

Is the New Obstetrics Package for Non-local Pregnant Women Making a Change?

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Objectives:

To determine whether the new obstetrics package for non-local pregnant women delivering in Hong Kong has had an impact on the local obstetric service and pregnancy outcomes.

Methods:

This is a retrospective study based on delivery records of women who gave birth in Tuen Mun Hospital during two different periods. Records of 1713 non-booked pregnant women and 155 booked pregnant women who gave birth between March 2006 and February 2007, and 1297 booked pregnant women and 101 non-booked pregnant women who gave birth between August 2007 and July 2008 in Tuen Mun Hospital were reviewed.

Results:

There was a significant drop in the number of non-local pregnant women delivering in our hospital ($p < 0.001$) and there were more elective Caesarean sections ($p < 0.001$). Apart from more preterm deliveries ($p < 0.001$) and low-birth-weight babies ($p < 0.05$) in recent years, there was no significant change in pregnancy outcomes or admission to delivery times.

Conclusion:

The package successfully reduced the number of non-local pregnant women delivering in Tuen Mun Hospital but did not improve pregnancy outcomes. A more comprehensive package is needed to improve their pregnancy outcomes.

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Keywords: Birth weight; Pregnancy complication; Pregnancy outcome

Introduction

In recent years there has been a marked rise in the number of pregnant women from mainland China (non-local women) giving birth in Hong Kong¹⁻³. In 2000, there were 6052 deliveries in Tuen Mun Hospital and 1132 (18.7%) involved non-local women. By 2004 however, of 5680 deliveries, 1759 (31%) were to non-local women. Many of these patients had made no formal bookings in our antenatal system, had no regular antenatal care and some had not even undergone the most basic antenatal assessments, or routine blood tests before their delivery. Many came to the hospital just before delivery with problems such as wrong dates, fetal compromise, an abnormal lie, and required urgent intervention and operative delivery¹⁻³. Lastly, many did not pay their hospital charges. This extra patient load and patient complexity created a heavy burden for our health care system, in terms of cost, manpower, and availability

of service.

In 2005, the Hospital Authority (HA) launched an obstetrics package costing HK\$20,000, but this failed to reduce the number of non-local pregnant women using the hospital (1759 deliveries in 2004 vs 2013 deliveries in 2005). In February 2007, the HA launched a new obstetrics package for non-local pregnant patients.¹ All non-local patients from mainland China are now required to book formally at an HA hospital, to come for at least one screening visit, to have routine antenatal blood tests performed, and to pay a deposit of HK\$39,000. The booking system has been centralised so that no further bookings are accepted when quotas are filled. The package was **developed to limit the number of non-local pregnant women delivering in Hong Kong**

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and thus ensure that local pregnant women can access appropriate obstetric services. It also aimed to deter women with no prior bookings or past antenatal checks from arriving last minute, in labour, at accident and emergency departments. Lastly, **this package ensures** that hospital charges are paid in advance.

This retrospective review was undertaken to determine whether the provision of this package to non-local women has improved pregnancy outcomes, such as mode of delivery, number of preterm deliveries, number of low-birth-weight babies. It also aimed to detect any change in admission patterns, such as fewer ‘last-minute’ admissions and emergency Caesarean sections.

Methods

This study compared the outcomes of non-local pregnant women coming from China from March 2006 to February 2007 with those of non-local women delivering from August 2007 to July 2008. August 2007 was chosen rather than April 2007, when the policy commenced, because it was assumed that time was required for non-local pregnant women to receive the new information and start booking for deliveries. The pregnancy outcomes studied include the number of deliveries, the mode of delivery, birth weight, low Apgar scores, preterm labour, need for induction of labour, pre-eclampsia at late presentation, uncontrolled gestational diabetes, untreated syphilis and breech presentation in labour. The time from admission to delivery and the number of emergency Caesarean sections were reviewed to see if the admission patterns were different. The data were retrieved from the labour ward delivery records, counterchecked with the hospital’s computerised

management system (CMS) and supplemented with information retrieved from the Obstetric Specialty Clinical Information System.

Graphpad Quickcals online software was used to perform the statistical analysis. The differences between the groups were analysed using the χ^2 test for categorical variables. A difference was considered statistically significant when $p < 0.05$.

Results

Number of Deliveries

From March 2006 to February 2007 (group A), 1868 non-local Chinese women were delivered of infants, including 14 pairs of twins. 1713 (91.7%) of these women had no prior booking, and only 155 (8.3%) had been seen in our antenatal clinic before delivery. Between August 2007 and July 2008 (group B), there were 1398 deliveries, including 25 pairs of twins and one set of triplets. Among these, 1297 (92.8%) were booked and only 101 (7.2%) not booked. **This difference** was statistically significant ($p < 0.001$).

