Journal of Health Science Research, *Vol 1(1), 18-28, 2016*
ISSN (Online) : 2456-2688
DOI: 10.18311/jhsr/2016/4760

A Paradigm Shift of Services by Providing Simple Cost Effective Interventions and Future Considerations in Managing the Care of Obese Women in Pregnancy

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Abstract

Objective: Our study explored a cohort of pregnant women to evaluate clinical care antenatally, at delivery and postpartum. We piloted the use of two simple measures: firstly the use of a patient educational leaflet in improving knowledge of risks associated with obesity during pregnancy and secondly, the use of a proforma to improve documentation in the management of obese women in pregnancy. **Study Design:** This was an observational study performed in Ealing Hospital, a district general hospital within Greater London. Fifty pregnant women with a Body Mass Index (BMI) >30kg/m^2 were asked to complete a questionnaire to assess their knowledge and understanding of obesity during pregnancy, before and after reading a patient educational leaflet. The notes of pregnant women with a BMI >30 kg/m^2 were audited against the CMACE/RCOG joint guideline. The feedback from the questionnaire and data from the audit were used to develop a service model to improve the care of obese women in pregnancy. **Results:** 60% of women knew the meaning of BMI, but only 32% could recall their own BMI. 72% of women were taking the recommended dose of folic acid. The extensive risks of obesity on fetal and maternal health during pregnancy were largely unknown. Women welcomed an educational leaflet that improved their motivation to make lifestyle changes. We selected 50 sets of patient notes at random to audit; obesity was not recognised as a risk factor in over half the pregnant women with a BMI >30 kg/m^2. Height and weight was recorded well but few took the recommended folic acid & Vitamin D. Majority of women were offered GTT and received an appropriate anaesthetic review. There was no documentation of manual handling requirements and little discussion about complications. Blood pressure was measured appropriately in majority of cases but size of cuff was not documented in all. **Conclusion:** There was poor knowledge of obesity effects on pregnancy. An educational leaflet and care pro forma may help achieve standards of healthcare. If the suggested leaflet and pro forma were used, the management of women antenatally should improve.

Keywords: Knowledge, Obesity, Patient Education, Pregnancy, Service Improvement

1. Introduction

With the prevalence of obesity reaching epidemic proportions, maternal obesity is now one of the most common risk factors in pregnancy. In the United States, around 64% of women of childbearing age are overweight and 35% are obese[1], with a similar picture now emerging in Europe[2]. In the United Kingdom, 50% of maternal deaths are amongst the obese or overweight[3] a high proportion of these was attributable to substandard care hence emphasising the need for improving care in obesity. Obesity is a huge burden for the National Health

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Service (NHS), costing around 0.5 billion pounds per year and a further 2.3 billion pounds in indirect costs for the UK economy[4], although the cost of maternal obesity in the United Kingdom has not been shown, studies from France show the cost of prenatal care was higher for women with a BMI >25kg/m^2 and even higher for women with a BMI >29kg/m^2 because of postnatal care when compared to women of BMI 18 to 24.9 kg/m^2 [5]. The latest CMACE report[6] and studies have shown an increased risk of adverse outcomes in pregnancy for this subset of woman; these include subfertility, miscarriage[7], Venous Thromboembolism (VTE)[8], Pregnancy Induced Hypertension (PIH), Pre-Eclampsia (PET) [9], Gestational Diabetes Mellitus (GDM)[10], fetal macrosomia, stillbirths[11] and neonatal deaths[12]. The CMACE/RCOG guidelines[13] state that all obese women of child bearing age should be counselled and supported to lose weight pre-pregnancy. Pregnant women with a booking BMI ≥30 kg/m^2 should be provided with information on obesity in pregnancy and how risks can be minimised. The CMACE report recommends women with a medical condition that impacts the pregnancy such as obesity, should receive specific pre-pregnancy counselling at every opportunity and prospective management plan. Although such guidelines are present, there is minimal guidance on how women should be given information pre- or during-pregnancy.

