

Project on Time Motion Study of Diabetes Mellitus in Pregnancy with Emphasis on Gestational Diabetes Mellitus

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Introduction

The University College Hospital was established by an Act of Parliament in 1952 in response to the need for the training of medical students following the establishment of a Faculty of Medicine at the University College, Ibadan in 1948.

The physical development was commenced in 1952 and clinical facilities were formally commissioned in November 1957. The naming of the Hospital, appointment of the Chairman of the Provisional Council of the University College Ibadan as the first Chairman of the Board of Management and the provision (physical facilities for students' from its inception, were ample proof of the functions envisaged for the hospital though primarily concerned with teaching and research with service only at a level to ensure the satisfactory performance of these basic obligations.

The situation changed dramatically with the Nigerian Civil War. The well-regulated processes of referrals from General Practitioners, State Hospitals and Clinics and Selections at the General Out-Patient Clinics (GOPD) were modified with consequences for disproportionate service load.

In the ensuing years, the symbolic relationship between the hospital and the University was a success story not only in the quality of Health Care available and the medical education provided, but also in its research output. By the time the University College Hospital was 30 years old, nearly 10 million patients had been treated there, while thousands of clinical student nurses and midwives, laboratory technologists, radiographers, medical record officers and several cadres of health workers have passed through its portals. At least a quarter of all doctors in practice in Nigeria today trained, researched or taught at Ibadan at one time or other. In addition to the undergraduate medical programme (based in the College of Medicine of the University of Ibadan, the UCH also provides training facilities for:

Postgraduate Residency Programme in the specialties of Internal Medicine, Surgery, Obstetrics and Gynaecology, Paediatrics, Otorhniolaryngology, Ophthalmology, Anaesthesia, Laboratory Medicine, Psychiatry, Community Medicine, General Medical Practice, Radiology, Radiotherapy and Dentistry, Geriatric Centre, Palliative Care Hospice.

Schools Available are:

- Schools of Nursing
- School of Midwifery
- School of Medical Records
- School of Occupational Health Nursing (First in the Country)
- Environmental Health Tutors Course
- Primary Health Care Tutors Course
- Community Health Officers Tutors Course
- Continuing Education Programmes for Nurses and Midwives in Administration and Management (CEPNAM)

Outreach community based activities include two Rural Comprehensive Health Centres run in collaboration with Oyo and Osun State Government and the Local Governments in Sepeteri and Okuku. These are additional to smaller programmes in Abedo Village, Akinyele, Arere, Mele, Osun and Idi-Ikan areas of the Ibadan Metropolis.

The Hospital gives annual financial support to the Ibarapa Programme of the College of Medicine which is under the supervisory control of its Department of Community Medicine and provides staff and strong financial support endowed for the purpose.

With specific relevance to the Residency Training Programme, the Hospital offers Comprehensive facilities for training and clinical exposure at a level compatible with requisite skills in most discipline for specialization. As at today, there are almost 300 Residents undergoing training in the various specialties.

The Hospital has 53 service and clinical departments and runs 96 Consultative Outpatient Clinics, in a week 50 specialty and subspecialty disciplines. In addition to the College of Medicine, the Hospital “houses” a Virus Research Laboratory, a W.H.O. collaborating centre in immunology and an institute of Advance Medical Research and Training (IMRAT). The UCH also houses the special treatment clinics (S.T.C), a state-of-the-art clinic for research, training and treatment of sexually transmitted diseases. The Hospital has been collaborating with the International Atomic Energy Agency (IAEA) in the area of Radiotherapy, Nuclear Medicine and Nuclear Pharmacy. The Agency has also been assisting with capacity building in terms of staff development and equipment donations.

The number of beds has grown to about 1000 with the rapid expansion of the oncology section into a cancer treatment centre, with inpatient facilities. There has also been an update of the facilities in neonatology (The Special Care Baby Unit).

There are almost 200 Hospital Consultants and in-patient admissions exceed 10,000 annually while out-patient clinic attendances approximate to over 170,000. With the on-going rehabilitation this Premier Teaching Hospital as well on its way to redeeming its hard-earned and longstanding reputation as Nigeria’s leading tertiary health care institution.

Recently, the Hospital decided on the provision of Private suites as a bold step in encouraging intramural private practice. This will stem the unwelcome tide of extramural private practice, and strengthen the revenue generation base of the Hospital. The resulting financial returns can thus be ploughed back into the institution so as to optimize the quality of health care, training and research.

Arrangements are on-going to commence full training in Cardio-thoracic surgery and in Nuclear Medicine. Sustained attempts are being made to upgrade the training potential by the acquisition of more modern technology such as the computerized tomography, computerized dosimetry for irradiation treatment, state-of-the-art angiographic equipment and biochemical auto analysers, etc.

Presently, the hospital has successfully carried out an open-heart surgery, procure state-of-the art equipment and installed the first cardiac Catheterization Unit which was inaugurated by the Minister of Health Professor Onyebuchi Chukwu in 2013.

The Hospital is a designated centre for the yearly conduct of professional Medical Doctors Exams in West Africa. The ultimate, however, is the establishment of the broad spectrum of clinical and diagnostic services for wide student and trainee exposure with appropriate qualities for patient management.

UCH mission statement

To render excellent and prompt care to clients in an atmosphere that ensures and promote hope and dignity irrespective of status while providing outstanding development of intellect, skill and character, in an environment that stimulates qualitative and relevant research (Relevant to our country).

Goals and objectives

1. To be better positioned to achieve our vision and mission.
2. To ensure value for efforts by the Government and Health Consumers.
3. To ensure excellence in Service, training and Research
4. To expand and promote necessary linkages to achieve our goals.
5. To maintain and improve on our social responsibilities to our immediate community and the Nigerian society at large.

Obstetrics and gynaecology department UCH

This is one of the departments in the hospital, it comprises of several wards such as:

- Labour Ward Complex
- Lying in Ward (obstetrics)
- Gynaecology ward and Gynaecology theatre

These are further divided into:

Labour Ward Complex

Here, we have the labour rooms for Stages 1, Stages II, III and fourth Stage of labour for normal deliveries with Operating theatres for Caesarean Sections and other obstetric procedures.

