogenicity and safety prior to being FDA approved. The evidence for the 9v HPVvaccine are summarized in the following paragraphs.

In a phase III efficacy randomized trial comparing 9vHPV with 4vHPV vaccine in about 14,000 females aged 16 through 26 years, the 9vHPV efficacy for prevention of ≥CIN2, VAIN grade 2 or 3, and VIN grade 2 or 3 caused by HPV 31, 33, 45, 52, or 58 was 96.7% in the per protocol population.[7] Few cases were caused by HPV 6, 11, 16, or 18 in either

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vaccine group. The 9vHPV vaccine generated anti-HPV 6, 11, 16, and 18 immune responses that were non-inferior to those generated by the 4v HPV vaccine.[7] In the 9vHPV group, >99% seroconverted to all nine HPV vaccine types. The 9vHPV vaccine also reduced the numbers of pap test abnormalities and cervical procedures. In terms of vaccine related adverse events (AEs), the 9v HPV vaccine caused more injection site AEs compared to the 4v HPV vaccine but the systemic AEs are similar.[7] The most common injection-site AEs were pain, swelling, erythema, and pruritus whereas the most common vaccine-related systemic AE in both vaccines was headache. As with the 2v and 4v HPV vaccines, vaccination with the 9v vaccine should be postponed till completion of pregnancy. Nevertheless, current data does not indicate any increased risk of malformation or fetal/neonatal toxicity in pregnant women.

In the immunobridging study involving 2400 girls and boys age 9 to 15 years compared to 400 women 16 to 26 years, the immune responses for the adolescents were found to be non-inferior to those in women.[8] In both females and males, >99% seroconverted to all 9 types, and the geometric mean titres(GMT) in boys were non-inferior to those in girls. In another immunobridging study involving 1394 males age 16 to 26 years compared to 1075 women 16 to 26 years, the GMTs for all 9 HPV types were non-inferior in heterosexual males compared to the women but the GMTs were slightly lower in MSM compared with heterosexual males and women.[9]

With regards to giving the 9vHPV vaccine to women with prior 4v HPV vaccine (>12 months interval), a study was performed whereby 924 women were randomized to placebo or the 9v vaccine.[10] The GMTs against HPV Types 6, 11, 16, and 18 showed evidence of an immune memory response in prior 4vHPV vaccine recipients and immunogenicity was demonstrated with respect to HPV Types 31, 33, 45, 52, and 58 in prior 4v HPV vaccine recipients. Hence, the 9v HPV vaccine can be given to those with prior vaccination.

In a recently concluded study comparing the immunogenicity of the 2 dose and 3 dose regimens of the 9v HPV vaccine, the 2-dose schedule was shown not to be inferior to the 3 dose in both girls and boys age 9 to 14 years.[11] Furthermore, the HPV antibodies were found to be higher in those who receive at a 12-month interval than in those at 6-month interval. The 2-dose schedule has cost saving and pragmatic advantages that may facilitate a higher coverage.

CURRENT GLOBAL HPV VACCINE COVERAGE

More than 80 countries have introduced a national HPV vaccination program but the majority are in high or upper middle income countries. 70% of all women immunized against HPV worldwide are found in high income countries which bear only 0.14% of cervical cancer burden.[12] Recently, Gavi and WHO has provided some financial assistance to help some low-income countries to implement a national program. However, barriers still exist such as the perceived adverse effects of vaccination, low perceived risk of getting cancer, parental refusal, convenience issues such as high cost and lack of access to vaccination clinics.[13]

Preliminary findings from a recent multicenter cluster randomized study in India suggest that a single dose of 4v HPV vaccine is immunogenic and provides lasting protection against HPV 16 and 18 infection similar to 3 and 2 doses.[14] In this study, 17729 girls age 10-18 years were vaccinated and randomized to three doses vs two doses. However, 4950 (28%) only received one dose, 8431 (47%) received 2 doses and 4348 (25%) received 3 doses and they were followed up for 4 years. Long term data on the HPV vaccine single dose is lacking and more studies are needed to validate this potential cost saving schedule which could increase uptake in low resource countries where the cervical cancer burden is high.

CONCLUSION

The HPV vaccine is a safe and effective vaccine for the prevention of cervical cancer. The new 9v vaccine covers up to 90% of the hrHPV types that can cause cancer. However, barriers still exist that prevent vaccine uptake in many countries especially those with the highest burden of cervical cancer. Ongoing clinical trials on the potential of single dose vaccination may provide the solution for an increased uptake in low income countries.[15]

Approved Recommendations for the 9v HPV Vaccine

Indications:	Girls and women 9-26 years of age	Boys and men 9-26 years of age
Cancers caused by HPV types 16, 18, 31, 33, 45, 52 and 58		
Cervical	✓*	
Vulvar	✓*	
Vaginal	✓*	
Anal	✓*	✓
Precancerous or dysplastic lesions caused by HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58		
Premalignant cervical lesions	✓	
Premalignant vulvar lesions	✓	
Premalignant vaginal legions	✓	
Premalignant anal legions	✓	✓
Cervical adenocarcinoma in situ	✓	
Genital warts caused by HPV types 6 and 11	✓	✓
HPV infections caused by HPT types 6, 11, 16, 18, 31, 33, 45, 52 and 58	✓	✓
Dosage: 3 dose (0, 2 and 6 months)	✓	

For 9 to 14 years of age, the 2 dose regimen can also be used at 0, 6-12 month interval.

