Sickle Cell Disease in Pregnancy

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Outline

- Introduction
- Effect of HbSS on pregnancy
- Effect of pregnancy on HbSS
- Management of pregnancy in HbSS

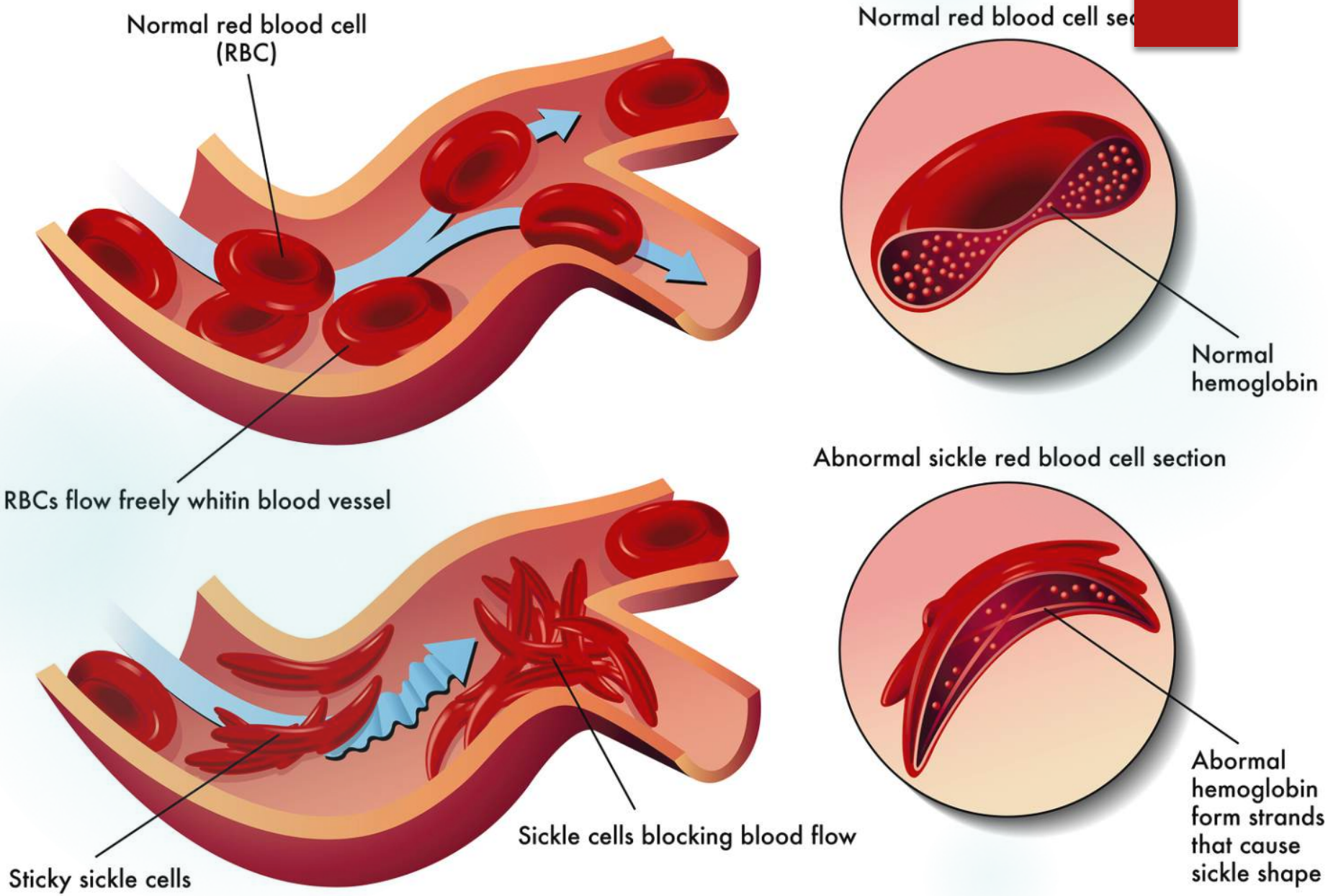
Introduction

- SCD is a group of inherited single-gene autosomal recessive disorders caused by the ‘sickle’ gene, which affects haemoglobin structure

Introduction

- The term SCD includes sickle cell anaemia (HbSS) and the heterozygous conditions of haemoglobin S and other clinically abnormal haemoglobins.
- These include combination with haemoglobin C,D, E, O-Arab or beta thalassaemia.
- All of these genotypes will give a similar clinical phenotype of varying severity

Sickle-Cell Anemia



Introduction

- SCD is the commonest genetic disorder in Jamaica, with 10% of the population carrying the S sickle gene.