Lying-in-Ward (Obstetrics) have the following wards:

i West 4

ii South East 4

iii West West 3

They are wards allocated for delivered mothers and sick prenatal patients.

Gynaecology Wards

Patients who are admitted here are cases such as vesicovaginal fistula, Rectovaginal fistula, Cancer of the cervix just to mention a few, with the following wards: C14th and SW4 (South West 4), Gynaecology theatre.

Procedures carried out include:

- Myomectomy
- Salpingectomy
- Oophorectomy
- Hysterectomy
- Laparotomy with removal of Abdominal mass (wherever located).

Most of the units in obstetrics and gynecology department are

1. FMM: FetoMaternal Unit
2. FRU: Fertility Research Unit
3. GUU: Genito Urinary Unit
4. GOU: Genito-Oncology Unit
5. ACU: Assisted Conception Unit

Some of the consultants and their units are

Unit consultants

FMM Prof. Olayemi, Dr. Fawole,
Dr. Adesina, Dr. Aimakhu
FRU Prof. Adekunle, Prof. Arowojolu,
Dr. Okunola, Dr. Roberts
GUU Prof. Ojengbede, Dr Nkwocha,
Dr. Mohasson Bello, Dr. Adekanbi
GOU Prof. Omigbodun, Prof. Adewole,
Dr. Odukogbe, Dr. Afolabi, Dr. Awolude.
ACU Prof. Ilesanmi, Dr. Oladokun, Dr. Bello,
Dr. Ogunbode, Dr. Obajimi

Tabular representation of units, consultants, ward round, theatre (operation day) and clinic days

UNIT	NAME OF CONSULTANT	WARD ROUND	CLINIC DAY	THEATRE
FMM	Prof. Olayemi, Dr. Fawole, Dr. Adesina, Dr. Aimakhu	Tuesdays	Tuesday- gynae clinic Thur – Clinic	Monday
FRU	Prof. Adekunle, Prof. Arowojolu, Dr. Okunola, Dr. Roberts	Thursday	Thursday-Gynae Clinic Tuesday – Clinic	Friday
GUU	Prof. Ojengbede, Dr. Nwocha, Dr. M.Bello, Dr. Adekanbi	Monday	Monday-Gynae Clinic Tuesday – Clinic	Friday
GOU	Prof. Omigbodun, Prof. Adewole, Dr. Afolabi, Dr. Odukogbe, Dr. Awolude	Thursday	Monday-Clinic Thursday – Gynae Clinic	Tuesday
ACU	Prof. Ilesanmi, Dr. Oladokun, Dr. Ogunbode, Dr. Obajimi	Tuesday	Monday – Clinic Tuesday – Gynaeclinic	Thursday

West 4

It is worthy of note to mention that the University College Hospital is a baby friendly Hospital.

West 4 is one of the lying in wards, caring for delivered mothers either through normal delivery, Caesarean Section or forceps. Also, patients who are gravid with pregnancy complications are also taken care of.

Cases admitted into West 4 are:

1. Delivered Cases
2. Sick Prenatal Cases – including premature rupture of membrane, pre-eclampsia gestational diabetes, threatened abortion, reduced fetal movement, asthma in pregnancy, malaria in pregnancy, anaemia in pregnancy, delirium in pregnancy, depression in pregnancy, vaso-occlusive crisis in pregnancy and degenerating fibroid in pregnancy etc.

Delivered cases

1. Elective lower segment caesarean section
2. Emergency lower segment caesarean section
3. Spontaneous vertex delivery
4. Spontaneous vertex delivery with episiotomy
5. Spontaneous vertex delivery with first (1⁰) degree perineal laceration.
6. Spontaneous vertex delivery with second (2⁰) degree perineal laceration
7. Spontaneous vertex delivery with macerated still birth
8. Spontaneous vertex delivery with fresh still birth
9. Emergency lower segment caesarean section due to premature rupture of membrane.
10. Emergency lower segment caesarean section due to placenta previa type I, II, III
11. Emergency lower segment caesarean section due to poor progress in labour with previous caesarean section x 1.
12. Emergency lower segment caesarean sector due to cephalopelvic disproportion.
13. Emergency lower segment caesarean section due to fetal distress.
14. Emergency lower segment caesarean section due to fetal distress.
15. Emergency lower segment caesarean section due to previous vaginoplasty and premature rupture of membrane.

16. Emergency lower segment caesarean section due to multiple gestation.
17. Emergency lower segment caesarean section due to severe oligohydramnios.
18. Emergency lower segment caesarean section due to persistent fetal tachycardia.
19. Elective lower segment caesarean section due to maternal request
20. Elective lower segment caesarean section due to vasaprevia
21. Elective lower segment caesarean section due to Retroviral status
22. Elective lower segment caesarean section due to co-existing fibroid.
23. Elective lower segment caesarean section due to gestational diabetes mellitus.
24. Elective lower segment caesarean section due to previous vesicovaginal fistula repair with bad obstetric history
25. Elective lower segment caesarean section due to background infertility.
26. Elective lower segment caesarean section due to post datism
27. Elective lower segment caesarean section due to oblique lie
28. Elective lower segment caesarean section due to chronic hypertension.
29. Elective lower segment caesarean section due to short stature.

Sick prenatal cases

1. Acute exacerbation of asthma in pregnancy
2. Degenerating uterine fibroid in pregnancy
3. Major placenta previa Type III
4. Gestational Diabetes Mellitus
5. Malaria in pregnancy
6. Pre-eclampsia and severe pre-eclampsia
7. Pregnancy induced Hypertension
8. Spurious Labour
9. Cervical Incompetence
10. Hyperesis Gravidarum
11. Preterm Contraction
12. Reduced fetal movement
13. Threatened abortion
14. Missed abortion
15. Inevitable abortion
16. Intrauterine growth retardation
17. Placenta Previa type I
18. Delirium in pregnancy due to Electrolyte derangement
19. Chronic hypertension with superimposed pre-eclampsia
20. Puerperal psychosis
21. Anaemia in pregnancy
22. Severe Anaemia due to haemolytic crisis
23. Pregnancy induced hypertension
24. Depression in pregnancy
25. Brochopneumonia in pregnancy
26. Deranged oral glucose tolerance test in pregnancy
27. Arrhythmia in pregnancy
28. Spotting per vagina
29. Acute exacerbation of peptic ulcer disease in pregnancy
30. Puerperal psychosis with puerperal sepsis

Other caring aspects include

1. Care of neonates with elevated serum bilirubin value been nursed under phototherapy.
2. Care of neonates whose mothers have psychotic background

3. Care of neonates whose mothers have spinal injury and are under admission.
4. Care of neonates whose mothers are not capable.
5. Care of neonates whose mothers are admitted in intensive care unit.

