

High-Risk Consult Multidisciplinary Team in a Tertiary Maternity Unit: Changing Prevalence of Cases

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Introduction: The management of high-risk pregnancies requires coordinated expertise across multiple specialties. The High-Risk Consult (HRC) brings together a multidisciplinary team of specialists, including maternal–fetal medicine specialists, neonatologists, anaesthesiologists, and relevant subspecialties to provide comprehensive, individualized care for these complex pregnancies. While this model of care delivery is increasingly adopted worldwide, data on the prevalence and patterns within such multidisciplinary services remains limited.

Objective: To describe the types of high-risk antenatal cases managed by an HRC and compare the prevalence of these conditions across two distinct time periods.

Methods: This retrospective observational study analyzed all cases discussed at the HRC of a single tertiary center, KK Women's and Children's Hospital (KKH), in Singapore. Data were collected for two epochs: 1994–2003 and 2008–2021.

Results: There were 2356 cases (with 4097 associated conditions) from 1994 to 2003 and 2514 cases (with 5944 conditions) from 2008 to 2021. These cases constituted 1.51% of 151,589 deliveries and 1.55% of 162,017 deliveries at KKH in the respective epochs. Despite an overall decrease in annual delivery rates over time, the proportion of high-risk cases remained stable. However, the prevalence of specific conditions changed significantly. The incidence of preterm rupture of membranes (17.6% vs 9.6%), preeclampsia (10% vs 4.8%), and preterm labor (12.6% vs 2.9%) decreased (all $p < 0.0001$), while fetal anomaly showed a marked increase (1.6% vs 14.5%; $p < 0.0001$).

Conclusion: The overall proportion of pregnancies requiring HRC consultation remained consistent at approximately 1.5% across both epochs, but there were notable shifts in the case composition. These findings highlight evolving priorities for multidisciplinary care and inform resource allocation and service planning in tertiary maternity units.

Trial Registration: CIRB Ref: 2022/2458.

Keywords: perinatal outcomes, complicated pregnancy, multidisciplinary care, management prevalence, clinical governance

Background

The value of multidisciplinary approaches in maternal healthcare has been recognized for over three decades.¹ Early quantitative studies demonstrated the positive impact of prenatal pediatric surgical consultation on perinatal management of fetuses with surgically correctable congenital anomalies.^{2,3} More recent evidence has further solidified the crucial role of multidisciplinary team (MDT) care in high-risk pregnancies. A 2019 NICE review emphasized that MDT-based individualized care reduces adverse outcomes by preventing contradictory interventions.⁴ This aligned with the 2017 MBBRACE findings, which revealed that the absence of well-functioning MDTs could lead to poor outcomes, including mortality.⁵ In the same year, Johnston et al demonstrated that MDT care effectively addresses the complex needs of high-risk pregnancies.⁶

Contemporary literature continues to reinforce these findings, with recent studies showing improved maternal and fetal outcomes through coordinated multidisciplinary care.^{7,8} International consensus and guidelines, including the 2023 SOMANZ guidelines,⁹ now provide frameworks for standardized MDT approaches in high-risk obstetric care.¹⁰

While this model of care delivery is increasingly adopted worldwide, there is a significant gap in the data on the prevalence and patterns within such multidisciplinary services.¹¹ Traditionally, perinatal morbidity and mortality have been used as measures of perinatal care provision. However, monitoring prevalence of cases over time gives information on changing patterns of conditions and incidence, which is useful when drawing up unit policies and protocols.

The objective of the study was to describe and compare the prevalence of high-risk antenatal cases as defined by the HRC between two epochs just under fifteen years apart, the hypothesis being that prevalence of high-risk cases changes with time.

Perinatal High-Risk Consult (HRC)

The Perinatal High-Risk Consult (HRC) at KK Women’s and Children’s Hospital (KKH), the largest stand-alone maternity unit in Singapore, was implemented in 1994 as a high-quality MDT service run by experienced maternal–fetal medicine (MFM) specialists and neonatologists to develop an antenatal and immediate postnatal care plan for high-risk pregnancies to ensure best outcome. A high-risk pregnancy may be defined as any pregnancy in which, for whatever reason, the mother, fetus or both are at higher risk of an adverse outcome compared with an uncomplicated pregnancy. Such pregnancies need individualized comprehensive care to achieve the best outcome possible depending on the condition involved.