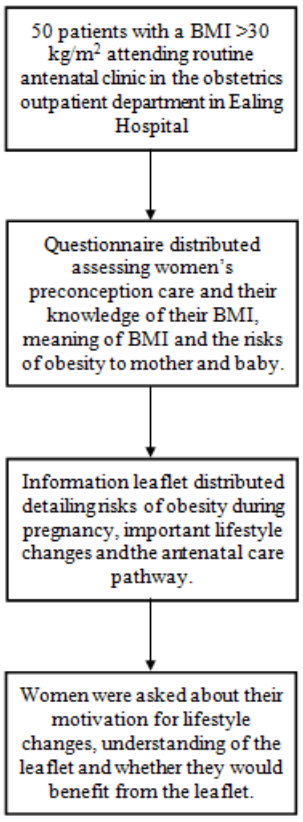
To date, there have been many interventional studies which have shown inconclusive evidence[14-17] about the range of supportive, educational and behavioural interventions to manage a healthy lifestyle. Studies have shown that advice surrounding healthy weight management during pregnancy is often brief and non-individualised, more than 80% of women surveyed said general advice from their midwife about weight gain was not good and obesity issues or BMI were not explained[18]. Although healthcare professionals thought that they were providing gestational weight gain recommendations to overweight/obese women in an effective and empathetic manner, a study[19] has shown that there was still a need for more training and access to appropriate tools such as materials and programmes to help with counselling of these women.

We sought to provide tools in the form of written information for patients, care pro forma and a model of service provision to help healthcare professionals to address issues surrounding substandard of care when managing obese women in pregnancy. We addressed this by investigating women's awareness of obesity associated risks in pregnancy and assessed the potential use of a leaflet to educate patients and provide recommendations of appropriate lifestyle changes. Secondly, we audited pregnancy care for obese women within our department to assess whether standards set by the RCOG/CMACE were being met. Combining the findings of these two studies, we are able to recommend resources to help healthcare professionals provide appropriate care to obese women in pregnancy.

2. Methods

A questionnaire was designed to assess women's knowledge of weight control and the effects of obesity during pregnancy (Appendix S1: Questionnaire).

The flow diagram below summarises our questionnaire study:



The questionnaire was distributed to 50 patients with a BMI of >30 kg/m^2 attending routine antenatal clinic our obstetrics outpatient department in Ealing Hospital, within Greater London. Participation in the study was voluntary and the women were asked questions by doctors

in English or using language interpreters if English was not their first language. Specifically, women were asked if they understood the importance of weight control prior to pregnancy, the meaning of BMI and whether they were aware of their own BMI. They were also asked whether they knew about specific risks of obesity to the mother and baby during pregnancy and childbirth. Women were asked if they had received any information about risks of a raised BMI prior to becoming pregnant and whether they took folic acid supplementation prior to conception.

A leaflet outlining risks of obesity during pregnancy and important lifestyle changes for obese women in pregnancy was designed (Appendix S2: Leaflet) and distributed to the same women. Understanding of the effects of obesity during pregnancy and the acceptance of the leaflet was assessed. Women were asked how motivated they were to making lifestyle changes before and after reading the leaflet, whether they understood the information provided in the leaflet and whether they would benefit from the leaflet.

We audited our care for obese women during pregnancy within our obstetrics department, comparing it to recommendations and standards set out by the CMACE/ RCOG guidelines and local policy (Appendix S3: Pro forma). Data from Euroking, our obstetric database of patient healthcare contacts over a 12 month period was reviewed (January 2014 to January 2015) for women who booked and delivered with a BMI of >30 kg/m^2. The delivery type according to BMI was recorded. We also examined 50 sets of notes at random during the same period and reviewed documentation of height and weight, folic acid intake, blood pressure monitoring, discussion of complications, management plan for pregnancy, anaesthetic review, manual handling assessment and infant feeding problems.

3. Results

A total of 50 questionnaires were answered voluntarily (response rate 100%). A large proportion (90%, n = 45) of the women knew the importance of weight control before and during pregnancy for a better pregnancy outcome. Although 60% (n = 30) knew what BMI meant, only 32% (n = 16) of women knew what their own BMI was. Figure 1 shows that only 24% (n = 12) of women stated that they were given information on the risks of having a BMI >30 kg/m^2. A large proportion of women (72%, n = 36) were taking folic acid and the majority said they were taking the recommended 5 mg dose.