Aims and objectives

1. Wholistic care of both pregnant and delivered mothers.
2. Prevention of Nosocomial infection
3. Ensuring prompt care and quality services
4. Teaching and enlightening mothers on care of the new born
5. Ensuring immunization of all delivered babies.

Routine/daily activities

- a. Doctors ward round
- b. Paediatricians ward round
- c. Patients transfer (in and out)
- d. Wound dressing
- e. Shaving of operation site
- f. Bedmaking
- g. Medication round
- h. Vital signs monitoring
- i. Commencement of post operative patients on graded oral sips
- j. Catheterization
- k. Admission and discharge

Introduction to west 4

West 4 is located on the West Wing of the Hospital. It is also named as such because it is on the 4th (fourth floor) of the hospital.

It can be accessed through the lift, staircase or ramp.

West 4 is a 27 bedded ward divided into:

- i. General Ward
- ii Small Ward

It consists of 16 beds with 16 baby cots. At the end of the ward there is a sluice room toilet area and bathrooms. There is a store for baby cots and within the sluice end are bedpans with bedpan washer and sinks.

Small Ward

It consists of 10 beds with a side room. At the end of the ward there is a bathtub, bathroom with shower, toilet area, sluice end with bedpan washer and bedpans.

Between the General Ward and Small ward are:

- a. The nursery for babies bathing with 3 (three) bathing sinks
- b. The major treatment room consisting:
 - i. CTG monitoring machine
 - ii. Emergency tray and cupboard
 - iii. Examination couch
 - iv. Huge boiler for hot water
 - v. Oxygen cylinders
 - vi. Medication trolleys
- c. Minor treatment room consisting:
 - i. Sterilizers
 - ii. Cupboard with vomit bowls, dressing bowls, kidney dishes gallipots, and forceps.
- d. Nurses break room

- e. Linen room
- f. Kitchenette
- g. Doctors call room
- h. Office of the Assistant Director of Nursing
- i. Matrons Office with CDA (Controlled Drug Act) cupboard
- j. Store

Drugs used

- Adrenalin
- Atropin
- Misoprostol 200µg (microgram)
- Dopamin
- Pentazocine 30mg
- Pethidine 50mg and 100mg
- Calcium gluconate
- Sodium bicarbonate
- Magnesium sulphate
- Water for injection
- Aminophylline
- Oxytocin
- Ergometrine
- Hydrocortisone
- Promethazine
- Lidocaine
- Syntocinon
- Fuisemide
- Vitamin K
- Diazepam
- Haloperidol
- Dexamethasone
- Hydralazine
- I.V Labetalol
- Chlorpromazine
- MetoChlopromide
- Ophthalmoscope
- Cut down set
- 50% Dextrose saline
- 0.9% Normal Saline
- 19G Cannular size
- 21G Cannular size
- 4.3% Dextrose Saline
- 5% Dextrose Saline
- 23G Cannular size,
- 5ml needle and syringe
- 21G Cannular size,
- 2ml needle and syringe,
- 10ml needle and syringe
- 5ml needle and syringe
- 4.3% Dextrose Saline,
- 5% Dextrose saline

- Ringers lactate
- 20ml needle and syringe
- Full strength Darrows solution
 - ½ Strength Darrows

Equipment

- Adult Beds (27)
- Baby's Cot (16)
- Adult Weighing Scale (1)
- Baby weighing scale
- Stethoscope
- Sphygmomanometer
- Electrical suction machine
- Manual suction machine
- Adult ambu bag
- Paediatric ambu bag
- Medication Trolleys
- Trolleys
- Wheel Chair
- CTG machine
- Pinead fetoscope
- Oxygen gauge
- Oxygen cylinder
- Solar lamps
- Infusion stand
- Infusion giving set
- Sterile gloves size 7, size 8
- Elbow length gloves size 7,Size 8
- Drums

Statistics for gestational diabetes

Statistics 2013

Total Admission: 1200
Gestational diabetes Cases: 12

Statistics 2014

Total Admission: 1015
Gestational Diabetes Cases: 10

Statistics 2015

Total Admission: 645
Gestational Diabetes Cases: 6

Tabular representation of cases In 2013

MONTH	TOTAL PATIENT ADMISSION MONTHLY	TOTAL NUMBER OF CASES
January	144	4
February	140	0
March	165	1
April	139	1
May	116	1
June	69	1
July	103	1
August	104	0
September	143	1
October	8	0
November	6	1
December	63	1
Total	1200	12