The HRC takes the form of a weekly meeting of MFM specialists and neonatologists, with attendance of other specialists including fetal cardiologists and paediatric surgeons depending on the conditions being discussed. Other allied professionals such as pharmacists who contribute with drug information, midwives and operating theatre coordinators who facilitate the booking of cases are also present. Plans for undelivered mothers, previously presented, are reviewed and updated. Referrals come from a number of sources including the scan service, antenatal clinic and in-patient wards. A perinatal audit of cases is included which examines outcomes of cases previously discussed in HRC and any unexpected poor neonatal outcomes in the previous week. Some cases seen for follow-up in the paediatric clinic are also discussed to update obstetricians on the outcomes. The role of the neonatologist team during the perinatal audit is critical. Management of babies who are born with poor outcomes is scrutinized by the perinatal team focused on deficiencies in the peripartum management rendered and potential areas for improvement. In cases of Hypoxic ischemic encephalopathy, there is a multidisciplinary review of the Cardiotocography (CTG) tracings, antenatal and postnatal management, and investigations including MRI scans to identify the time of injury.

The HRC format comprises a structured summary providing a detailed account of each case, from which a problem list is derived including the primary condition and other conditions. The summary contains maternal demographics, history of previous pregnancies, past medical, surgical, family and psychiatric history with medications that could affect the developing fetus, smoking, alcohol consumption, other illicit drug use and any social issues. There follows a detailed description of the current pregnancy with gestational age, course to date, trending of all investigations including routine and other blood tests, antenatal screening and testing, scan results and any other relevant issues (see Box 1). After recommendations for any specific measures from appropriate subspecialists, a detailed individualized patient care plan is

Box 1 Types of Conditions Discussed in Perinatal HRC

(1) Maternal - Poor past obstetric history; Chronic conditions: eg, hypertension, diabetes mellitus, cancer, auto-immune diseases; Chronic infections: eg, hepatitis, HIV, syphilis; Psychiatric conditions; Intravenous drug use; and Advanced maternal age in combination with above
(2) Obstetric - Preterm premature rupture of membranes; Preterm labour; Preeclampsia; Placenta accreta spectrum disorders
(3) Fetal - Prematurity; Fetal Anomalies: cardiological, surgical, lethal; Intra uterine growth restriction: intra uterine infection, abnormal Dopplers; Exposure to fetotoxic drugs; and Twins especially mono-chorionic twins with twin to twin transfusion syndrome

formulated. This might include the need for antenatal steroids including rescue dosing, tocolysis, antibiotics, magnesium sulphate for maternal indications or fetal neuroprotection, discontinuing maternal aspirin and low molecular weight heparin, need for Doppler ultrasonography and ideal timing and mode of delivery. Also discussed are neonatal and other measures or personnel required around delivery such as a prostaglandin infusion for duct-dependent cardiac lesions, postnatal zidovudine for HIV-positive mothers or paediatric surgical input, according to the Birth Defect Clinic (BDC) team recommendations. The BDC is a separate meeting to discuss all new fetal anomalies picked up in the previous week and has close links with the HRC.

The neonatologists within the team coordinate resuscitation plans with allied specialists. In cases of fetal anomaly likely to require postnatal surgical management, they facilitate communication with the relevant surgical team to ensure optimal management of the defect and reduce infection risk. Similarly, if there are concerns over patency of the airway, an MRI may be ordered to delineate the trachea and look for obstruction for which an Ex-Utero Intrapartum Treatment (EXIT) procedure can be arranged to manage the airway at delivery, which involves a large multidisciplinary team (refer to [Annex 1](#)). Often, a pre-operative meeting or “huddle” is arranged with all related specialists, such as paediatric anaesthetists, surgeons, operating theatre staff, obstetricians and neonatologists to discuss step-by-step delivery plans and role assignments during the delivery of the baby.