Mode of Delivery

In group A, of the non-booked pregnant women, 1229 (71.7%) were delivered by normal vaginal delivery, 186 (10.9%) by vacuum extraction, 10 (0.6%) by elective Caesarean section and 287 (16.8%) by emergency Caesarean section. There was one assisted vaginal breech delivery. Among the 155 booked women, 87 (56.1%) were delivered by normal vaginal delivery, 15 (9.7%) by vacuum extraction, 24 (15.5%) by elective Caesarean section, and 29 (18.7%) delivered by emergency Caesarean section (Table 1).

Table 1. Mode of delivery in booked and non-booked pregnant women

Mode of delivery	2006-2007 (Group A)			2007-2008 (Group B)		
	Booked (n=155; 8.3%)	Non-booked (n=1713; 91.7%)	Total (n=1868)	Booked (n=1297; 92.8%)	Non-booked (n=101; 7.2%)	Total (n=1398)
Normal vaginal delivery	87 (56.1%)	1229 (71.7%)	1316 (70.4%)	887 (68.4%)	73 (72.3%)	960 (68.7%)
Vacuum extraction	15 (9.7%)	186 (10.9%)	201 (10.8%)	102 (7.9%)	8 (7.9%)	110 (7.9%)
Elective CS*	24 (15.5%)	10 (0.6%)	34 (1.8%)	89 (6.9%)	0	89 (6.4%)
Emergency CS	29 (18.7%)	287 (16.8%)	316 (16.9%)	217 (16.7%)	20 (19.8%)	237 (17.0%)
Vaginal breech delivery	0	1 (0.1%)	1 (0.1%)	2 (0.2%)	0	2 (0.1%)
				+ a second twin		+ a second twin

* CS denotes Caesarean section

In group B, of the booked pregnant women, 887 (68.4%) were delivered by normal vaginal delivery, 102 (7.9%) by vacuum extraction, 89 (6.9%) by elective Caesarean section, and 217 (16.7%) by emergency Caesarean section. There were also three assisted vaginal breech deliveries including one second twin. Among the 101 non-booked women, 73 (72.3%) were delivered by normal vaginal delivery, 8 (7.9%) by vacuum extraction, and 20 (19.8%) by emergency Caesarean section.

Antenatal Problems: Breech Presentation, Twins, Pre-eclampsia, Gestational Diabetes Mellitus / Impaired Glucose Tolerance, Maternal Syphilis

There was no significant difference between the numbers of women with breech presentation identified at the time of labour ($p=1$). In group A, 14 non-booked women with a breech presentation were admitted in labour. Only one (4.5%; $n=22$) was admitted in the second stage of labour and she had an assisted vaginal breech delivery while the remaining 13 (59.1%) were delivered by emergency Caesarean section. In group B, two (6.1%; $n=33$) booked women were admitted in the second stage of labour and had assisted vaginal breech deliveries. Another 18 booked women and one non-booked woman (57.6%) were admitted in labour with breech presentations and were delivered by emergency Caesarean section.

Women with pre-eclampsia who required immediate interventions, either an emergency Caesarean section or a combined induction, within 6 hours of admission, were defined as late presentations. Women with severe pre-eclampsia usually require stabilisation and screening for possible complications prior to delivery. Six hours is considered a reasonable time for this. In group A, three booked women and eight non-booked women were delivered by emergency Caesarean section and six non-booked women required combined inductions within 6 hours of admission (total: 17, or 63% of all women with pre-eclampsia). In group B, among the booked women, 15 (68.2% of all women with pre-eclampsia) required immediate intervention — 11 by Caesarean section and 4 by combined induction. All three non-booked women required an emergency Caesarean section and one was admitted in eclampsia (total: 18 cases, 85.7% of all women with pre-eclampsia in that group, $p=0.1071$).

All women with impaired glucose tolerance and gestational diabetes were included. Those with no control or no monitoring after commencing a diabetic diet were considered untreated. In group A, four (50%) of eight booked women were treated. In the non-booked group, four (33.3%) were treated and eight (66.7%) were untreated. In group B, six (16.2%) of the booked women were treated and 31 (83.8%) untreated. No case of gestational diabetes or impaired glucose tolerance was identified among the non-booked women in group B. Although there appeared to be more untreated women in group B, the increase was not statistically significant ($p=0.0594$).