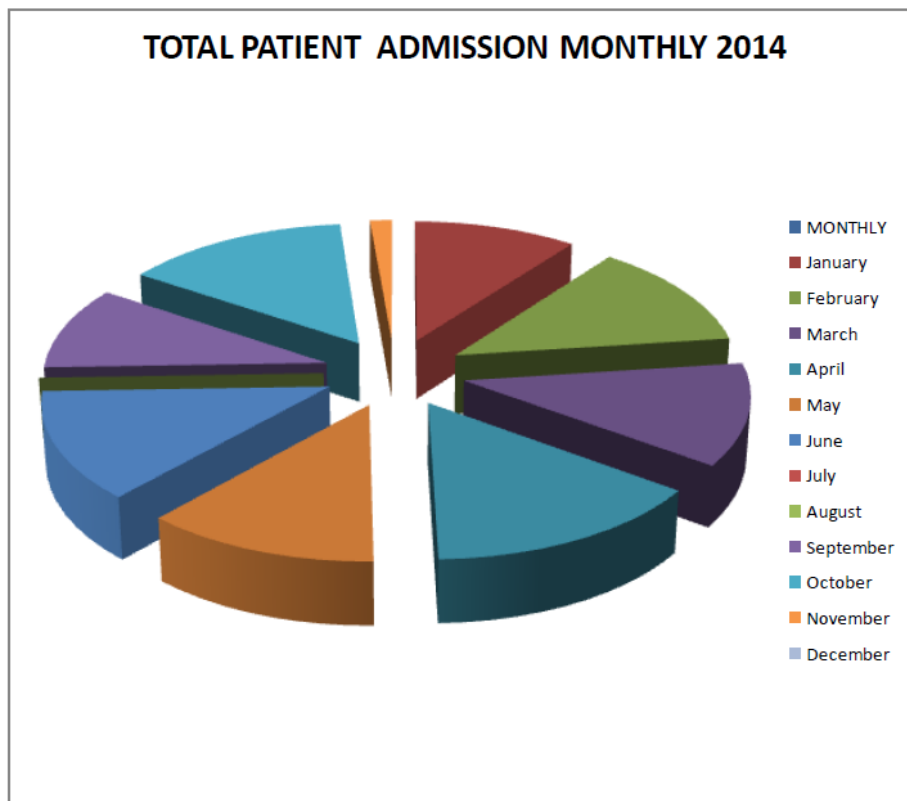
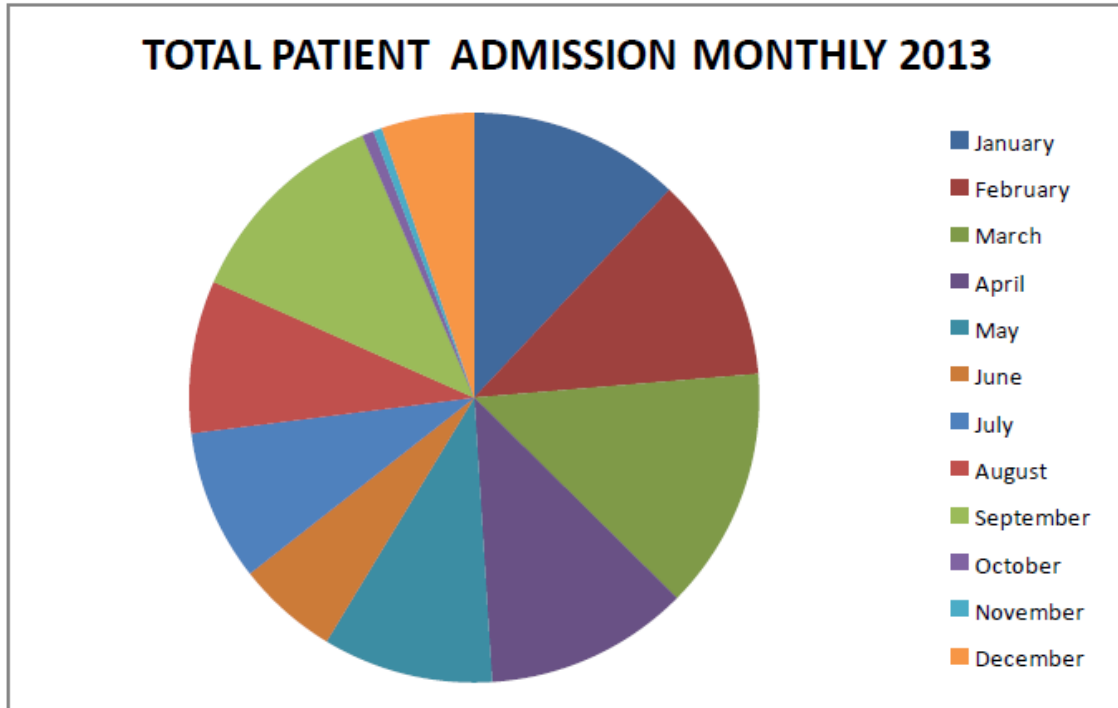
Tabular representation of cases in 2014

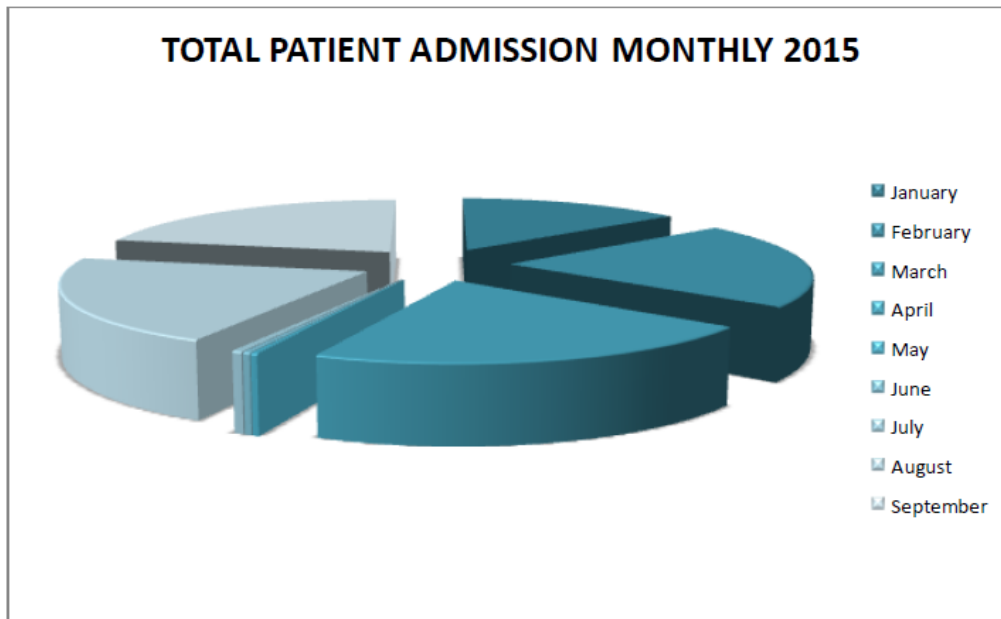
MONTHLY	TOTAL PATIENT ADMISSION	TOTAL NUMBER OF CASES
January	105	1
February	128	1
March	122	4
April	149	2
May	122	0
June	130	0
July	Nil	Nil
August	Nil	Nil
September	100	1
October	145	1
November	14	0
December	Nil	Nil
Total	1015	10