The HRC meeting concludes with team endorsement of a perinatal plan for each case presented with a date for review if the pregnancy is continuing. The plan is then uploaded onto the early warning system in the computerized case notes to alert healthcare providers at the time of delivery and highlight any anticipated problems to ensure an appropriate team is on standby.

The patients are subsequently counselled by the appropriate clinicians on prognosis and possible outcomes depending on the maternal or fetal condition involved. All mothers admitted with threatened preterm labour or a potentially serious obstetric complication at the peri-viable gestation between 23 and 24+6 weeks are routinely counselled by the team, led by a neonatologist, towards active resuscitation or comfort care within an ethical and legal framework. Comfort or palliative care is also discussed for fetuses with serious life-limiting conditions, with recommendations for referral to the relevant teams or perinatal palliative team for support of mother and family.

Methods

Study Design

This was an observational retrospective epidemiological cohort study focussed on prevalence of high-risk perinatal case types managed in KKH, collected either contemporaneously or, after 2002, from a record made at the weekly HRC meeting. Outcomes of previously presented cases from an audit at the same meeting were also included. Inclusion criteria comprised all cases presented to the HRC with complete documentation. Cases were excluded if medical records were incomplete or unavailable. Sample size was determined by all eligible cases during the study periods. Two trained researchers independently extracted data using a standardized collection form. The form captured demographic information, clinical conditions (categorized using ICD-10 codes), management decisions, and outcomes. Content validity was established through expert panel review. This presentation follows the STROBE (Strengthening the reporting of observational studies in Epidemiology) guidelines. A case study is illustrated in [Annex 1](#) to show the process and usefulness of the HRC in a fetus with a structural anomaly.

Study Setting

KKH is the largest maternity facility in Singapore with between 11,000 and 12,000 deliveries annually and offers tertiary care for women with complex medical and obstetric conditions and neonates at all viable gestations, with the legal limit of viability being 24 completed weeks in Singapore but active resuscitation being offered up to a week earlier during the study period depending on the situation. It also accepts in-utero transfers of problem pregnancies from all sectors.

Data Sources

All analyses were based on hospital presentations and admission records.

Participants

The study population was based on available hospital records of patients discussed in the HRC between two epochs 1994–2003 and 2008–2021.

Statistical Analysis

All cases discussed during the two epochs, 1994–2003 and 2008–2021, were collected and entered into a database by condition, as indicated on the problem list, and analyzed using the statistical software R. Changes in the prevalence of the numbers and types of conditions between the two time periods were compared. A comparison of types of cases seen in the two epochs by all conditions was analyzed using the chi-square test. Statistical significance was set at 0.05.

Results

The types of conditions discussed in HRC varied ([Box 1](#)). Both primary and other conditions were looked at for each case. The results of the leading conditions are reported here.

A total of 2356 cases with 4097 conditions were discussed at the High-Risk Consult from 1994 to 2003. These cases constituted 1.51% of the 151,589 deliveries in KKH during this period. Of the 4097 conditions, they included preterm rupture of membrane (PPROM) (17.6%), preterm labour (PTL) (12.6%), fetal growth restriction (FGR) (13.6%), preeclampsia (10.0%), diabetes (4.5%), twin pregnancy (7.1%), triplet pregnancies (0.8%) and fetal anomalies (1.6%) ([Table 1](#)).