- Among live born infants, 0.33% are homozygous SCD (SS) and 0.67% have some form of SCD

Serjeant GR (1997) Sickle-cell disease. Lancet 350: 725–730.GR Serjeant1997Sickle-cell disease.Lancet350725730

Significance

- Increased risk of antenatal hospitalizations
- Increased risk of maternal morbidity and mortality
- Increased risk of perinatal morbidity and mortality
- Significant contributor to indirect deaths in Jamaica

These risks are due, at least in part, to

Pregnancy

- The metabolic demands
- Hypercoagulable state
- Vascular stasis

Sickle Cell Disease

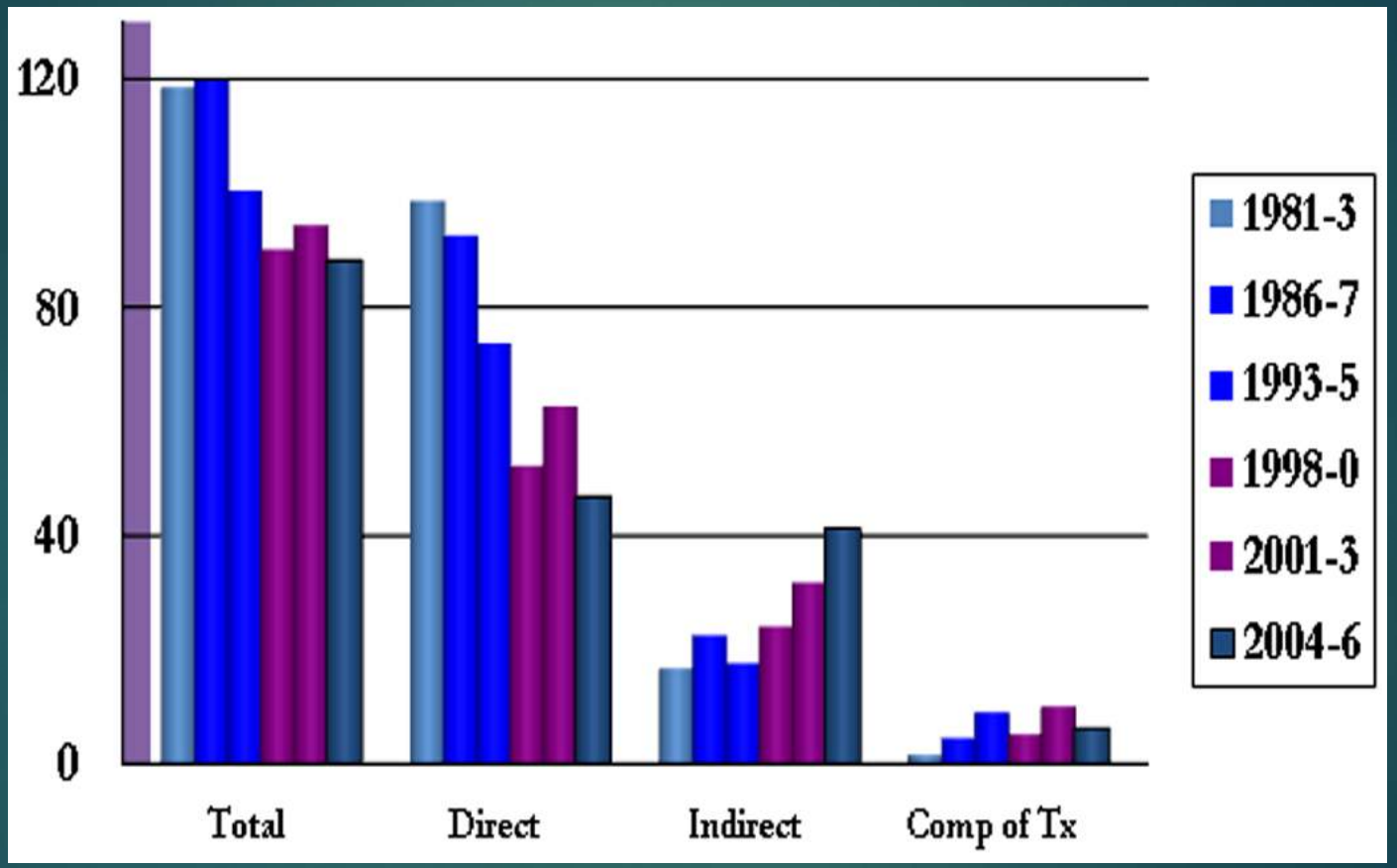
- Haemolytic anemia
- Multiorgan dysfunction