Tabular representation of cases in 2015

MONTHLY	TOTAL PATIENT ADMISSION MONTHLY	TOTAL NUMBER OF CASES
January	0	0
February	92	1
March	136	1
April	136	4
May	2	0
June	2	0
July	3	0
August	134	0
September	140	0
Total	645	6

Graph





Diabetes in pregnancy

Diabetes Mellitus in pregnancy is one of the endocrine disorders in pregnancy: Other endocrine disorders include:

- Thyroid disorders in pregnancy
- Parathyroid disorders in pregnancy
- Adrenal disorders in pregnancy
- Pituitary disorders in pregnancy

Among these, gestational diabetes is the commonest among pregnancy women while others are less common.

Diabetes mellitus

Diabetes is the most common medical condition to affect pregnancy and occurs in approximately 4 per 1000 pregnancies in the UK. It complicates approximately 1% of all pregnancies in Caucasian populations, but a higher percentage of pregnancies in other ethnic groups. Recent audits undertaken identified persistently poorer outcomes in pregnant women with diabetes compared with the overall obstetric population. The aim of both the St. Vincent declaration of the European Association for the Study of Diabetes and of the UK Task Force is to achieve a pregnancy outcome for the diabetic mother equal to that of a non-diabetic mother.

The term 'diabetes mellitus' (DM) describes a metabolic disorder of multiple aetiology that affects the normal metabolism of carbohydrates, fats and protein. It is characterized by increasing levels of glucose in the blood (hyperglycaemia) and excretion of glucose in the urine (glycosuria) resulting from defects in insulin secretion, or insulin action, or both. The classic signs and symptoms are excessive thirst (polydipsia), excessive urinary excretion (polyuria) and unexplained weight loss. The long term effects of DM are reflected in the development of macrovascular and micro-vascular disease producing coronary heart disease, peripheral arterial disease, kidney disease (diabetic nephropathy), loss of vision (diabetic retinopathy) and nerve damage (diabetic neuropathy).

A normal fasting blood glucose of < 6.1 mmol/L is regulated by the pancreatic hormones insulin and glucagon. Following the ingestion of carbohydrates the rising blood glucose stimulates the pancreas to secrete insulin, which reduces blood glucose. Falling blood glucose levels induce glucagon production, which prevents further glucose reduction. The combined action of these two hormones maintains the blood glucose within normal limits.

Hyperglycaemia is usually the result of insulin deficiency when there is a high secretion of hormones antagonistic to insulin action; severe hyperglycaemia (blood glucose > 25.0mmol/L) may result in diabetic ketoacidosis, coma or death. Hypoglycaemia is defined as a blood glucose <2.2mmol/L. Symptoms of a falling blood glucose include tremor, sweating and tachycardia. Severe hypoglycaemia, particularly in neonates, can result in fits, coma and death. Repeated severe episodes of hypoglycaemia are associated with the risk of permanent brain damage.

Classification

Type 1 DM. This occurs when beta cells in the islets of Langerhans in the pancreas are destroyed, stopping insulin production. Insulin therapy is required in order to prevent the development of ketoacidosis, coma and death. It presents more commonly in childhood, but can occur at any age and in some cases is attributable to an autoimmune process.

Type 2 DM. This results from a defect(s) in insulin action and insulin secretion and insulin therapy is not needed to survive. The risk of developing this type of DM increases with age, obesity and lack of physical activity. It occurs more frequently in women with prior gestational diabetes mellitus and in individuals with hypertension. Its frequency varies between different racial or ethnic groups and there is some suggestion of a genetic predisposition.

Statistically, 87.5% of pregnancy have gestational diabetes, 7.5% have type I, Diabetes Mellitus 5% have type II, Diabetes Mellitus.

Type II Diabetes Mellitus are increasing in minority ethnic groups.

Gestational diabetes mellitus (GDM). This is defined as carbohydrate intolerance resulting in hyperglycaemia of variable severity, with its onset or first recognition during pregnancy.

Statistically, 87.5% of pregnancy have gestational diabetes

7.5% have type I, Diabetes Mellitus.

5% have type II, Diabetes Mellitus.

Type II Diabetes Mellitus are increasing in minority ethnic groups.

Impaired glucose regulation: This includes impaired glucose tolerance (IGT) and impaired fasting glycaemia (IFG), which are metabolic states intermediate between normal glucose homeostasis and diabetes. IGT is categorized as carbohydrate metabolism resulting in slightly raised postmeal blood glucose levels of > 7.8 mmol/L. IFG refers to fasting glucose concentrations that are lower than those required to diagnose DM but higher than the 'normal' reference range (i.e. > 6.1 mmol/L but < 7.0mmol/L). Individuals with impaired glucose regulation are at increased risk of developing DM and cardiovascular disease.

Gestational diabetes

The incidence of GDM varies widely across different ethnic groups. In Caucasians it is 1-2% in Afro-Caribbeans 2-3% and in Asians 4-5%. An agreement as to what is considered a 'normal' blood glucose levels in pregnancy and at what level maternal and fetal morbidity ensues remains elusive. Hence, the significance of GDM is difficult to determine. The strongest evidence suggests that fetal macrosomia and caesarean section rates are increased. In the longer term there appears to be an association between raised glucose levels in utero and the development of obesity and diabetes in later life. There is also evidence to suggest that women who develop GDM are at risk of developing type 2 DM. It was identified that some women are at high risk of developing GDM and there may be some benefit in selective screening for GDM in women where the following risk factors are identified:

- maternal age > 25 years
- DM affecting a first degree relative
- High risk racial heritage e.g. Asian-Indian, Middle Eastern, Afro-Caribbean.
- BMI >27kg/M².
- Family history (Polyhydramnios)
- Previous baby > 4.5kg
- Previous unexplained still birth

- Glucosuria > ++
- Multiparity greater than 4
- Polycystic Ovarian Syndrome
- Impaired Glucose tolerance test

The following guidance with regard to screening for GDM with the proviso that these are likely to alter as new information becomes available:

1. Urine should be tested for glucose at every antenatal visit.
2. Timed random laboratory plasma glucose measurements should be made whenever glycosuria (1 + or more) is detected, at the booking visit and 28 weeks gestation.
3. A 75g 2 hour OGTT should be performed if the random blood glucose concentrations are ≥ 6.1 mmol/L in the fasting state or > 2 hours of food, or ≥ 7.0 mmol/L within 2 hours of food.