A total of 2514 cases with 5944 conditions were discussed at HRC from 2008 to 2021. The cases constituted 1.55% of the 162017 deliveries in KKH over this time. The problems discussed included preterm rupture of membrane (9.2%),

Table 1 Comparison of Types of Cases Seen in the 2 Epochs by All Conditions

1994–2003			2008–2021		p (chi sq)
By All Conditions					
	Total	%	Total	%	
PPROM	720	17.6	544	9.2	<0.00001
PTL	515	12.6	174	2.9	<0.00001
FGR	557	13.6	828	13.9	0.616
PET	411	10.0	284	4.8	<0.00001
DM	185	4.5	255	4.3	0.596
TWIN	291	7.1	401	6.8	0.498
TRIP	31	0.8	40	0.7	0.626
FA	65	1.6	859	14.5	<0.00001
Other	1322	32.3	2552	43.0	<0.00001
Total	4097	100	5937	100	

Abbreviations: PPRM, Premature Prelabour Rupture of Membranes; PTL, Preterm Labour; FGR, Fetal Growth Restriction; PET, Preeclampsia; DM, Diabetes; TWIN, Twin Pregnancy; TRIP, Triplet Pregnancy; FA, Fetal Anomalies.

preeclampsia (4.8%), FGR (13.9%), twin pregnancy (6.8%), triplet pregnancy (0.7%), preterm labor (2.9%), fetal anomalies (14.5%) and diabetes (4.3%) (Table 1).

“Other” conditions comprised a heterogeneous mix of differing conditions affecting the mother, fetus, pregnancy or all three. Of these, cervical weakness, placenta accreta spectrum disorder and antepartum haemorrhage appeared most commonly, but the numbers were low and sporadic.

As shown, the HRC case numbers and prevalence were steady for several conditions between the two epochs. However, there was a change in pattern of incidence for some case types over time with preterm rupture of membrane, preeclampsia, and preterm labour showing a decreasing trend (p-values < 0.0001) and fetal anomaly showing an increasing trend (p-values < 0.0001). FGR featured as a leading problem in both groups (Table 1).

When focusing on the primary condition, for 1994–2003, of the 2356 patients, preterm rupture of membrane affected 30.6% (720) of the patient cases, followed by FGR 23.6% (557), preterm labour 21.9% (515), preeclampsia 17.4% (411), diabetes 7.9% (185), twin pregnancy 12.4% (291), fetal anomaly 2.8% (65) and triplet pregnancy 1.3% (31) (Table 2). For 2008–2021, the primary condition of the 2514 patients discussed was fetal anomaly which affected 34.2% (859) of the patient cases, followed by FGR 32.9% (828), preterm rupture of membrane 21.6% (544), twin pregnancy 16.0% (401), preeclampsia 11.3% (284), diabetes 10.1% (255), and triplet pregnancy 1.6% (40) (Table 2).

Over the period of the study, the stillbirth rate¹² showed a consistent decline from 4.49 to 3.42, 3.36 and 3.05 per 1000 births in 1994, 2003, 2010 and 2021, respectively. Likewise, the perinatal mortality rates similarly showed a consistent decline from 6.36 to 4.20, 4.07 and 3.72 per 1000 births in the same years (Table 3).

Analysis of annual trend of the 2008 to 2021 epoch for both the main diagnosis condition and overall number of conditions showed patterns of decreasing incidences of preterm rupture of membrane, preeclampsia, and preterm labour

Table 2 Comparison of Types of Cases Seen in the 2 Epochs by Primary Diagnosis

Primary Diagnosis	1994–2003		2008–2021	
	Total	%	Total	%
PPROM	720	30.6	544	21.6
PTL	515	21.9	174	6.9
FGR	557	23.6	828	32.9
PET	411	17.4	284	11.3
DM	185	7.9	255	10.1
TWIN	291	12.4	401	16.0
TRIP	31	1.3	40	1.6
FA	65	2.8	859	34.2
Other	1322		2552	
Cases	2356		2514	
Total deliveries	151158		162,017	
% of deliveries	1.56		1.55	

Abbreviations: PPRM, Premature Prelabour Rupture of Membranes; PTL, Preterm Labour; FGR, Fetal Growth Restriction; PET, Preeclampsia; DM, Diabetes; TWIN, Twin Pregnancy; TRIP, Triplet Pregnancy; FA, Fetal Anomalies.