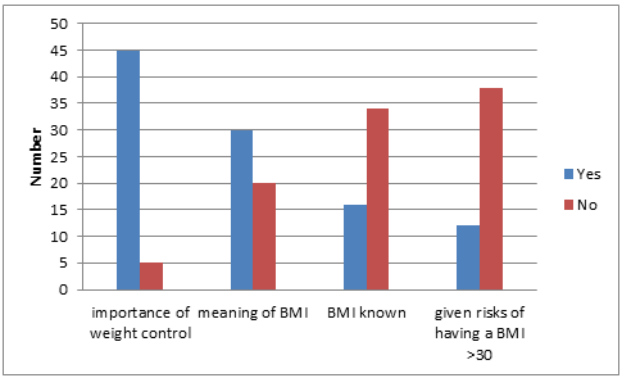


Figure 1. Results of knowledge of weight control and BMI.

Women were asked whether they knew about specific maternal and fetal associated risks of obesity in pregnancy:

3.1 Patient Knowledge of Maternal Risk

Figure 2 shows that the majority of women were aware of an increased risk of diabetes mellitus and high blood pressure in pregnancy, but less knew about the increased risk of Deep Vein Thrombosis (DVT), infections, pre-eclampsia, cardiac disease, post-partum haemorrhage, anaesthetic risks, and wound infections.

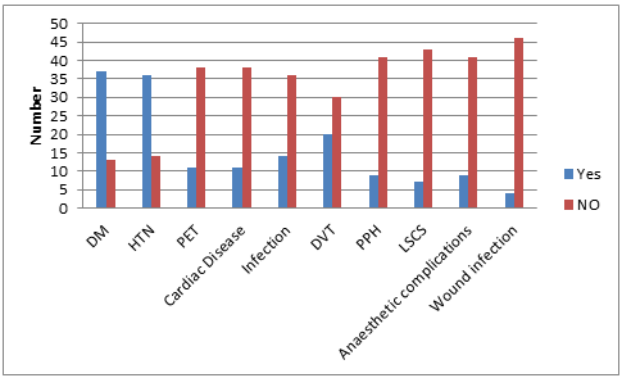


Figure 2. Women's perception of effects of obesity on the mother.

3.2 Patient Knowledge of Fetal Risk

Figure 3 shows the knowledge about an increased risk of miscarriage, the child developing diabetes mellitus/

obesity later in life and risk of macrosomia was poor and few knew of the risk of birth defects, increased difficulty in feeling fetal movements, increased difficulty in feeling for fetal position, increased risk of prematurity, and risk of still births and neonatal deaths.

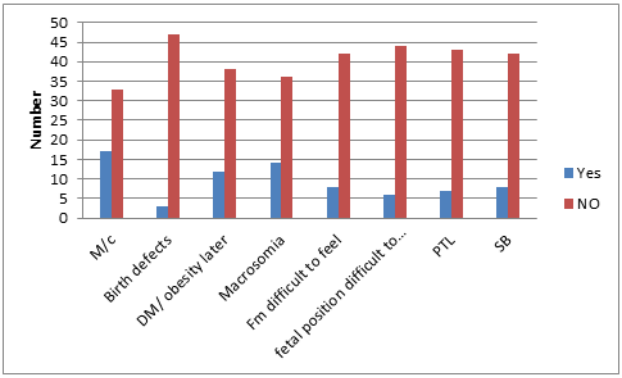


Figure 3. Understanding of effects of obesity on baby.

Prior to reading the educational leaflet, 18% of women were not at all motivated to make lifestyle changes to control their weight, 48% were slightly motivated, and 34% were very motivated. After reading the educational leaflet, 2% were not at all motivated to make lifestyle changes, 30% were slightly motivated and 68% were very motivated. All of the women recruited in our study understood the leaflet and majority (98%) felt that they could have benefited from the leaflet prior to pregnancy.

Between January 2014 and January 2015, 16% of the women who delivered had a BMI >30 kg/m^2 in our department. The mean BMI for these women was 36 kg/m^2.