Diagnosis is based on the WHO (1999) recommendations; however, caution should be exercised if these occur in the third trimester when glucose tolerance is known to be impaired.

1. If the fasting venous plasma glucose is > 7.0 mmol/L, or
2. A fasting venous plasma glucose < 7.0 mmol/L and a plasma glucose of > 7.8 mmol/L 2 hours after a 75g glucose load.

Monitoring diabetes

The main objective of diabetic therapy is to maintain blood glucose levels as near to normal as possible and to reduce the risk of long term complications. Diabetics are therefore encouraged to monitor their blood glucose concentration regularly by obtaining a finger-prick sample of capillary blood and using reagent test strips (e.g. BM test) with or without a reflectance glucose meter. Blood glucose can also be estimated by testing urine for glucose using reagent strips, although this is less accurate than the blood test and not recommended in pregnancy. Long term blood glucose control can be determined by undertaking a laboratory test to measure glycosylated haemoglobin (HbA1c). Five to eight percent of haemoglobin in the red blood cells carries a glucose molecule and is said to be glycosylated. The degree of haemoglobin glycosylation is dependent on the amount of glucose the red blood cells have been exposed to during their 120 day life. A random blood test measuring the percentage of haemoglobin that is glycosylated will reflect the average blood glucose during the preceding 1-2 months. The higher the HbA1c the poorer is the blood sugar control. Good diabetic control is defined as an HbA1c of < 6.5%.

Carbohydrate metabolism in pregnancy

Pregnancy is characterized by several factors that produce a diabetogenic state so that insulin and carbohydrate metabolism is altered in order to make glucose more readily available to the fetus. Increasing levels of oestrogen, progesterone and prolactin produce progressive hyperplasia of the pancreatic beta cells resulting in the secretion of 50% more insulin (hyperinsulinaemia) by the third trimester. However, progesterone, human placental lactogen and cortisol are insulin antagonists and reduce the effectiveness of insulin. This is considered to be a glucose-sparing mechanism, which enables large quantities of glucose to be taken up by the maternal circulation and transferred to the fetus via the placenta by a process known as "facilitated diffusion". After the placenta is delivered insulin resistance and requirements decrease rapidly and the prepregnancy sensitivity to insulin is restored. Gestational diabetes is most likely to emerge during the third trimester when the extra demands on the pancreatic beta cells precipitate glucose intolerance. Women with DM do not have the capacity to increase insulin secretion in response to the altered carbohydrate metabolism in pregnancy and therefore glucose accumulates in the maternal and fetal system leading to significant morbidity and mortality.

Pre-pregnancy care

The risk of the development of congenital malformations increases significantly in women with DM. The malformations associated with diabetes – cardiac, neural tube defects and caudal regression

syndrome occur during the first trimester of pregnancy and are thought to be related to poor diabetic control at this time. It is important therefore that good metabolic control is established before pregnancy. Women should have access to a prepregnancy counseling service and ideally meet a diabetic specialist midwife/Doctor before becoming pregnant. Assessment is made of current diabetic control aiming for premeal glucose levels of < 6 mmol/L and HbA1c of $\leq 7\%$. Insulin dosage is reviewed and an explanation given of the adjustments that will be required during pregnancy. Women with type 2 DM on oral hypoglycaemics will need to transfer to insulin to prevent the possibility of teratogenesis. Pregnancy may lead to a deterioration of diabetes and for this reason the presence of renal, cardiovascular or retinal changes need to be assessed. Angiotensin-converting enzymes (ACE) inhibitors to control hypertension are widely used in women with diabetes. However, these drugs are contraindicated in pregnancy because of possible teratogenesis and therefore alternative therapy such as methyldopa or nifedipine needs to be considered. Diet, including weight control and folic acid supplementation, and general health measures, including checking rubella status and smoking cessation, need to be discussed in addition to giving advice regarding the effect of diabetes on pregnancy and of pregnancy on diabetes.

Antenatal care

Women and their partners should ideally be seen in a combined clinic by a team that includes a physician, an obstetrician with a special interest in diabetes in pregnancy, a specialist diabetes nurse, a specialist midwife and dietician. The woman is seen as often as required in order to maintain good diabetic control, this may entail fortnightly visits until 28 weeks gestation and then weekly until term. Blood glucose levels should be monitored frequently (four times a day using a reflectance meter) and insulin levels adjusted to achieve premeal blood sugar level of 5.0 – 6.0 mmol/L and postmeal levels of < 7.8 mmol/L. Additional estimations of blood glucose control such as monthly HbA1c measurements are also recommended. Diabetic control is particularly difficult to maintain in early pregnancy owing to the effects of pregnancy on diabetes. This may be exacerbated by other pregnancy disorders such as nausea and vomiting. Women with DM are more likely to become hypoglycaemic at this time and loss of hypoglycaemic warning symptoms is common. Women and their relative need to be warned of this and advice should be given regarding the recognition, management and treatment of hypoglycaemia. A glucagon kit should be supplied and her partner and relatives instructed on how to use it. Dietary advice and monitoring is continued throughout pregnancy as the need for carbohydrate increases as the fetus grows. A diet that is high in fibre is beneficial as carbohydrates are released slowly and therefore a more constant blood glucose level can be achieved. Glycosuria is common in pregnancy owing to the increased glomerular filtration rate and decreased renal threshold. Women with DM have a predisposition to urinary and vaginal infections during pregnancy, these should be discussed with the midwife or doctor so women can recognize the signs and symptoms and seek treatment as soon as possible.