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Episiotomy – An Evidence-based approach

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ABSTRACT

This article reviews the evidence relating to episiotomy.

INTRODUCTION

Few interventions are as misunderstood or as maligned as the episiotomy. This simple incision to enlarge the vaginal introitus has proponents as well as opponents. The practice was born out of seemingly logical justifications. It has been suggested that a linear surgical incision is easier to repair than a spontaneous vaginal tear which may be jagged and haphazard. Proponents suggest that because an episiotomy can be angled away from the anus, it may be helpful in preventing obstetric anal sphincter injuries (OASIS), namely 3rd and 4th degree perineal injuries[1]. Other justifications for episiotomy are hastening delivery when clinically necessary such as in acute fetal distress when the fetal head is just about to crown, protection of the fetal head and even reducing damage to the maternal pelvic floor[2] or reducing the risk of shoulder dystocia. There is a common perception that the perineum in the Asian woman is intrinsically different and that episiotomy is more likely to be necessary, particularly in primigravidae. There is little scientific evidence to support this belief.

ROUTINE EPISIOTOMY VERSUS RESTRICTIVE EPISIOTOMY

The advent of evidence-based medicine allowed us to put these beliefs and theories to the test. Two approaches to performing an episiotomy have been extensively studied. The first is a routine approach in which all women will receive one. The second isrestrictive use, where the obstetrician attempts to avoid an episiotomy where possible but will perform one based on clinical judgement in certain scenarios. These two approaches were studied specifically with respect to spontaneous vaginal deliveries. Findings in randomised controlled trials as well as systematic review and meta analysis of these trials (as in the Cochrane Library)[3] support the view that in spontaneous vaginal births, selective use was beneficial. A restrictive approach resulted in a30% lower incidence of severe perineal injury defined as 3rd and 4th degree perineal tears. The irony of this finding must not be lost amongst obstetricians because it means that episiotomies increase the risk of a complication they were designed to prevent. It is explained by the fact that if the perineum is allowed to stretch and tear spontaneously, it should only tear as much as will be necessary to deliver the baby whereas in making an episiotomy, an obstetrician may create a more generous incision than required . Episiotomies have also not been shown to have any fetal benefit in terms of protection to the fetal head or to protect the maternal pelvic floor. A restrictive approach to episiotomy also results in a reduced need for suturing which simply means some women may have intact perineums or very superficial tears which do not require suturing.

The only benefit of a routine approach appears to be reduced anterior trauma in the perineum. This refers to tears and lacerations in the peri-urethral area and anterior vaginal wall. This finding is explained by the fact that making an incision In the posterior vaginal wall will reduce the pressure and consequent trauma to the opposite anterior vaginal

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wall. It is also evident that making an episiotomy will hasten delivery of a fetal head which is about to crown so the intervention can be useful in scenarios where fetal distress occurs just prior to crowning. An episiotomy may also be useful to gain access to the vagina to perform the necessary fetal manoeuvres to dislodge the anterior shoulder once shoulder dystocia has been diagnosed. In this respect, they do not prevent shoulder dystocia in which the source of obstruction is the anterior shoulder being wedged against the bony pelvis. They merely facilitate access to the vagina by the obstetrician's hand to carry out the manoeuvres to overcome the dystocia.

It is important to point out that research has focused on comparing a routine approach versus a restrictive approach and not performing an episiotomy versus not performing one.A restrictive approach does not mean one should avoid an episiotomy at all costs. A considered approach is called for where an obstetrician allows the perineum to distend and stretch spontaneously and makes a judgment as to whether an episiotomy is needed just before crowning. Clinical information such as fetal head position and fetal size can also be incorporated in this decision-making process and the clinician can choose to perform an episiotomy when there is malposition, such as occiput posterior position when the presenting diameters are larger, of if the fetus is judged to be big. A restrictive approach is, therefore, a matter of subjective assessment and clinical experience. It is unclear what the precise episiotomy rate should be when practicing a restrictive approach and this may differ depending on the patient population. In 1996, the WHO suggested in 1996 that the optimal rate should not exceed 10%. One large randomised controlled trial performed in Argentina suggested that an episiotomy rate of more than 30% was unlikely to be beneficial[4]. In Argentina at the time of this trial, episiotomy was a routine intervention in nearly all nulliparous and primiparous births[5]. The role of episiotomy in operative vaginal deliveries such as vacuum or forceps-assisted deliveries is less clear from the evidence-based perspective. It would seem reasonable to perform an episiotomy if the obstetric forceps is used as the instrument increases the diameter of the presenting part by virtue of the blades being applied alongside the fetal head. A systematic review and meta-analysis concluded that routine mediolateral episiotomies increases the risk of OASIS in multipara had no effect of the OASIS rate in nullipara undergoing vacuum-assisted deliveries[6]. This would suggest that a at least a proportion of women undergoing vacuum-assisted deliveries may not need an episiotomy.