From the 50 sets of case notes, height and weight was recorded in most cases (96%). However, less than 20% of cases had documentation that information about obesity in pregnancy was provided.

About half of the women in our cohort had a normal vaginal delivery and one sixth had elective caesarean sections and one sixth had emergency caesarean sections. Women with BMI >40 kg/m^2 had approximately a 50% caesarean section rate and women with BMI ranging 30-39.9 kg/m^2 had approximately a 40% caesarean section rate.

The commonest co-morbidities documented were GDM and PIH (Figure S1). Documentation showed majority of women were taking folic acid, but less than 5% received the recommended 5mg dose. In majority of patients, VTE risk was assessed but there was poor documentation regarding the VTE history and use of anticoagulants in the past. The use of LMWH antenatally was poor and only about half had documented evidence of thromboembolism stockings (TEDS) use.

Blood pressure was measured in more than 80% of patients and at intervals according to guidelines for more than 70% of patients. But the size of cuff was only documented in about 30% of measurements. A glucose tolerance test was offered to more than 80% of patients. A management plan for delivery was documented in 50%, but discussion about complications for delivery was only documented in around 20% of notes and there was little documentation about the difficulties faced when breast feeding. There was no documentation of manual handling requirements.

Of the women with a BMI between 30 and 39.9 kg/m^2 less than 5% had an anaesthetic review and about 75% of patients with a BMI >40 had an anaesthetic review.

4. Discussion

4.1 Main findings

The provision of information about risks associated with obesity in pregnancy; pre-conception and in the antenatal period was poor and there was also poor documentation of information provided. Women welcomed written information and counselling regarding specific problems pre-pregnancy and during pregnancy; this may be attained by providing an educational leaflet pre-conceptually, perhaps in primary care, throughout pregnancy and in the postnatal period.

There have been many studies which show that pre-pregnancy obesity and excessive weight gain during pregnancy is associated with complications in pregnancy and obesity in the offspring[5,10,20]. In our cohort, women's knowledge about the implications of obesity on the subsequent course of pregnancy was poor, especially so for fetal risks. With the support of written information, such as an educational leaflet, women may be better informed about the risks and management course of their high risk pregnancy. Pregnant women are usually receptive to health care advice and may subsequently be motivated to make lifestyle changes[13]. Discussion about risks of obesity in pregnancy should be clearly documented for both healthcare providers and patients to refer to and help women achieve attainable goals. The Confidential Enquiry into Maternal and Child Health (CMACH), now

known as CMACE audited the number of women having a BMI > 35kg/m^2 and showed the UK prevalence rate of 4.99%[3]. In our hospital the rate is much higher at 16%; this provides a strong basis for improving care in our unit for obese women in pregnancy.

Our audit of notes showed that height and weight was very well documented (in 96% of patients); this is comparable to finding from the CEMACH project[3]. This was particularly well documented possibly because the clinical records had a specific area for recording this information. Areas that lacked documentation included the size of blood pressure cuff used, and amount of folic acid and Vitamin D supplementation women were taking. A pro forma was designed and introduced in the maternity notes where information could be clearly documented so that RCOG/CMACE guidelines can be adhered to[13]. There have been many studies which show improved the quality of documentation with the use of pro formas[21-23].

Manual handling was not addressed in any of our patients that were audited, similarly CMACE found that only 14% of notes of BMI >40 kg/m^2 had a manual handling assessment. As a part of postnatal care a clear discussion about breast feeding and difficulties in obese women needs to be documented in the notes and a specialist nurse referral needs to be made. Lactation failure resulting in formula fed babies increase the childhood obesity rates[24].

We propose developing services with a multidisciplinary approach in-line with planning service provision based on the local population which could mean a separate 'maternal obesity clinic'. The clinic should include a consultant obstetrician with a special interest in maternal obesity, a midwife a special interest in promoting healthy lifestyle and breast feeding, an anaesthetic specialist with an interest and expertise in technically difficult regional anaesthesia, a dietician, a manual handling expert, and a counsellor for psychological support and breast feeding. Women should be seen either at hospital or out in primary care pre-pregnancy, during pregnancy and after pregnancy to encourage long-term health benefits of diet and exercise to assist this training and education of healthcare workers including those in the primary care setting.