Significance

- In Jamaica, the contribution from **indirect deaths** to maternal mortality has risen from 17% in 1993–1995 to 31% in 2001–2003 , with sickle cell disease (SCD) a consistent associated condition or underlying cause.

McCaw-Binns A, Alexander SF, Lindo JL, Escoffery C, Spence K, et al. (2007)

Epidemiologic transition in maternal mortality and morbidity: new challenges for Jamaica. Int J Gynaecol Obstet 96: 226–232.A. McCaw-BinnsSF AlexanderJL LindoC. EscofferyK. Spence2007Epidemiologic transition in maternal mortality and morbidity: new challenges for Jamaica.Int J Gynaecol Obstet96226232


120
80
40
0
Total
Direct
Indirect
Comp of Tx
1981-3
1986-7
1993-5
1998-0
2001-3
2004-6

Significance

Asnani MR, McCaw-Binns AM, Reid ME (2011) Excess Risk of Maternal Death from Sickle Cell Disease in Jamaica: 1998–2007. PLoS ONE 6(10): e26281. https://doi.org/10.1371/journal.pone.0026281

- The maternal mortality ratio for SCD decedents was 7–11 times higher than the general population, with 41% of deaths attributable to their disorder.
- Cause specific mortality was higher for cardiovascular complications, gestational hypertension and haemorrhage.
- Respiratory failure was the leading immediate cause of death.

Significance

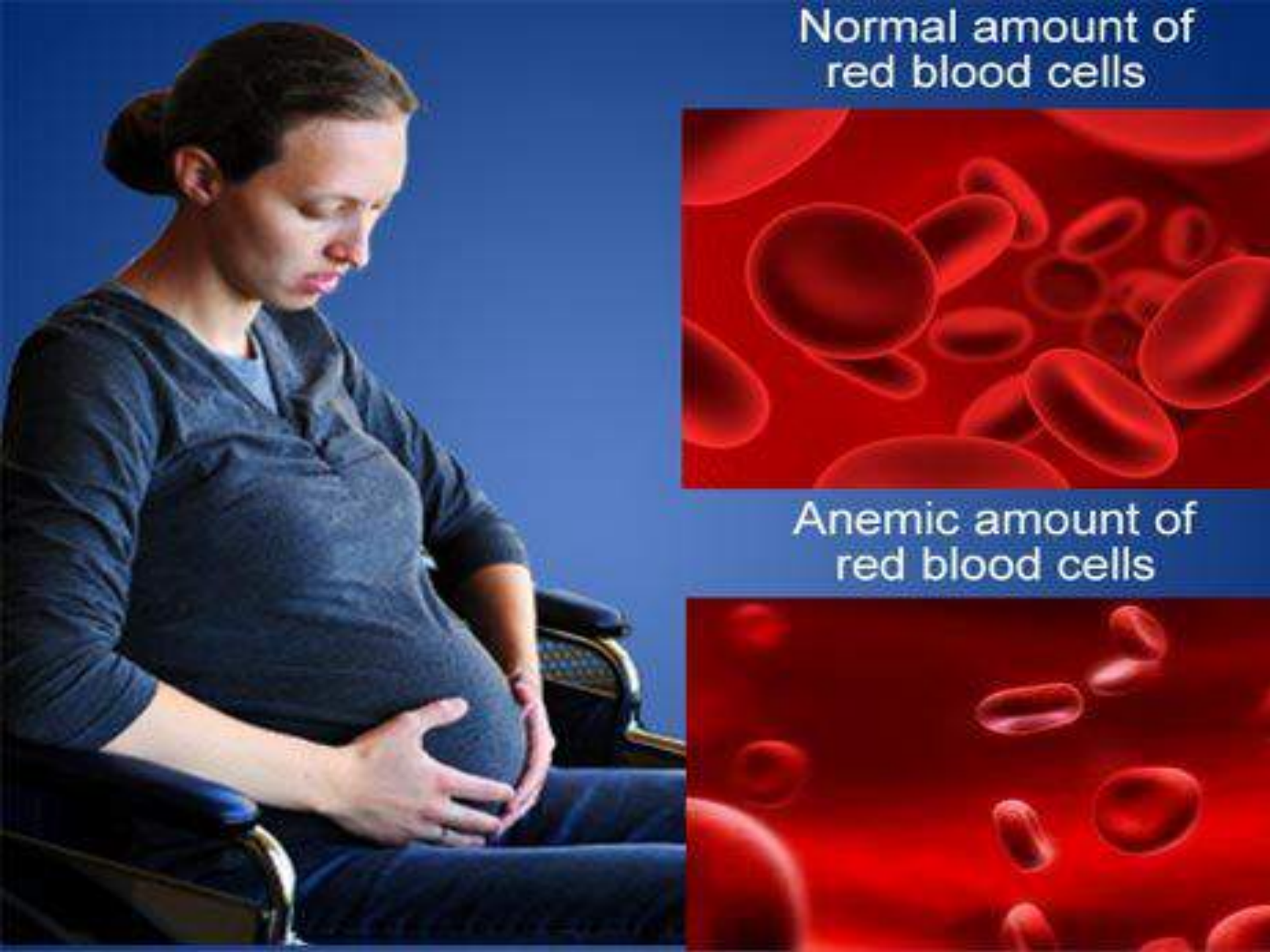
- Morbidity and mortality in SCD have decreased markedly over the past few decades because of improvements in:

- **general medical care for sickle cell patients**
- **transfusion medicine**
- **advancements in neonatal care**

- Pregnancy is still a significant clinical risk for many patients with sickle cell disease

Effects of sickle cell disease on pregnancy

- More Vaso-occulisve crises
- Increased risk of :
  - Miscarriges
  - Preterm deliveries(1-30%)
  - IUGR (1-25%)
  - Stillbirth (1-6%)
  - Opertive deliveries
  - VTE
  - APH


Normal amount of
red blood cells
Anemic amount of
red blood cells

Effects of pregnancy on sickle cell disease

- Cardiac output: well adapted, no alteration
- Ventricular systolic function: no alteration
- Ventricular diastolic function: ventricular filling dysfunction
- Acute pulmonary edema: increased risk during immediate pre and post-partum
- Aggravation of pre-existing anemia - by dilution associated with normal pregnancy:

Objectives for Management

- Pre- conception care
- Antepartum care- Obstetric
  Medical
- Intrapartum care
- Post Partum care

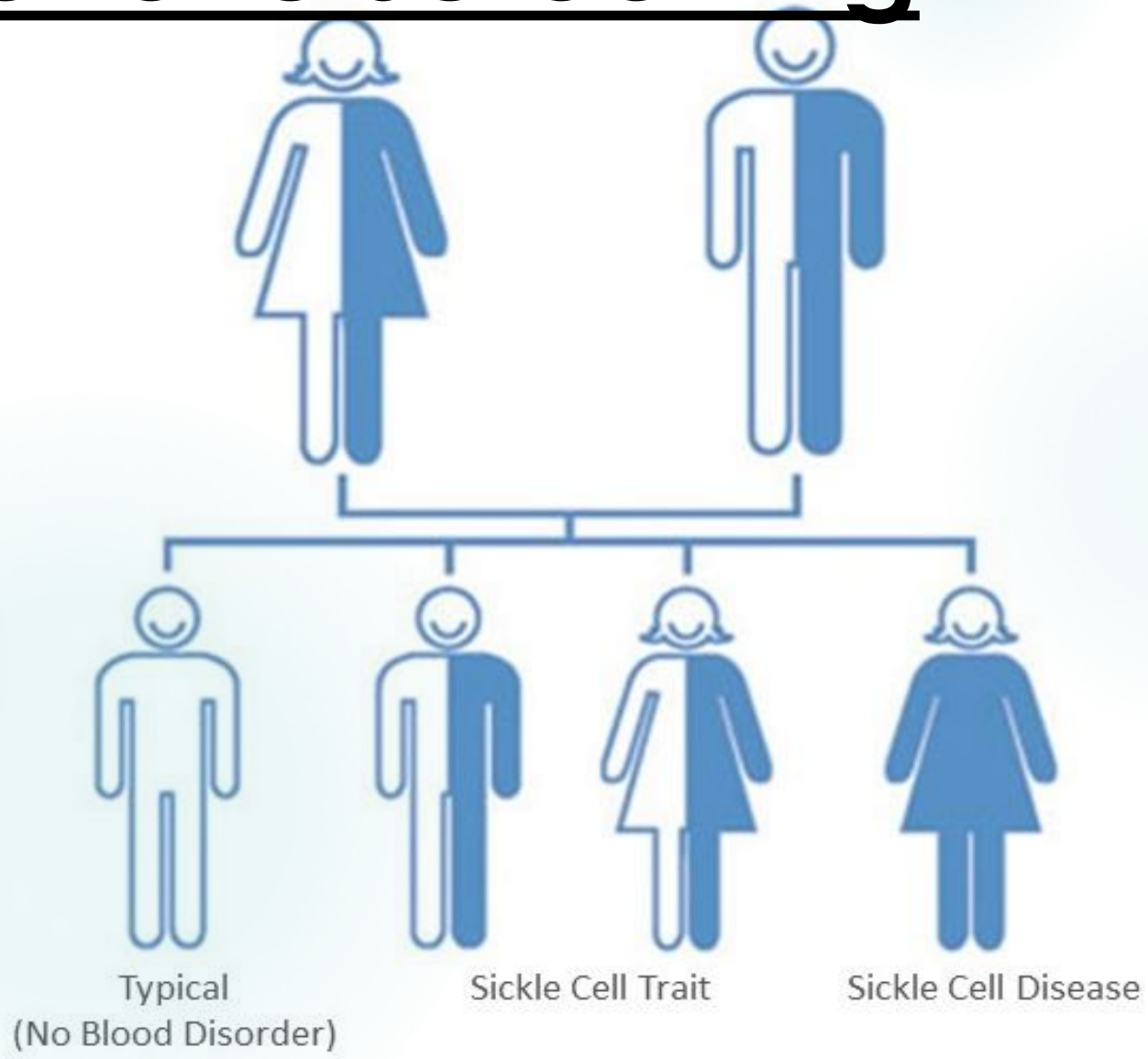
What is the importance of planning pregnancy and how can outcomes for mother and baby be improved?

- From adolescence – Disuss the reproductive desires and the impacts of the disease on pregnancy and pregnancy on the disease.
- Contraception
- Preconceptual screening- end organ damage
- Preconceptual counselling- This consultation should include optimisation of management and screening for end organ damage.

The assessment for chronic disease complications should include:

- Screening for pulmonary hypertension with echocardiography
- Blood pressure and urinalysis should be performed to identify women with hypertension and/or proteinuria