Table 3 Stillbirth Rates and Perinatal Mortality Rates 1994–2021

Year	Total Deliveries	KKH Stillbirth Rate (per 1000 Births)	KKH Perinatal Mortality Rate (per 1000 Births)
1994	14,719	4.49	6.36
1995	14,719	3.47	4.88
1996	15,052	4.64	6.27
1997	15,681	3.57	4.7
1998	15,434	3.25	4.7
1999	15,753	2.87	4.24
2000	16,744	3.67	4.06
2001	14,579	3.19	4.11
2002	14,837	3.61	4.33
2003	13,640	3.42	4.2
2004	13,185	4.05	4.79
2005	12,565	3.61	4.39
2006	12,018	3.69	4.1
2007	12,134	3.66	4.39
2008	12,314	2.71	3.43
2009	11,903	1.97	3.78
2010	11,093	3.36	4.07
2011	11,583	4.48	5.66
2012	11,622	3.72	4.9
2013	10,870	2.53	3.34
2014	11,592	3.05	4.15
2015	11,869	3.47	3.72
2016	11,633	3.37	4.38
2017	11,695	4.27	5.45
2018	11,677	2.78	4.21
2019	11,240	3.23	3.58
2020	11,298	3.23	4.01
2021	11,628	3.05	3.72

and increasing incidence of fetal anomaly (Table 4A and B). The incidences of FGR twin and triplet pregnancies were relatively stable. Diabetes showed an increase overall but was stable as the primary condition in terms of incidence (Table 4B).

Table 4 Case Prevalence from 2008 to 2021 by All Conditions and by Primary/Main Diagnosis

A. All Conditions	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
PPROM	54	45	73	44	53	22	31	27	42	50	30	21	28	24	544
PET	23	24	28	27	37	12	19	17	24	20	10	9	19	15	284
FGR	50	49	66	51	57	60	57	53	62	68	69	49	71	66	828
TWIN	30	26	38	47	41	24	30	25	28	20	15	25	26	26	401
TRIP	3	3	1	3	3	8	5	2	1	4	3	1	2	1	40
PTL	20	17	13	11	13	13	15	11	11	12	11	7	7	13	174
FA	21	36	43	50	54	37	31	74	52	78	72	98	131	82	859
DM	0	0	14	18	21	12	14	18	32	29	22	23	27	25	255
Cervical Incompetence	5	14	20	10	14	15	19	21	17	14	16	17	18	15	215
APH/ Placenta Previa/ Recurrent APH	17	10	12	8	7	6	10	12	17	8	8	15	10	9	149
Placenta Accreta	4	0	1	1	1	0	0	1	7	4	3	4	5	4	35
Others	118	89	81	94	95	176	114	160	259	199	220	182	220	153	2160
Total	345	313	390	364	396	385	345	421	552	506	479	451	564	433	5944
B Primary/Main Diagnosis	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
PPROM	43	37	53	31	22	13	26	25	31	34	24	13	22	14	345
PET	17	18	17	22	12	11	11	12	15	14	6	7	9	11	165
FGR	28	31	29	23	29	18	23	21	28	32	32	17	29	29	341
TWIN	26	22	21	28	25	20	19	17	16	13	13	15	17	24	250
TRIP	3	2	1	2	1	5	2	2	1	3	3	1	2	0	25
PTL	8	7	5	3	5	3	2	6	3	7	5	4	3	8	61
FA	18	27	30	31	31	12	26	30	36	41	46	51	74	47	482
DM	4	3	2	3	1	2	3	3	4	5	3	6	2	2	39
Cervical Incompetence	3	8	10	4	10	8	7	11	13	7	12	13	15	10	128
APH/ Placenta Previa/ Recurrent APH	5	6	9	3	3	4	5	10	13	3	4	9	5	5	79
Placenta Accreta	2	0	0	1	0	0	0	0	5	4	2	4	3	2	21
Others	21	19	13	23	21	28	35	43	32	37	42	39	31	37	400
Total	178	180	190	174	160	124	159	180	197	200	192	179	212	189	2514

Abbreviations: PPRM, Premature Prelabour Rupture of Membranes; PTL, Preterm Labour; FGR, Fetal Growth Restriction; PET, Preeclampsia; DM, Diabetes; FA, Fetal Anomalies; DM, Diabetes Mellitus; APH, Antepartum haemorrhage; TWIN, Twin Pregnancy; TRIP, Triplet Pregnancy.