The technique for making an episiotomy has also been studied. Some obstetricians favour a mediolateral episiotomy which is angled between 45 to 60 degrees away from the midline hence directing it away from the anus. The alternative is a midline episiotomy. The evidence is clear on this issue because midline episiotomies have been shown to increase the risk of 3rd and 4th degree tears. Proponents of the midline episiotomy maintain that it is easier to repair and is less painful. There is a lack of scientific data to support these findings and, in any case, the reduction of 3rd and 4th degree tears is a benefit that should outweigh other short-term considerations. When mediolateral episiotomies are performed, one study suggested that they are often performed too close to the midline[7]. This may result from the fact that the perineum is stretched over the fetal head at crowning, giving the false perception that an episiotomy has been made at the recommended 45 to 60 degrees away from the midline when, in reality, it is much closer. Specially-designed angled scissors have been designed to ensure that the obstetrician consistently performs an episiotomy which is sufficiently deviated from the midline[8].

There is compelling evidence to show that continuous suturing of the episiotomy wound with subcuticular suturing for the skin is associated with less short term pain compared to placing interrupted sutures and wound dehiscence rates are the same with both techniques[9]. Using polyglycolic acid suture materials (such as Vicryl®) is also associated with reduced short-term pain compared to catgut[10]. Catgut is also increasingly difficult to obtain. As it is manufactured from sheep gut, there are concerns over disease transmission such as scrapie which is caused by a prion virus and is the sheep-borne version of bovine spongiform encephalopathy (BSE) or "mad cow disease".

SUMMARY

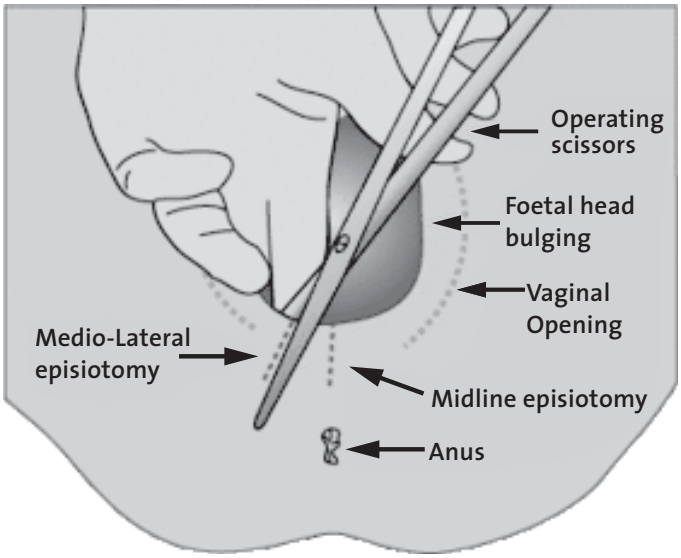
1) A restrictive approach to episiotomy is shown to be beneficial when compared to routine episiotomy in spontaneous vaginal births.

2) Episiotomy should be considered when there is a need to expedite delivery, in operative vaginal deliveries and in the management of shoulder dystocia.

3) Mediolateral episiotomies reduce the risk of anal sphincter injuries compared to midline episiotomies.

4) Continuous, subcuticular suturing of an episiotomy wound with polyglycolic acid sutures (such as Vicryl®) is associated with less short-term pain when compared to interrupted sutures using catgut

Fig.1 Midline and mediolateral episiotomies



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Speech by Prof Charles Ng at RCOG World Congress 2018 on The First International Scientific Meeting of RCOG, Singapore 1990

Prof Charles Ng[1] ***MA, MBBChir (Contab), MRCS, LRCP, FRCOG, FAMS***

ABSTRACT

This is the text of speech given by Prof Charles Ng at RCOG World Congress 2018, Singapore, March 21 – 24, 2018 on The First International Scientific Meeting of the Royal College of Obstetricians and Gynaecologists, Singapore, September 20 – 23, 1990

Prof Charles Ng

As the Chairman of the Organizing Committee of the First International Scientific Meeting of the RCOG held in Singapore in September 1990, I am honored to be asked to recount the event. In the late 1980s, as the Chairman of the Reference Committee of the RCOG in Singapore, I asked my fellow members to support my suggestion for the RCOG to hold an International Scientific Meeting outside UK to complement the British Congress held biannually in cities in UK. This was to allow Members and Fellows of the College outside UK to participate in a RCOG Scientific Meeting and update their knowledge and also socialize with one another. It would also make the College more assessable to these overseas Members and Fellows and give the College a higher profile.