Pre-existing vascular diseases will increase the risk of a woman with DM developing hypertensive disorders in pregnancy and will cause a deterioration of diabetic retinopathy.

In view of the increased risk of congenital malformations, anomaly ultrasound screening should be offered at 20 weeks gestation. It is also recommended that fetal echocardiography is undertaken at 20 – 22 weeks to detect cardiac abnormalities. Serum screening for Down syndrome is altered with maternal diabetes and care should be taken when interpreting the results.

Fetal growth must be observed carefully because of the risk of growth restriction due to maternal vascular disease, pre-eclampsia, or a combination of both. A baseline measurement of the fetal abdominal circumference is taken at 20 weeks. This is followed by serial measurement every 2-4 weeks commencing at 24 weeks. Serial ultrasound should also detect fetal macrosomia and whether polyhydramnios is present.

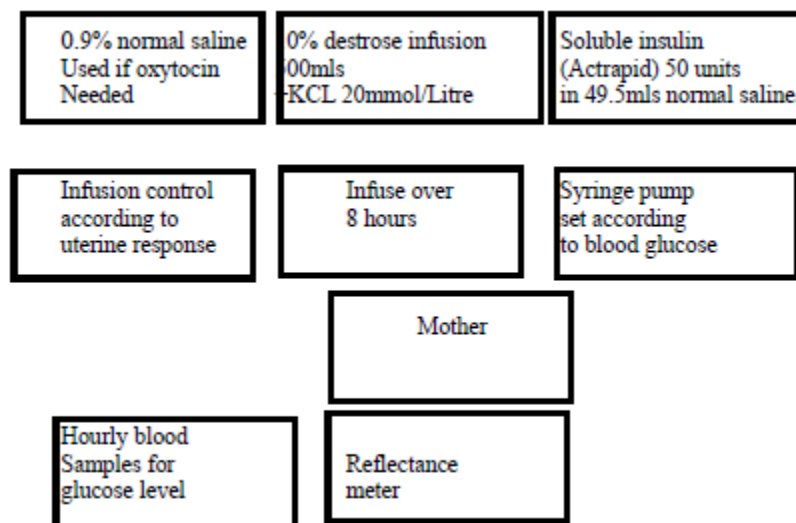
As far as possible the woman monitors her diabetes at home and diabetic care is provided on an outpatient basis. It is important that the midwife assesses the progress of the pregnancy in the normal

way in order to detect any complications. Hospital admission may be required because of poor diabetic control, a destabilizing illness or obstetric complications.

Intrapartum care

Ideally labours should be allowed to commence spontaneously at term for women with uncomplicated DM during pregnancy. Poor diabetic control or deterioration in the maternal or fetal condition may necessitate earlier, planned birth. Induction of labour may also be considered where the fetus is judged to be macrosomic. Routine induction of labour at 37-38 weeks gestation is no longer recommended as it does not reduce the perinatal mortality rate and is more likely to result in respiratory morbidity. It may also contribute to the high caesarean section rate for diabetic pregnancies compared with normal pregnancies. The St Vincent declaration states that caesarean sections are to be performed solely for obstetric indications. Fetal lungs mature more slowly when the mother is diabetic and it is important to take this into account if early induction of labour is planned. In addition, steroids such as dexamethasone, which may be used to aid lung maturation and surfactant production, will increase insulin requirements in women with DM.

The aim of intrapartum care is to maintain normoglycaemia in labour (i.e. < 7.0 mmol/L). Maternal hyperglycaemia leads to an increase in fetal insulin production, which will cause neonatal hypoglycaemia. The St Vincent declaration recommends that maternity units should aim to maintain a maternal blood glucose concentration of between 4 and 6 mmol/L. However, it was found there to be a wide variation within UK maternity units with 15% of units aiming to maintain a concentration of 8.0mmol/L or above. All units should have their own written guide lines for the management of diabetes in labour although regimens will vary. An example of such a regiment utilizing a sliding scale of insulin dosage depending on the maternal blood glucose concentration is outlined.



Fetal distress is more common as placental blood flow is reduced and glycosylated haemoglobin decreases oxygen carriage in diabetic pregnancies. In addition, maternal ketoacidosis may result from dehydration and unstable diabetes. If the mother becomes acidotic, ketones will cross the placenta and affect the fetal acid-base status. Continuous electronic fetal monitoring is recommended and fetal blood sampling should be utilized if acidosis is suspected. Adequate pain relief, such as epidural analgesia, assists in regulating the blood sugar levels and preventing the development of metabolic acidosis in women with DM. It is also useful if difficulties should arise with the birth of the shoulders or an operative birth is required.

Postpartum Care

Immediately after the third stage of labour the insulin requirements will fall rapidly to pregnancy levels. The insulin infusion rate should be reduced by at least 50%. Carbohydrate metabolism returns to normal very quickly and women can resume their pre-pregnancy insulin regimen. Women with type 2 DM who were previously on oral hypoglycaemics or dietary control need to be reviewed prior to recommencing therapy. Monitoring of blood glucose levels should continue during this interim period. Breastfeeding should be encouraged in all women with diabetes. An additional carbohydrate intake of 40-50g is recommended and insulin therapy may need to be adjusted accordingly. Operative birth, together with diabetes, predisposes these women to infection and delayed healing. The administration of antibiotics may be a useful preventive measure in this instance. All women should be offered contraceptive advice so that optimum metabolic control is achieved prior to planning the next pregnancy. The issues governing choice of contraception for women with DM are similar to those for non-diabetic women. All contraceptive methods are considered safe, acceptable and effective for diabetic women. Women with DM, gestational diabetes or IGT should be reviewed at 6 weeks, ideally at a combined diabetes clinic or alternatively by their GP (General practitioner).

Neonatal Care

The development of complications in the neonate is related to maternal hyperglycaemia during pregnancy leading to fetal hyperinsulinaemia. This will result in the following conditions: macrosomia, hypoglycaemia, polycythaemia and respiratory distress syndrome.