Discussion

This study showed the changing epidemiological prevalence of the most common conditions affecting high-risk pregnancies in a busy maternity unit over more than a twenty-five-year period, as reflected by records before and after the setting up of a specialized multidisciplinary HRC.

The reduced number of PPRM and PTL cases discussed may reflect the lower delivery rate but may also reflect a lower incidence of PPRM due to better recognition of women at risk of early membrane rupture with correctable causes, such as cervical incompetence from previous cervical surgery or infection, which can be screened for and, if

detected early enough, may be prevented by cervical cerclage or timely antibiotics. Additionally, protocolized care and evidence-based guidelines, in line with other international guidelines, have evolved for many conditions over time. As well as potentially prolonging the pregnancy, these usually recommend early neonatal activation, which may obviate the need for formal discussion in HRC.

The observed trend in diabetes cases in our study (increasing from 7.7% to 9.8%) appears lower than global prevalence rates, which report gestational diabetes affecting up to 14% of pregnancies worldwide.¹³ This disparity may reflect regional variations in screening approaches, diagnostic criteria, and population risk factors. Asian populations, in particular, have shown higher rates of gestational diabetes, with some studies reporting prevalence rates of 12–18% in South Asian and East Asian populations, attributed to genetic predisposition, changing lifestyles, and increasing maternal age.^{13,14} The lower rates in our study could be explained by several factors: differences in population demographics, variations in screening protocols prior to the adoption of IADPSG/WHO 2013 criteria,¹⁵ or potential underreporting of cases in the earlier epoch before standardized screening was implemented.¹⁶ Additionally, the rise we observed might have been tempered by local preventive strategies and early intervention programs, though this warrants further investigation. Understanding these differences is crucial for service planning and resource allocation, particularly in units serving diverse populations with varying risk profiles.

Pre-existing DM is associated with an increased rate of fetal anomaly related to the peri-conceptual glycaemic control as indicated by the HbA1C. This condition is associated with higher rates of spontaneous preterm delivery, along with other associated obstetric conditions, including preeclampsia and fetal problems such as macrosomia and polyhydramnios. In our cohort, we observed a rising trend in both pre-existing DM and fetal anomalies, suggesting the need for further subanalysis. To optimize perinatal care and achieve the best possible outcomes for these infants, a multidisciplinary approach is essential.⁵

The greatest rise in cases discussed was for fetal anomaly (from 3% to 28.3%). This rise may, in part, be due to an actual increase in fetal anomaly but is also likely to reflect the huge advances in technology regarding imaging modalities over the period of the study.

The HRC meeting allows dissemination of information among health care providers and promotes communication and exchange of ideas to formulate a delivery plan, which is readily available to the birth attendants. Through an individualized approach towards the mother with a problem fetus, including objective, accurate and up-to-date counseling, it provides some choice and realistic expectations of the antenatal, intrapartum and postnatal care as well as antenatal and postnatal support.

HRC also provides a forum to review outcomes after delivery and a quality improvement opportunity for healthcare providers to optimize plans for similar cases in the future with adjustment of practices and protocols as indicated. It has the potential to reduce the risk of unplanned delivery of babies with complex problems in under-resourced settings, need for in-utero and ex-utero transfers and improve survival and morbidity of high-risk fetuses.

The existence of an HRC is beneficial to obstetricians, neonatologists and, most importantly, patients. High-risk pregnancies have higher rates of adverse outcomes, and optimization of care is crucial to ensure best outcomes. Over time and with medical and surgical advances, an increasing number of conditions have become potentially treatable and recognition through a multidisciplinary team approach ensures careful evaluation and individualization to optimize outcome. The main use of any HRC is to provide a direct communication channel between obstetricians and neonatologists to highlight potential cases of concern to ensure all possible measures are implemented for a fetus to be born in the best condition into the ideal perinatal environment with a neonatal team on standby equipped with appropriate skills to promote best possible outcome.