Having obtained their support, I contacted my friend, Sir George Pinker, the then President of the College for his view. I was delighted when he supported the idea and would present it to the Council of the College. I told Sir George that we in Singapore would be happy to organize and host the first Meeting if the Council approved. We also proposed that this Meeting be held between the British Congresses that is once every 3 years when there was a void between the British Congress.

To our surprise and delight, the Council approved our proposal and so we were in business! We had barely 2 years to organize the Meeting. I asked 3 senior Fellows of the College in Singapore to give us 'seed money' as the Representative Committee had no funds. They willingly gave us $10,000/00 each and they are

[1] *Emeritus Consultant, Dept of O & G, SGH, Singapore*

Dr Oon Choon Seng, an Honorary Fellow of the College; Dr Dennis Hangchi and Dr Cheng Wei Chen, both Fellows. With this amount plus a pledge from the Congress Trust Fund of the 0 & G Society of Singapore to give us more money, we embarked on our task.

To commemorate the link with Singapore, we suggested launching the Singapore Lecture to be held at every subsequent International Scientific Meeting of the RCOG. The Lecturer and topic was left to the Organizing Committee. We promised to donate a Gold Medal to the Lecturer and after our successful Meeting, we gave the College 9 more Gold Medals (to make 10) and when they ran out, another 25 was given in 2013!

The first Singapore Lecturer was Sir George Pinker, the President of the RCOG and it was most appropriate as he gave us his unstinting support and encouragement. Dr Oon Chiew Seng our Honorary Fellow of the College presented the Medal to him.

The format of the Meeting is very similar to the current one with Plenary Lectures, Symposiums, Free Paper and Poster presentations, and both pre and post Workshops. A Scientific and Commercial Exhibition were held in conjunction with the Meeting to give exposure to our sponsors and generate more income.

To encourage our younger colleagues to participate, we were prepared to give monetary assistance to 20 best paper/poster presentation and the main author who made the presentation had to be under 35 years old.

Other "firsts" at the Meeting was the invitation to the President of the American College of O& G, and Presidents of the O& G Societies of ASEAN countries as we asked these societies to support our Meeting through their newslettersand journals. Of course, we invited the Presidents of the Australian, New Zealand, and Hong Kong Colleges of O& G and their Members and Fellows came in large numbers.

To add glamour to our Meeting, the College held its first Council Meeting overseas and the College Mace

Prof Charles Ng presented the gold medal to Prof Lesley Lumsden

was brought along together with College Gowns for Members and Fellows all at College Expense! This added colour and pomp to the Opening Ceremony which was opened by our Guest of Honour, the President of Singapore, Mr Wee Kim Wee.

The College Council also decided to hold the Convocation Ceremony for the Members who sat for the preceding MRCOG examination in UK to choose taking the ceremony in London or Singapore. Many Members who were from the region decided to come to Singapore instead of London as it was cheaper and they could also bring their guests like their spouses and parents. They took the opportunity to attend the Meeting thus helping to swell the numbers of delegates and accompanying persons. We had over 1000 delegates at our Meeting, which was a large number by Singapore standards then.

For social events, we had help from the Singapore Tourism Board to suggest interesting tours and we had both an informal party for our foreign visitors to try the local cuisine with hawker food stalls at SENTOSA and a formal Black Tie Banquet to conclude the Meeting.

During the Opening Ceremony, the College honoured Singapore by conferring the Honorary Fellowship of the RCOG to our Prime Minister, Mr Lee Kuan Yew. He accepted the Fellowship as it reflected the strong links between Singapore and

the College and the help the College provided in the training of our specialists in O& G and the conduct of our Master of Medicine in 0 & G held by our Academy of Medicine (now conjoined with the MRCOG Examination in Singapore).

Mr Lee Kuan Yew receiving the Honorary Fellowship of the Royal College of O&G from the President of RCOG, Sir George Pinker

As a result of the success of the First Meeting, we managed to make a handsome profit and we donated a sizable sum to the College. We hoped that this would set the precedent in subsequent overseas International Scientific Meetings of the College and add to the College funds. I must add that we made profit because the Organizing Committee and Sub Committees did all the work with additional help from our Members and Fellows and we drafted our junior doctors, nurses and medical students to run the sessions. We did not have a PCO (there was none at that time with the experience of running a complex medical congress) and so we saved money by our "blood and sweat" hard work!

I must confess that little did we know that our dream and the embryo we conceived has grown into such a big and strapping young adult. The RCOG World Congress has become an Annual event with venues in all countries where there are sizable numbers of Members and Fellows. Personally, to be asked to speak at the return of the RCOG Congress after 28 years and beyond is my wildest dream.

Thank you for the honour and your attention.