Macrosomi: This is defined as a fetal birth weight > 4500g. Maternal hyperglycaemia and consequently fetal hyperglycaemia induce fetal hyperinsulinaemia. This leads to an increase in the amount of fetal body fat and the enlargement of fetal organs such as the liver, heart, spleen, adrenals and the beta cells of the pancreas (beta cell hyperplasia). The increased fetal size may cause prolonged labour due to cephalopelvic disproportion. It also predisposes the infant to difficult deliveries, such as shoulder dystocia and birth injuries. As a consequence asphyxia is common and these infants are more likely than babies of normal weight to die from an intrapartum-related event.

Hypoglycaemia: Beta cell hyperplasia causes the baby to continue to produce more insulin than required for up to 24 hours following birth. The impaired metabolic response to this hyperinsulinaemia causes neonatal hypoglycaemia (blood glucose of < 1.9mmol/L in the term infant). To prevent this complication the neonatal blood glucose needs to be assessed 1-2 hours after birth and then every 4-6 hours for the first 24-48 hours. Regular feeding is encouraged to maintain a blood glucose of at least 2mmol/L.

Polycythaemia: Fetal hyperinsulinaemia during pregnancy also lead to an increase in red cell production resulting in polycythaemia (venous haematocrit > 65%). The rapid breakdown of the excess red blood liver in the newborn predisposes the baby to jaundice. This will be exacerbated if there is bruising as a result of birth trauma.

Respiratory distress syndrome: Hyperinsulinaemia is thought to impair the production of surfactant and delay lung maturation. Hence, babies born at term may display symptomatology of respiratory distress. Infants of diabetic mothers are not routinely admitted to a neonatal unit. A paediatrician should examine the baby carefully at birth, who should be allowed to stay with his mother unless there are medical complications as outlined above. Observations of temperature, apex beat and respirations and monitoring of blood sugar levels are important in the first 24-48 hours. Clinical signs together with symptomatology such as respiratory distress, apnoea or tachypnoea, cyanosis, jitteriness, irritability, seizures, feeding intolerance and temperature instability may all be indicative of respiratory distress syndrome, polycythaemia and hypoglycaemia, which will require further investigation and treatment in a neonatal unit. Others could include miscarriage, intrauterine growth retardation.

Gestational diabetes

The incidence of GDM varies widely across different ethnic groups. In Caucasians it is 1-2%, in Afro-Caribbeans 2-3% and in Asians 4-5% (Lowy 1997). An agreement as to what is considered a 'normal' blood glucose level in pregnancy and at what level maternal and fetal morbidity ensues remains illusive. Hence, the significance of GDM is difficult to determine. The strongest evidence suggests that fetal macrosomia and caesarean section rates are increased. In the longer term there appears to be an association between raised glucose levels in utero and the development of obesity and diabetes in later life. There is also evidence to suggest that women who develop GDM are at risk of developing type 2 DM. It was identified that some women are at high risk of developing GDM and there may be some benefit in selective screening for GDM in women where the following risk factors are identified.

- Maternal age > 25 years
- DM affecting a first degree relative
- High risk racial heritage e.g. Asian-Indian, Middle Eastern, Afro-caribbean
- BMI > 27kg/M².

The following guidance with regard to screening for GDM with the proviso that these are likely to alter as new information becomes available.

1. Urine should be tested for glucose at every antenatal visit.
2. timed random laboratory plasma glucose measurements should be made whenever glycosuria (1 + or more) is detected, at the booking visit and 28 weeks' gestation.
3. a 75g 2 hour OGTT should be performed if the random blood glucose concentrations are ≥ 6.1 mmol/L in the fasting state or > 2 hours after food, or ≥ 7.0 mmol/L within 2 hours of food.

Diagnosis is based on the WHO (1999) recommendations, however, caution should be exercised if these occur in the third trimester when glucose tolerance is known to be impaired.

1. if the fasting venous plasma glucose is > 7.0 mmol/L, or
2. a fasting venous plasma glucose < 7.0 mmol/L and a plasma glucose of > 7.8 mmol/L 2 hours after a 75g glucose load.

Conclusion

Treatment will depend on the blood glucose levels. The midwife should involve both the diabetic nurse specialist and dietician in dietary interventions to regulate carbohydrate intake and restrict fat and sugars. Advice regarding exercise in pregnancy will be of benefit and smoking cessation strategies may also need to be employed. Grossly abnormal results are likely to require insulin therapy. Blood glucose monitoring should continue on a regular basis throughout pregnancy in order to detect hyperglycaemia. Fetal macrosomia is the main complications and therefore fetal growth and well-being should be closely monitored for the remainder of the pregnancy. Decisions can then be made about the optimal mode and time of birth. Following birth the baby should be closely monitored for hypoglycaemia. If the woman is on insulin therapy this is withdrawn immediately after the birth of the baby.

Recommendation

It is recommended that a postnatal OGTT is performed at 6 weeks; if the results are abnormal then appropriate referral should be made. Those with normal glucose levels require advice regarding the implications for future pregnancies and the development of type 1 or type 2 DM. If the woman adopts a healthy lifestyle and avoids obesity this risk may be reduced.

Conclusion and recommendation

Many patients do not seek medical attention on time, mostly due to cultural beliefs which negate the preference of Caesarean section as a choice of delivery to mothers in general, despite her status.

More so, there are no clinics or provision for Preconception Counselling either for couples or for intending mothers.

It is very imperative that the Government should institute such services within the existing hospitals and making it as a form of legislation that all women who are married or unmarried that fall within the reproductive age should have their blood sugar check done routinely every 6 months.

Those in the rural area should also be taught to do same in the Primary Health Centres. This would help to pick mothers who are at risk early enough to ensure good reduction of maternal and infant mortality and morbidity.

The Public Health Service should be strengthened to disabuse the minds of people on ill cultural practices. Some patients belong to the sect that declines blood transfusion, which may be of great need to their survival in dire emergencies, this possesses a challenge for the health provider especially where autologous transfusion may not be possible and other alternatives are not readily available, this may cause delay or loss of life.

Therefore, the government has to ensure constant public enlightenment or set up a facility for such group where provision of other blood products can be made available at a cost affordable.