The modern MDT framework has evolved beyond traditional obstetric-neonatal collaboration to include essential specialists: anesthesiologists managing complex maternal comorbidities and potential peripartum complications; cardiologists providing expertise in maternal cardiac conditions; and internists specialized in obstetric medicine addressing various medical complications during pregnancy. This comprehensive team composition enables effective management of increasingly complex pregnancy scenarios.

However, Taylor et al⁵'s analysis of MDT management in pregnant women with pre-existing diabetes and cardiac conditions revealed significant variability in practice. Their study highlighted the need for evidence-based

recommendations to support and better define MDT care protocols, particularly regarding management approaches and cost-effectiveness, to reduce fragmentation and inconsistency in care delivery.

In addition to the HRC contribution to patients' care, the team's effectiveness is enhanced through systematic follow-up during pregnancy, utilizing various monitoring tools. A specialised Fetal Growth Clinic for growth restricted fetuses uses obstetric Doppler ultrasonography to provide crucial information about fetal wellbeing and placental function to guide timing and mode of delivery.^{17,18} The anaesthesia team are involved in maternal hemodynamic monitoring, which is particularly important in cases with cardiovascular complications,^{19,20} allowing for precise adjustment of management strategies. These complementary tools support the MDT's decision-making process and help optimize both maternal and fetal outcomes.²¹

Strengths and Limitations

One limitation of the study is its accuracy due to the inconsistency in which the cases discussed were reported with the potential for a selection or reporting bias in the reported numbers due to some relevant cases being overlooked, although this remained unchanged throughout. Another limitation is the lack of specific neonatal mortality and morbidity data for individual conditions, but this data was not the primary aim of the study. It is acknowledged that there was a gap in collection of the data and that the two epochs were of differing lengths but one of the strengths of this study is that the data was collected contemporaneously and handled consistently over a long period and because it formed the basis for the clinical service there were no cost or ethical implications. The separate epochs allowed changes in prevalence to be identified, and although the changing incidence of certain conditions might have indicated that the early data had become outdated the trends in prevalence were in keeping with observed clinical practice and were useful in shaping changes in processes over time as the service developed.

Implications for Clinical Practice and Health Policy

Knowledge of prevalence of the most common case types affecting high-risk pregnancies provides important information for service planning. While FGR remained one of the most common case types discussed between the two epochs, the number of FAs rose sharply over time to become the leading cause for discussion in the second epoch, replacing PPRM, which led over two decades earlier. The trend seen with FAs is likely due to improved awareness and diagnosis, resulting in increased recognition that multidisciplinary team and interprofessional management are key for this group of patients. Monitoring trends in other conditions will help ensure optimal management. Audit of outcomes in these cases allows continuous practice improvement and additionally provides a valuable teaching tool. Future research examining these trends over a continuous time period could provide additional insights into the evolving patterns of high-risk pregnancy complications.

Conclusion

In conclusion, our study demonstrates significant changes in the epidemiology of high-risk conditions managed through the HRC over two decades in a tertiary maternity unit. The most striking finding was the substantial increase in fetal anomaly cases from 3% to 28.3%, reflecting improved diagnostic capabilities and growing recognition of the importance of multidisciplinary management in these complex cases. We also observed a modest rise in diabetes cases from 7.7% to 9.8%, while noting a reduction in PPRM and PTL cases, likely attributable to both changes in delivery rates and the implementation of standardized protocols. These trends may provide valuable insights to guide resource allocation and service development in tertiary maternal care units.

Data Sharing Statement

The datasets used and/or analyzed during the current study are not publicly available due to limitations of ethical approval involving the patient data and anonymity but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

Ethics approval was obtained from the SingHealth Centralised Institutional Review Board (CIRB ref: 2022/2458). All methods were performed in accordance with the relevant guidelines and regulations and data was collected in 2022. The need for Informed Consent was waived by the Singapore Singhealth Review Board due to the retrospective nature of the study. This study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki (as revised in 2013) regarding medical research involving human subjects.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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