Opening ceremony of the 1st International Scientific Meeting of RCOG and Conferment of Honorary Fellow, RCOG on Mr Lee Kuan Yew, From left: Prof Victor Tindall (Senior Vice President, RCOG who delivered the citation on Mr Lee Kuan Yew), Dr Charles Ng, Mr Wee Kim Wee (President of the Republic of Singapore), Sir George Pinker, Mr Lee Kuan Yew

Singapore Journal Of Obstetrics & Gynaecology
2018; 49(2): 48-56

Reflections on the RCOG World Congress 2018

A/Prof Timothy Lim Yong Kuei [1]

A/Prof Lim Yong Kuei, Chairman, Local Organising Committee, RCOG World

The RCOG World Congress is a leading medical conference that features world renowned clinicians and researchers who share, discuss and debate on the latest developments in the field of Obstetrics & Gynaecology that can impact clinical practice around the world.

In 1991, for the first time in its history, the Royal College of Obstetricians & Gynaecologists (RCOG) held its first international scientific meeting in Singapore, outside of the UK. The Singapore RCOG meeting was graced by the late Prime Minister Mr Lee Kuan Yew, and since this meeting, the Singapore Lecture was incarnated and was given at every subsequent international RCOG World Congress.

After a hiatus of 25 years, the Singapore delegation led by the then President of OGSS, A/Prof Tan Lay Kok, successfully won the bid to host the RCOG World Congress in Singapore for the second time. The bid was formalized and signed in Birmingham in 2016.

A team of O&G specialists, represented by the public and private organisations, was formalized to organise the Singapore RCOG event. The local committee was led by A/Prof Lim Yong Kuei, and its executive members included Dr Lim Min Yu, as the Vice-Chairman and Treasurer, Dr Manisha Mathur and Dr Serene Thain, as the Chair & Co-Chair Scientific Subcommittee, respectively, Dr Lee Keen Whye & Dr Christopher Ng, as Chairs of the Sponsorship Subcommittee, Dr Tan Eng Kien, as the Chair of the Abstract Subcommittee, Dr Natalie Chua the Chair of the Social Subcommittee and our OGSS secretary, Janet Kok.

A/Prof Tan Lay Kok & Prof Paul Fogarty in Birmingham, at the signing of agreement to host RCOG World Congress 2018 in Singapore

[1] *Chairman Local Organising Committee*
RCOG World Congress 2018 & Vice-President of OGSS

The Organising committee with guest of honour, Minister of Health, Mr Gan Kim Yong

The rest of the local organising committee comprised of heads of departments and leaders from the various public institutions and professional societies.

The local committee was under great pressure to meet the expectations of the RCOG due to past success from the two preceding congresses in Birmingham and Cape Town in 2016 and 2017, respectively, with attendances of 2651 and 2288. In view of the potential capacity of between 1,500 to 2,000 delegates, the local committee members and the RCOG Director of Meetings, Lynn Whitley and Manager, Jessica Letters visited two potential sites that could host large numbers, namely Singapore Expo and Suntec Convention Centre. The final decision was to host in Suntec due to its strategic location at the heart of Singapore.

The local committee had regular meetings and spent many evenings from July 2016 to March 2018 to discuss and deliberate on the scientific content and logistics of the congress. Much effort was also spent on the publicity of the congress through various channels as well as garnering the sponsorship from pharmaceutical and medical devices companies to finance the congress. In October 2017, the committee's efforts paid off when we received our first piece of good news of more than 1,550 scientific abstracts submission. More good news ensued since then. Firstly, all 11 locally organized congress workshops were fully booked one month prior to the congress. Secondly, 2,890 confirmed participants registered to attend the congress, and thirdly, the registration was closed for the first time in Singapore due to the overwhelming local and international response.

Guest of honour, Singapore's Minister of Health, Mr Gan Kim Yong

Dr Quek Swee Chong presented a special lecture on the Himalayan Women's Health Project

The committee believed that the high number of registrations was a reflection of the high quality of the scientific program that was put forth. There were a total of 160 lectures covering all aspects of O&G practice including seven plenary lectures given by world renowned speakers.

The Singapore lecture was given by Professor Lesley Regan, the President of RCOG and it was a historic moment when Professor Charles Ng, the organizer of the 1st RCOG International meeting presented

Prof Lesley Regan, President of RCOG at the Singapore Lecture

the Gold Medal to Professor Lesley Regan. The opening ceremony was graced by our Minister of Health, Mr Gan Kim Yong and the special lecture on the Himalayan Women's Health Project was presented by Dr Quek Swee Chong.

The sell-out congress party was held at the iconic Flower Dome, Gardens by the Bay and it was an unforgettable and memorable evening for all who attended.

Overall, the congress was a resounding success and it would not have been possible without a capable organizing team as well as the concerted collaboration and camaraderie of the public and private O&G sector of Singapore. It is indeed a proud moment for the O&G fraternity of Singapore and I sincerely hope that this event will be remembered in the years to come and serve as an inspiration to the future generation of local O&G specialists.