5. Conclusion

We have shown educational needs of obese women in our local population using a questionnaire; obese women in pregnancy had little knowledge of what effect obesity had upon their own health as well as the health of their unborn child. They welcomed information and help in improving their pregnancy outcome by reducing risk of obesity associated complications. Although there was clear documentation of height and weight in the notes of obese pregnant woman, less than 20% had documentation that information about obesity in pregnancy was provided. There is scope for significant improvement of documentation of VTE history, delivery management plans, manual handling assessments and blood pressure monitoring in this subset of women.

Material and programmes for healthcare professionals and patients improve the management of obese women in pregnancy. Counselling of women should be supported by providing verbal and written information in the form of a leaflet pre-pregnancy and during pregnancy about the risks and how to minimise these. The use of a national pro forma (Appendix S4: National pro forma) may ensure that guidelines in the management of obese women in pregnancy are followed. This may lead to a subsequent reduction in risks and optimisation of appropriate healthcare for this subset of women.

6. Disclosure of Interests

None.

7. Contributions to Authorship

B. Sagoo designed the leaflet, pro forma, co-ordinated data collection, interviewed patients and wrote the manuscript. KYB Ng designed the questionnaire, interviewed patients and analysed responses. R. Hamid helped approve the leaflet, pro forma, data collection and analysis. All authors helped revise and approve the final manuscript.

8. Funding

None.

9. Details of Ethics Approval

No ethical approval was required.

10. Acknowledgements

We would like to thank I. Okaisabor for help with audit data collection and analysis and J. Bhamra for guidance.

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Appendix S1

Questionnaire handed out to patients

How much do you know about how your weight affects your pregnancy?

If you need any help filling out this leaflet please ask a member of staff

1. **Prior to reading the leaflet, did you know that weight control before and during pregnancy is important for a better pregnancy outcome?**
   Yes [ ] No [ ]
2. **Did you know what 'BMI' means?** Yes [ ] No [ ]
   - If yes, please answer question 3 . If no, please move to question 4
3. **Do you know your BMI?** Yes [ ] No [ ]
4. **Did you know about any of the following risks associated with having a BMI of 30 or more?**

Risks to mother			Risks to baby		
	Yes	No		Yes	No
Diabetes			Miscarriage		
High blood pressure			Birth defects and congenital anomalies		
Pre-eclampsia			Diabetes/obesity in later life		
Cardiac disease			Abnormally large baby		
Infections			Difficulty in feeling baby kicks		
Blood clots			Difficulty in feeling baby's position		
Bleeding after delivery			Prematurity		
C-section and instrumental deliveries			Still births and neonatal deaths		
Anaesthetic risks					
Wound infection					

5. **Were you given any information prior to becoming pregnant on the risks of having a BMI of 30 or more?** Yes [ ] No [ ]
   - If yes, what kind of information was given and by whom? _____
     _____
     _____
6. **Were you prescribed 5 mg of folic acid prior to pregnancy?** Yes [ ] No [ ]
7. **Prior to reading this leaflet, how motivated were you to making healthy lifestyle changes?**
   - Not at all [ ] Slightly motivated [ ] Very motivated [ ]
8. **After reading the leaflet, how motivated are you in making healthy lifestyle changes?**
   - Not at all [ ] Slightly motivated [ ] Very motivated [ ]
9. **Did you understand the information provided by this leaflet?** Yes [] No []
10. **Do you feel that you could have benefited from an information leaflet before pregnancy?**
    - Yes [] No []

Appendix S2

HOW CAN WE HELP YOU

Ideally weight loss before you get pregnant, but this can not always be planned.

You should try to maintain your current weight and certainly not put on more than 9kg (20 pounds) if BMI more than 30.