- Retinal screening. Proliferative retinopathy is common in patients with SCD, especially patients with HbSC, and can lead to loss of vision
- Screening for iron overload
- Screening for red cell antibodies.

Genetic screening



What's the Ideal? Genetic Counselling

- Partner testing for haemoglobinopathy
- Use of donor sperm from a male without hemoglobinopathy
- Preimplantation genetic diagnosis
- Prenatal diagnosis (CVS, Amniocentesis,NIPT)
- A gestational carrier
- A gestational surrogate
- Adoption

Preconceptual management

- What medications should be reviewed preconceptually?
- Hydroxyurea should be stopped at least 3 months before conception
- Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers should be stopped before conception.
- Vaccination status
- Partner testing- sickle status

Antenatal Mangament

Antepartum Management

- High risk clinic
- Multidisciplinary approach to management
- Monthly obstetrical consultations- +/- 28- 30 weeks of gestation and then every 15 days
- Early diagnosis of vascular disorders
- Monthly biometric measurements with Doppler's

First Visit

- Confirm diagnosis
- Review partner haemoglobinopathy testing
- Obtain clinical history to establish extent of SCD and its complications/Examination
- Review medication/immunization
- Review of baseline renal/cardiac/liver/retinal assessments
- Baseline BP (and at all visits)
- MSU-C&S (continue same monthly)

Antepartum Management

- Aspirin 100mg/day
- Supplement with folic acid 5mg/day
- Don't give iron except in cases of documented iron deficiency anaemia
- Monthly urine cultures

Scanning during pregnancy?