RCOG 2018 Local Organising Committee

Chairperson:

A/Prof Lim Yong Kuei

Vice Chair and Treasurer:

Dr Lim Min Yu

Local Organising Committee:

A/Prof Ho Tew Hong

A/Prof Bernard Chern

A/Prof Tan Hak Koon

Prof Arijit Biswas

Prof Yong Eu Leong

Dr Ng Ying Woo

Dr Chris Ng

Dr Lee Keen Whye

Dr Chang Tou Choong

Prof Tan Kok Hian

Dr Joseph Ng

Dr Roy Ng

Dr Natalie Chua

Dr Manisha Mathur

Dr Serene Thain

Dr Tony Tan

Advisor:

Prof Charles Ng

A/Prof Tan Lay Kok

RCOG World Congress 2018

21 - 24 March 2018, Suntec City Convention Centre, Singapore

Prof Lesley Regan, President, Royal College of Obstetricians & Gynaecologists

Prof Edward Prosser-Snelling, Royal College of Obstetricians & Gynaecologists

Panel for the "Stump the Professor" segment

Some international delegates at the Congress

The RCOG World Congress 2018 had some notable & renowned personalities presenting lectures

Sir Prof Arulkumaran Sabaratnam

Prof Haywood L Brown

Prof Jon Hyett

Prof Tim Draycott

Prof Dirk Timmerman

Prof Carl Weiner

L-R: Prof Haywood L Brown, Prof Mary Ann Lumsden, A/Prof Tan Lay Kok, Prof Janice Rymer

The main conference was filled to full capacity with attendees from 82 countries

Guests at the Congress party held at the iconic Flower Dome, Gardens by the Bay

During the closing ceremony, Certificates of Achievement were given to:

Dr Yousra Ahmetd-Salim for Best Oral Presentation

Dr Lise Brogaard for Best Poster Presentation

Dr Holly Lewis for Best Video Presentation (Certificate collected on behalf of Dr Holly)

Prof Lesley Regan presented OGSS President, A/Prof K Devendra with a token of appreciation

Prof Janice Rymer introduced Dr Nick Panay, Deputy Director of Conferences for RCOG World Congress 2019

Events

Annual General Meeting 2018

28 March 2017, Shangrila Hotel

OGSS President, A/Prof Devendra Kanagalingam convened AGM 2018 at Shangrila Hotel

OGSS Vice President & RCOG Congress 2018 Chairman, A/Prof Lim Yong Kuei presented the report for the recently concluded RCOG Congress 21-24 March 2018

Dr Tan Eng Kien, OGSS Honorary Secretary reported on activities for the past year.

OGSS Honorary Treasurer, Dr Lim Min Yu presented his report for the past year

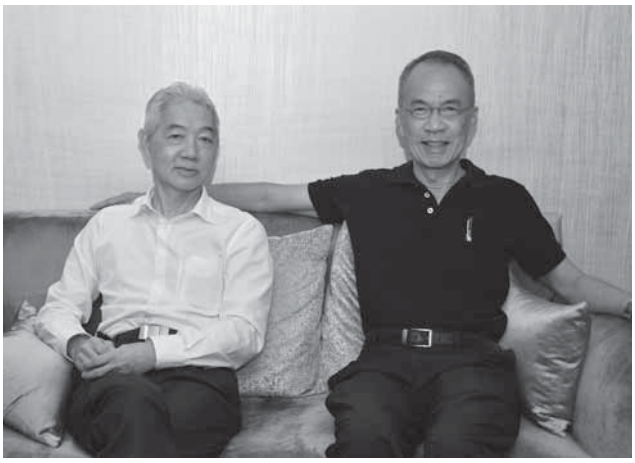
Prof Tan Kok Hian reported on activities for SJOG & Congress Trust Fund

Voting of new council members for the year 2018/2019

Some members present at AGM 2018

(L-R): Prof Wong Peng Cheang, Dr Jason Lim, Dr Tan Eng Kien, A/Prof Devendra Kanagalingam, Dr Anthony Siow, Dr Lim Min Yu, Dr Serene Thain, Prof Tan Kok Hian

Dr Ilka Tan & Dr Tan Toh Lick



Dr Lee Seong Tuck & Dr Khong Chit Chung

OGSS Honorary Secretary, Dr Tan Eng Kien & Council Member, Dr Susan Logan

Dr Vesna Dramusic

NIPT – Case Studies

13 December 2017, KK Women's & Children's Hospital

Prof George Yeo Seow Heong presented an interesting and engaging topic on "Clinical Application of NIPT – Case Studies. What to do with Cheese, Wine, Massively Parallel Sequencing & Genomics?"