You can help by:

- Healthier eating
- Cutting down on fatty foods, sugary foods and drinks
- Eating regular meals
- 5 portions of fruits, vegetables, salads a day
- Becoming more active
- Regularly do brisk walking, swimming, exercise classes.
- Starting Vitamin D 10 mcg daily

If you would like help and advice on weight reduction, ask your GP or midwife who can refer you to a dietician

What happens at antenatal appointments	
Booking	Calculate BMI identify risks Set targets to help with weight maintenance Random blood sugar
28 weeks	Glucose screen
34 weeks	Repeat glucose screen if required
34-36 weeks	Anaesthetic appointment if required
Postnatal	6 week follow up at GP to discuss healthy eating and contraception

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January 2014 Version 1.0

EALING HOSPITAL

Obesity in Pregnancy

Better health for you and your baby

Introduction

Controlling weight has been identified as an important issue for a better pregnancy outcome.

We understand that it may be difficult or embarrassing to talk about your weight. This leaflet is to help you get the most out of your pregnancy for you and your baby.

At you first antenatal appointment your Body Mass Index (BMI) will be measured. This allows us to measure if your weight is appropriate for your height (see table):

BMI	Weight status
Below 18	Underweight
18.5 – 24.9	Normal weight
25.0 – 29.9	Overweight
30.0 – 39.9	Obese
40 or above	Morbidly obese

As the BMI increases the risks of diseases and problems in pregnancy to both mother and baby increase, this has been identified in the Confidential Enquiry into Maternal and Child Health report, 'Saving Mothers Lives' (CEMACH, 2007).

If your BMI is above 35 you are at greater risk of complications. We would then advise consultant led care so that you may receive specialist advice and guidance helping you achieve a healthier pregnancy.

WHAT ARE THE RISKS OF BEING OBESE?

Risks to mother	Risks to your baby
Developing diabetes	Abnormally large baby
Developing high blood pressure, pre-clampsia, cardiac disease	Birth defects and congenital anomalies
Infections	Prematurity
Blood clots in the lungs or legs	Problems later in life, e.g. obesity and diabetes
Haemorrhage after having a baby	Difficult to feel baby and its lie
Increased chance of C-sections, and instrumental deliveries	Still births and neonatal deaths

PAIN RELIEF

Epidurals and spinal blocks are more difficult to place in larger women and general anaesthesia has more risks.

You may need to see an anaesthetist to discuss pain relief and access to veins prior to labour.

You only need to eat the equivalent of an extra banana a day!

LABOUR

Woman with a BMI more than 35 may have problems mobilising in labour so you are at greater risk of blood clots.

It can be more difficult to hear the baby's heart beat so it may be necessary to attach a clip (fetal scalp electrode) to help give a more accurate reading.

You baby may be bigger than normal, which may make your delivery more difficult. This increases your need for a delivery using instruments or even needing a caesarean section.

If caesarean section is required this is technically more difficult with increased risks both surgically and anaesthetically. There is increased risks of bleeding, infection and blood clots compared to women with normal BMI.

Because of these risks we advise you to have a small plastic tube (cannula) inserted into a vein in your arm so that medications can be given more easily and quickly.

POST DELIVERY

After birth you are at increased risk of developing blood clot in your leg or lungs. You will be given blood thinning injections in hospital which may need to be continued for 1-6 weeks to help prevent blood clots.

If you have to have a cut or tear in your vagina or a caesarean section, you are at more risk of having wound infections

Appendix S3.

OBESITY AUDIT PROFORMA used to collect data from notes

DEMOGRAPHICS

1. Age at Delivery
   ……
2. Ethnicity

White	Mixed	Asian/ Asian british	Black or black british	Other ethnic group
British	White & black caribbean	Indian	Caribbean African	Chinese Other
Irish	White & asian	Pakistani Bangladeshi	Other	
Other	White & black African Other	Other		

3. **Deprivation score from postcode……**
4. ***Marital status:***

Married	Cohabiting	Single	Other	Not known

5. ***Previous Miscarraige <24 week:***

0	>1

6. ***Previous births (live/still born) ≥ 24 week:***

0	>1

7. ***Maternal morbidities:***

	Diagnosed prior to this pregnancy		Diagnosed during or after this pregnancy	
	Yes	No	Yes	No
GDM				
T1 DM				
T2 DM				
DVT/ PE				
Es HTN <20 week				
PIH ≥ 20 week				
Severe PET (HELLP) / eclampsia				
CVD				
Other morbidity				