Women with syphilis who had been treated previously, either in Hong Kong or China, were considered treated. Among the booked women in group A, nine (82%) were treated and two (18%) were untreated. Among the non-booked women, six (60%) were treated and four (40%) were untreated. In group B, of the booked women, 11 (64.7%) were treated and 6 (35.3%) were untreated. No case of maternal syphilis was identified among the non-booked women (Table 2).

Problems at Labour: Preterm Delivery, Post-term Pregnancy, Induction of Labour

In group A, there were 34 (2%) preterm deliveries, ranging from 29 weeks of gestation to 36 weeks of gestation among the non-booked women, compared with only one (0.6%) preterm delivery at 36 weeks of gestation in the booked women. In group B, there were 59 (4.5%) preterm deliveries, ranging from 31 weeks of gestation to 36 weeks of gestation among booked women, compared with 12 (11.9%) preterm deliveries in non-booked women, ranging from 28 weeks to 36 weeks of gestation (Table 3).

Post-term pregnancy was also reviewed, as this is associated with a higher risk of perinatal morbidity and mortality. In group A, one booked woman had a post-term pregnancy of gestation ≥ 42 weeks (0.6%) while 58 (3.4%) non-booked women had gestations ≥ 42 weeks. In group B, there were 20 (1.5%) booked women and 5 (5%) non-booked women who delivered post-term. Fortunately, there were no perinatal deaths.

There were various indications for induction of labour, the commonest being premature rupture of the

Table 2. Antenatal problems of booked and non-booked pregnant women

Antenatal problems*	2006-2007 (Group A)			2007-2008 (Group B)		
	Booked	Non-booked	Total	Booked	Non-booked	Total
Breech	5 (3.2%)	17 (1%)	22	32 (2.5%)	1 (1%)	33
Vaginal	0	1 (5.9%)	1 (4.5%)	2 (6.3%)	0	2 (6.1%)
Elective CS	5 (100%)	3 (17.6%)	8 (36.4%)	12 (37.5%)	0	12 (36.4%)
Emergency CS	0	13 (76.5%)	13 (59.1%)	18 (56.3%)	1 (100%)	19 (57.6%)
Pre-eclampsia	5 (3%)	22 (1.3%)	27	18 (1.4%)	3 (3%)	21
CS in 6 hrs	3 (60%)	8 (36.3%)	11	11 (61.1%)	3 (100%)	14
IOL in 6 hrs	0	6 (27.3%)	6	4 (22.2%)	0	4
GDM / IGT	8 (5.2%)	12 (0.7%)	20 (1.1%)	37 (2.9%)	0	37 (2.6%)
Treated	4 (50%)	4 (33.3%)	8 (40.0%)	6 (16.2%)	0	6 (16.2%)
Untreated	4 (50%)	8 (66.7%)	12 (60.0%)	31 (83.8%)	0	31 (83.8%)
Syphilis	11 (7.1%)	10 (0.6%)	21	17 (1.3%)	0	17
Treated	9 (81.8%)	6 (60.0%)	15 (71.4%)	11 (64.7%)	0	11 (64.7%)
Untreated	2 (18.2%)	4 (40.0%)	6 (28.6%)	6 (35.3%)	0	6 (35.3%)

* CS denotes Caesarean section, IOL induction of labour, GDM gestational diabetes mellitus, and IGT impaired glucose tolerance

Table 3. Problems at labour of booked and non-booked pregnant women

Problems at labour	2006-2007 (Group A)			2007-2008 (Group B)		
	Booked	Non-booked	Total	Booked	Non-booked	Total
Preterm delivery	1 (0.6%)	34 (2%)	35 (1.9%)	59 (4.5%)	12 (11.9%)	71 (5.1%)
Post-term ≥42 weeks	1 (0.6%)	58 (3.4%)	59 (3.2%)	20 (1.5%)	5 (5%)	25 (1.8%)
Induction of labour	43 (27.7%)	364 (21.2%)	407 (21.8%)	312 (24%)	18 (17.8%)	330 (24%)
Delivery in approximately 1 hour	13 (8.4%)	238 (13.9%)	251 (13.4%)	160 (12.3%)	31 (30.7%)	191 (13.7%)
Low birth weight (<2.2 kg)	1 (0.6%)	22 (1.3%)	23 (1.2%)	30 (2.3%)	9 (8.7%)	39 (2.8%)
Apgar score ≤6 at 1 min	4 (2.6%)	38 (2.2%)	42 (2.2%)	34 (2.6%)	3 (2.9%)	37 (2.6%)
Apgar score ≤6 at 5 mins	0	7 (0.4%)	7 (0.4%)	5 (0.4%)	0	5 (0.4%)

membranes and a post-term pregnancy. Other indications included oligohydramnios, antepartum haemorrhage, intra-uterine growth restriction, premature rupture of the membranes, hypertensive disease and unsatisfactory cardiotocogram findings. In group A, there were 364 (21.2%) induced labours in the non-booked group and 43 (27.7%) in the booked group. In group B, there were 312 (24%) induced labours in the booked group and 18 (17.8%) in the non-booked group. There was no significant difference ($p>0.05$) between the groups.