Annual Oration

1 November 2017, Regent Hotel

OGSS Council members with Guests of Honour for the evening
Sitting (L-R): A/Prof Tan Lay Kok, Ms Ning Chong, A/Prof K Devendra, Mr Chong Huai Seng, Dr Jasmine Mohd
Standing (L-R): Dr Lim Min Yu, Dr Tan Eng Kien, Dr Serene Thain, Dr Susan Logan, Dr Jason Lim, Dr Ng Ying Woo

Welcome speech by OGSS President, A/Prof Devendra Kanagalingam

Emcees for the evening were Dr Ku Chee Wai & Dr Kwek Lee Koon

Oration citation was presented by Dr Jasmine Mohd

Dr Lim Min Yu explained the history of the SS Ratnam Book Prize

Guests of Honour, Mr Chong Huai Seng and Ms Ning Chong were presented tokens of appreciation by A/Prof Devendra Kanagalingam, OGSS President

"Art is Long and Life is Short" was the title of the oration by Guests of Honour, Mr Chong Huai Seng (left) and Ms Ning Chong (right)

The SS Ratnam Book Prizes were presented by OGSS President, A/Prof Devendra Kanagalingam to:

Ms Gao Ming Qi

Mr Felix Yeoh Zhi Guang

Mr Shanth Thiagarajan

Ms Audrey Chia Qi Xin

Past OGSS presidents (L-R): Dr & Mrs See Tho Kai Yin, Mrs & Dr Lee Keen Whye, Prof Tan Kok Hean, Dr Suresh Nair

L-R: Dr Tan Heng Hao, Dr Mahesh Sangrithi, Dr Chua Ka Hee

Standing (L-R): Dr Tan Eek Chaw, A/Prof Tan Thiam Chye
Sitting (L-R): Dr Serena Koh, Dr Neha Jinsiwale, Dr Seet Meei Jiun, Dr Tan Heng Hao

Clinical Updates Forum

7-8 October 2017, KK Women's & Children's Hospital

Invited foreign speaker, Prof Dan Farine from the University of Toronto, Canada, was the main speaker of this year's Clinical Updates

OGSS President, A/Prof K Devendra welcomed speakers & participants at the opening day of the Clinical Updates 2017

A/Prof Fong Yoke Fai spoke about "Endometriosis and Cancer Risk"

Dato' Dr Colin Lee touched on the topic: "Treatment for Poor Responders in IVF"

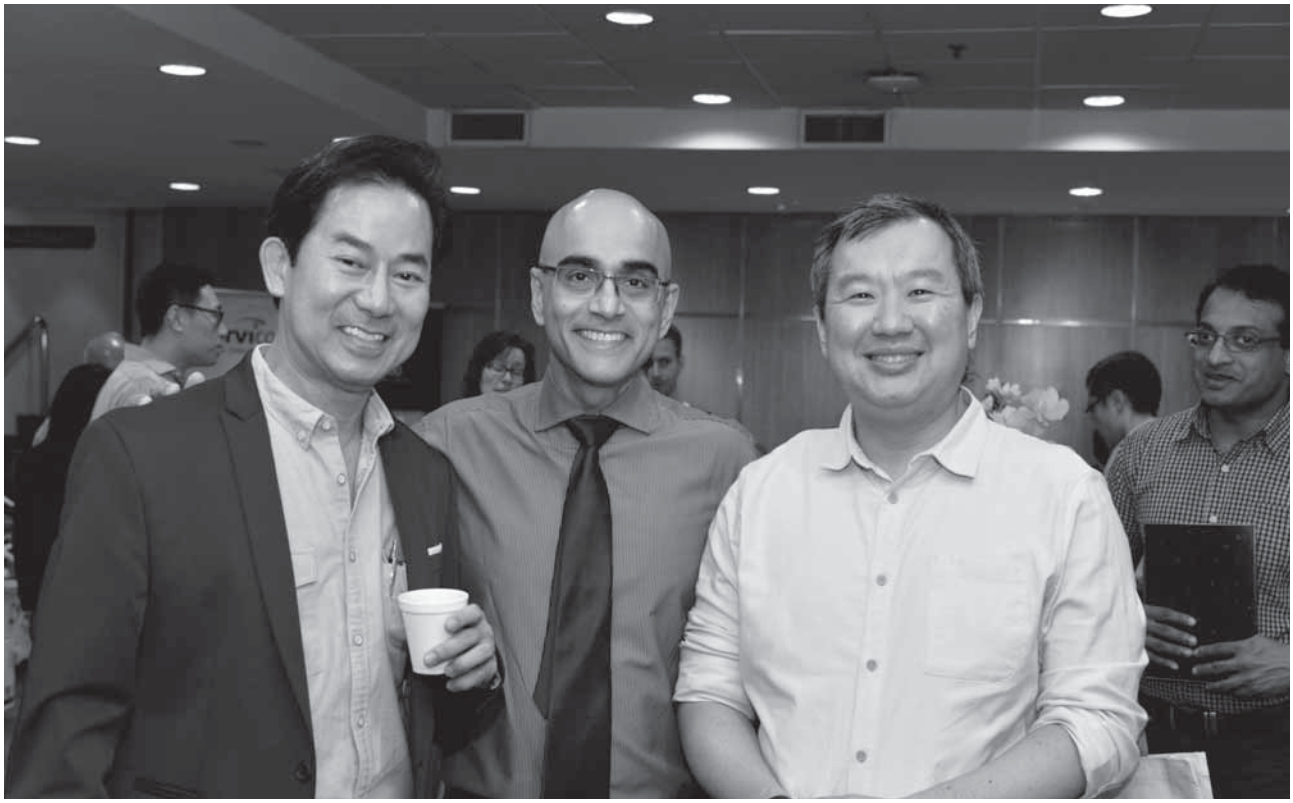
Dr Tony Tan gave an update on "Intervention in Preterm Labour – Avoiding Medicolegal Risks"