8. ***Height ……***
9. ***1st recorded weight ……..***
10. ***If not Why no weight:***

No ANC	Weight exceeds scales	Declined to be weighed	Other	Not known

11. ***If no weight judged as BMI >35 or weigh >100kg:***

Yes	No

12. **BMI at 1st recorded weight …….**
13. **Maximum recorded weight during pregnancy……**
14. **BMI at maximum recorded weight ……..**
15. **Date of delivery……**
16. **Baby Birth weight…….**

PREPREGNANCY AND EARLY PREGNANCY CARE

Booked at another unit Yes/NO if No:

Gestation at Transfer of care to this unit ……

Antenatal notes available from maternity unit of booking ……

Folic acid use before or during pregnancy:

400mcg	4mg	5mg

Evidence of information given antenatal about risk of obesity in pregnancy	YES	NO

MATERNAL SURVEILLANCE, SCREENING & ASSESSMENT

1. Primary reason for referral to consultant obstetrician……

		Yes	NO
	risk factors identified		
	Obesity listed as risk factor		
	VTE risk noted at booking		
	Previous VTE history		
	Evidence of thrombophillia		
	Long term warfarin use		
	Evidence prophylactic LMWH offered		
	Prophylactic LMWH prescribed antenatally		
	Evidence of other pharmacological thromboprophylactic agent offered antenatally		
	Use of TEDs antenatally		
	1st Antenatal BP measured		
	Size of cuff documented		
	GTT offered		
	Between 24 and 32 week BP and proteinuria assessed at least once every 3 weeks		
	between 32 week and delivery BP and proteinuria assessed at least once every 2 weeks		

PLANNING LABOUR & DELIVERY

		Yes	NO
	Information given about potential intrapartum complications related to obesity		
	Written obstetric management plan for labour & delivery		
	If previouys LSCS evidence of risk & benefit of different MOD		
	Antenatal anaesthetic consultation		
	Assessment to determine manual handling requirements for delivery		
	Infant feeding options discussed antenatally		

LABOUR & DELIVERY

		YES	NO
	Assessment of tissue viability		
	If operative intervention in theatre evidence that operating staff were alerted about the womans BMI prior to transfer to theatre		
	If induced was obesity only indication		
	On admission to LW was ST6 above anaesthetist informed about presence		
	On admission to LW was ST6 above obstetrician informed about presence		
	If operative delivery indicated was ST6 above anaesthetist and obstetrician in attendance		
	Venous access established prior to delivery		
	Use of TEDs during labour & delivery		
	If vaginal delivery active management of 3rd stage recommended		
	If LSCS were prophylactic antibiotics administered		

After Delivery

		YES	NO
	Evidence that prophylactic LMWH offered postnatal		
	Evidence that other pharmacological thromboprophylactic agent offered postnatal		
	Evidence woman received postnatal advice/ support for breastfeeding		
	Used of TEDs		

Follow up after pregnancy

		Yes	NO
	Evidence that the woman was offered referral to dietician or nutritionist in the post partum period		
	IF GDM documentation for need for a GTT within 2 months following delivery		

Appendix S4

Proposed proforma for the management of Women with BMI ≥ 30 in Pregnancy
To be put in antenatal notes

BMI recorded at booking	Please tick	
30.0 - 34.9 (Class I)		
35.0 - 39.9 (Class II)		
≥ 40 (Class III)		
≥ 50 (Super-morbid obesity)		

BMI ≥ 30	BMI sticker on notes	
Preconception advice received	Yes / No	
Folic acid 5mg Po od	Date commenced:	
Vitamin D 25mcg po od	Date commenced:	
Explain risk factors: Offered Information leaflet Yes/ No Accepted Information leaflet Yes/ No	Mother tick Miscarriage Diabetes Pregnancy induced HTN VTE Sleep apnoea Infection IOL/ failed IOL Operative delivery Perineal tear LSCS Unsuccessful VBAC PPH Maternal mortality	Baby tick Congenital malformation Macrosomia Misdiagnosis of IUGR Misdiagnosis of fetal lie Still birth Difficult monitoring Shoulder dystocia Birth defects Difficult breast feeding NICU admission Neonatal death