Admission to Delivery Time

The time from admission to delivery was analysed to see if prepayment would encourage patients in labour

to arrive earlier, thus allowing time to prepare for a smooth delivery and earlier identification of problems. In group A, the average admission to delivery time was 10.1 hours for non-booked women. Overall, 238 (13.9%) of the non-booked women and 13 (8.4%) booked women delivered within roughly 1 hour of admission to hospital. In group B, the average admission to delivery time was 4 hours for booked women. There were 160 (12.3%) booked and 31 (30.7%) non-booked women who delivered within roughly 1 hour of admission to hospital (Table 3).

Baby Outcome

Twenty-two (1.3%) of the babies born to non-

booked women in group A had a birth weight of 2.2 kg or less and 13 of these were born preterm, including two pairs of twins. Of booked women, only one (0.6%) term baby had a birth weight of 2.2 kg or less. In group B, 30 (2.3%) babies of booked women had birth weights of 2.2 kg or less, 19 of which were born preterm. This included four pairs of twins, one sibling from six pairs of twins and all three from one set of triplets. The non-booked women had 9 (8.7%) babies with birth weights of 2.2 kg or less, including two pairs of twins (Table 3).

In group A, non-booked women produced 38 (2.2%) babies with apgar scores ≤ 6 at 1 minute and 7 (0.4%) babies with apgar scores ≤ 6 at 5 minutes. The booked women produced 4 (2.6%) babies with apgar scores ≤ 6 at 1 minute and no babies with apgar scores ≤ 6 at 5 minutes. In group B, there were 34 (2.6%) booked babies with apgar scores ≤ 6 at 1 minute and 5 (0.4%) booked babies with apgar scores ≤ 6 at 5 minutes. The non-booked mothers had 3 (2.9%) babies with apgar scores ≤ 6 at 1 minute, and no baby with an apgar score ≤ 6 at 5 minutes.

Discussion

There was a significant drop (1868 vs 1398; $p=0.0001$) in the number of non-local pregnant women delivering in our hospital from 2006/2007 to 2007/2008. This may partly be attributed to the new obstetrics package pushing some of these patients into the private sector, as the charge for an uncomplicated delivery is similar in both types of hospital. The proportion of non-booked deliveries has dropped drastically from 91.7 to 7.2% ($p=0.0001$), meaning that there were fewer admissions through the emergency department and more than 90% of women had some form of antenatal check-up before their delivery.

The percentage of vaginal deliveries was similar in both periods (70.4% vs 68.7%, $p=0.19$). There appeared to be a drop in the vacuum extraction rate from 10.8 to 7.9% ($p=0.0055$) and an increase in the Caesarean section rate from 18.7 to 23.3% ($p=0.0001$) in group B. However, if all instrumental deliveries were counted together—vacuum extraction and Caesarean section—the total percentage of instrumental deliveries was similar (29.5% vs 31.2%; $p=0.2988$). The only difference was that more elective Caesarean sections

were performed in group B. So, 27.3% (89 out of a total of 326 Caesarean sections) of operations were performed in an elective setting, allowing better preparation.

For antenatal problems, including breech presentation, pre-eclampsia, gestational diabetes or maternal syphilis, there was no significant improvement in terms of earlier presentation or better treatment during pregnancy. Earlier management of breech presentation and pre-eclampsia can only be achieved if pregnant women are given third-trimester screening at approximately 34 to 36 weeks of gestation and seen at regular intervals. Many returned to China after their screening visit and had no regular antenatal check-ups, so these problems remained undetected until they were admitted in labour or in the worst case, in eclampsia, as happened to one non-booked woman in group B. There was an increase in the proportion of women with gestational diabetes in group B (1.1% vs 2.6%, $p=0.001$), but the proportion of women receiving proper treatment did not increase significantly (60% vs 84%; $p=0.0594$). The screening visit allowed identification of high-risk patients and the opportunity to perform an oral glucose tolerance test but further management was often declined due to the costs involved. There was no increase in the detection rates for maternal syphilis, nor any increase in the proportion obtaining treatment (28.6% vs 35.3%; $p=0.7342$).