Dr Tan Kai Lit spoke on "Screening for Micro / Deletions / Sex Chromosome Aneuplody with NIPT"

"VTE in Pregnancy in Asia: Is it a Pigeon or Rare Sparrow?" was the topic covered by A/Prof Tan Thiam Chye

Dr Susan Logan's topic was about "HRT Benefit And Risk Assessment"

Dr Huang Zhongwei shared about "Medical Treatment of Fibroids"



L-R: Dato' Dr Colin Lee, Dr Suresh Nair & Dr Lim Min Yu during coffee break at the Clinical Updates Forum

Educational Nite

19 July 2017, Blu Kouzina

A/Prof K Devendra opened the night with a speech

"Update of Usage of Oral Progesterone" was presented by Dr Huang Zhongwei

Arriving OGSS members signing in for the evening's events

Dr Ilka Tan, Dr Tan Toh Lick & Dr Ng Ying Woo

OGSS members, Dr Alex Ooi, Mrs & Dr Widjaja Lee Kusuma, Dr Tay Boon Lin

L-R: Dr Lim Min Yu, Dr Arthur Tseng, Ms Janet Kok

SINGAPORE JOURNAL OF OBSTETRICS AND GYNAECOLOGY

INFORMATION FOR AUTHORS

The Singapore Journal of Obstetrics & Gynaecology is the official Journal of the Singapore Obstetrical & Gynaecological Society. It provides a medium for the publication of original articles related to Obstetrics & Gynaecology in all its aspects. It also provides a source for continuing medical education for both the members of the Society and those members of the medical profession of Singapore who have an interest in any part of the discipline.

The Journal will consider for publication original articles relating to clinical practice in Obstetrics and Gynaecology and to research, whether basic or applied, in fields relating to the subject. Besides original articles, the Journal will publish case, reports, review articles, book reviews and letters to the editor.

Articles are accepted on the understanding that they have not been accepted or submitted simultaneously elsewhere in this or a similar form, and that a substantial part of the material contained in the article has not been published elsewhere. In the matter of multiple publications please see the British Medical Journal 1984; 288:52. For guidelines, on authorship please see the British Medical Journal 1985; 291:722. It is assumed by the Editor and his committee that articles are submitted with the approval of all co-authors involved. The opinions expressed in any paper are those of the authors and the Editorial Committee does not necessarily agree with them, nor are they unless explicitly stated the official views of the Singapore Obstetrical and Gynaecological Society.

The editor reserves the right to make literary changes to the article to fit the house style of the Journal. If significant changes are necessary they will be shown to the authors before publication. To avoid delays, the authors are advised to pay close attention to the following requirements. Articles that do not follow the Journal instructions, particularly in matters relating to references, including their accuracy, will have to be returned unviewed and cannot be considered until the necessary changes have been made.

The Singapore Journal of Obstetrics and Gynaecology from March 1993 onwards will follow the Vancouver style of Uniform Requirements for Manuscripts Submitted to Biomedical Journals. These guidelines were laid down by an International Committee of Medical Journal Editors. Authors are advised to follow closely these guidelines for preparing manuscripts.

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Integrated Platform for Research in Advancing Metabolic Health Outcomes of Women and Children (IPRAMHO)

11 & 12 January 2019
KK Women's and Children's Hospital, Singapore

ORGANISING COMMITTEE & SPEAKERS

Prof Tan Kok Hian
President of Perinatal Society Singapore & Lead PI of IPRAMHO Study Group

A/Prof Bernard Chern
Academic Chair
OBGYN ACP

Prof George Yeo Seow Heong
Chief of Obstetrics & Gynaecology, KKH

Prof Ounjai Kor-anantakul
Chair MFM Committee AOFOG

Dr Chua Mei Chien
Head of Neonatology, KKH

A/Prof Tan Lay Kok
Immediate Past President, OGSS

A/Prof Yong Tze Tein
President, COGS

Dr Tony Tan
Past Chair, MFM Committee, AOFOG

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- Global, Region and Local Perspectives in GDM Management
- Lectures from Overseas and Local Speakers on Metabolic Health
- Panel Discussion with Regional and International Experts
- Perinatal Nutrition Consensus Workshop
- IPRAMHO-International Research Network Meeting in Metabolic Health
- Poster Exhibition
- Primary Care Research Centre @ Punggol Polyclinic – IPRAMHO Site Visit

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