There was a significant drop (from 3.2 to 1.8% in group B; $p=0.0141$) in the proportion of pregnancies that went beyond 42 weeks. This drop probably reflects the value of the screening visit for confirming the pregnancy dates and informing the patient of a plan of management at term. The patient therefore understood that she should come to the hospital for further management, such as a combined induction, if the pregnancy went past 41 weeks. Perinatal death has been associated with post-maturity³, but this was not observed in our population group. This might be due to our small numbers (<100), as the incidence of intrauterine death beyond 42 weeks is 1 in 500.

The percentage of deliveries occurring roughly 1 hour after admission was similar in both groups (13.4% vs 13.7%; $p=0.8363$), suggesting that the obstetrics package did not encourage earlier admission during labour. This may reflect patient concerns that the

package would not cover the entire hospital stay if they were admitted too early. The package only allows a stay of 3 days and 2 nights. The entire labour and postpartum period is often longer than this period.

There was a significant rise in the number of preterm deliveries, from 34 in group A to 59 in group B (1.9% vs 5.1%; $p=0.0001$). **This can be explained partly** by an increase in the number of multiple pregnancies, from just five pairs of twins delivering preterm in 2006-2007 to 12 pairs of twins and one set of triplets delivering preterm in 2007-2008. This observed increase could be related to the higher risk of maternal and fetal problems in multiple pregnancies such as preterm labour and operative delivery. Women with multiple pregnancies may have been attracted by the better and more comprehensive obstetric and paediatric services available in Hong Kong public hospitals. Another possible factor is prepayment. Most of the non-local pregnant women returned to China after their booking visit and only returned to Hong Kong at term to await delivery. Under the old system, non-local pregnant women who went into preterm labour while still in China went to a nearby hospital rather than risking travelling to Hong Kong for delivery. But now, there is a strong incentive for them to rush to Hong Kong because they have paid a considerable sum in advance.

There appeared to be an increase in the number of low-birth-weight babies (≤ 2.2 kg; from 23 to 39 babies, 1.2% vs 2.8%; $p=0.0017$) **in group B. This may** be a result of the increase in the number of multiple pregnancies. In group A, there were only two pairs of twins among the low-birth-weight babies, but in group B, there were six pairs of twins, one sibling from six pairs of twins and all three members of a set of triplets. In group B, the proportions of preterm deliveries and low-birth-weight babies were even higher in the non-booked group (4.5% vs 11.9% and 2.3% vs 8.7%). Most non-booked women had no antenatal care and might have had uncertain dates. These non-booked preterm babies had birth weights ranging from 1.65 to 3.14 kg. Four out of 12 had birth weights expected of a term baby, suggesting they might not be preterm. On the other hand, non-booked women in preterm labour were usually admitted too late for management with tocolytics. These two reasons can partly explain why there appeared to be more preterm labour and

low-birth-weight babies in the non-booked group. Nonetheless, the cause is probably multifactorial and requires further study of each case.

The percentage of babies with low apgar scores was similar: 2.2% vs 2.6% at 1 minute ($p=0.4123$), and 0.4% for both groups at 5 minutes ($p=1$).

The new obstetrics package has successfully controlled the number of non-local pregnant women delivering in our hospital and reduced the number of admissions through the emergency department but does not appear to have improved the pregnancy outcomes or the admission patterns of these women. Problems that have been repeatedly mentioned are anxiety about extra costs due to longer hospital stays, extra investigations or treatment and lack of antenatal care between the screening visit and delivery. Consideration should be given to lengthening the period of hospital stay covered and provision of more antenatal visits. This can only be met by either an increase in the package charges or an increase in our hospital expenses. Either way, this requires careful discussion and consideration of these issues by the HA, the Hong Kong SAR government and the general public.

This study gives us a rough idea of what happened after the launch of the new obstetrics package, but is limited by various confounding factors such as patients' ages, parity, socio-economic backgrounds, and previous antenatal care. These factors may affect the mode of delivery, preterm deliveries, and baby outcomes. A more detailed study should be performed to exclude the effects of these confounding factors. With the accumulation of more patients, it would also be interesting to study what hindered non-booked women from booking after the launch of the new package.

Conclusion

The workload generated by non-local pregnant women delivering in our hospital has heavily burdened our obstetric service. Our data show that the number of non-local pregnant women delivering in Tuen Mun Hospital dropped considerably following the launch of the new obstetrics package. More than one-quarter of Caesarean sections were performed electively, allowing better preparation. There were also fewer admissions

through the emergency department. However, the new obstetrics package has not encouraged earlier admission during labour or improved pregnancy outcomes. A more comprehensive delivery package may be required to solve these problems.

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