Ultrasound Schedule

- A viability scan at 7–9 weeks
- 11–14 weeks for Dating an
- Anomaly scan at 20 weeks of gestation
- Growth scans every 4 weeks from 24 weeks of gestation
- Doppler's where indicated

Vaso-Occlusive/Painful Crises

- Most frequent complication (27% and 50%) and most frequent cause of admission
- Avoidance of precipitants
- History and Examination-assess rapidly for medical complications requiring intervention-(ACS, sepsis or dehydration)
- CBC, reticulocyte count ,RFTS ,GXM ± blood cultures, chest X-ray, urine culture and liver function tests

- Hydrate: RL, to be adapted with renal function and blood electrolytes.
- keep warm using warm blankets
- Oxygenate: 4 to 6 liters per min
- Analgesics- Given within 30mins of admission
- VTE prophylaxis
- Bed rest
- In case of failure of the above measures: transfuse slowly 2 units of PRBC

- Monitor oxygen saturations -supplemental O2 if falls below the woman's baseline or 95%. (early recourse to ICU if unsatisfactory)
- Fluid intake of at least 60ml/kg/24 hours should be ensured (orally or IV)
- Therapeutic antibiotics should be prescribed if the woman is febrile or there is a high clinical suspicion of infection
- Thromboprophylaxis -LMWH

Acute Chest Syndrome

- **T**he most common complication, after acute pain-reported in 7–20% of pregnancies.
- Characterised by respiratory symptoms or fever in the presence of a new infiltrate on CXR
- Early recognition of ACS is key!
- TX with antibiotics, oxygen and blood transfusion, as in non-pregnant women.

- Top-up blood transfusion may be required (If Hb falling/<6.5g/dL)
- In severe hypoxia, and if the haemoglobin level is maintained, exchange transfusion will be required
- Investigation to rule out pulmonary embolism may be needed
- Haematology/ ICU team consult

Acute Stroke

- Infarctive and haemorrhagic
- Rule out neurological impairment due to severe pre-eclampsia
- Medical emergency !- rapid-exchange blood transfusion can decrease long-term neurological damage.
- Urgent brain imaging
- Exchange transfusion.
- No role for thrombolysis in acute stroke 2 ° to SCD

Acute Anemia

- Fall below 6g/dL or more than2g/dL below baseline
- May be due to splenic or hepatic sequestration crisis, haemolytic anemia, bleeding
- Top- up transfusion

Blood Transfusion

- Routine prophylactic transfusion is not recommended during pregnancy for women with SCD.
- If acute exchange transfusion is required for the treatment of a sickle complication, it may be appropriate to continue the transfusion regimen for the remainder of the pregnancy.
- Blood should be matched for an extended phenotype including full rhesus typing (C, D and E) as well as Kell typing.

Indications for transfusion of SCD patients in pregnancy

Indication	Comments
Women with previous serious medical, obstetric or fetal complication	**Exchange or top-up transfusion** may be indicated depending on clinical indications and should be decided in the multidisciplinary clinic setting
Women who are on a transfusion regime before prgenancy for primary or secondary stroke prevention or prevention of severe disease complications	Transfusions should be continued in pregnancy
Twin pregnancies	Prophylactic transfusion should be considered owing to the high rate of complications in these women
Acute anaemia	Top-up transfusion
Acute chest syndrome or acute stroke	Exchange transfusion

What is the optimal timing and mode of delivery?

Elective delivery- Induction of labour, or by elective caesarean section if indicated @ 38-39weeks

What is the optimum care and place of birth for a woman with SCD?

- Tertiary Care institution with a HDU/ICU

- The relevant multidisciplinary team (senior midwife in charge, senior obstetrician, anaesthetist and haematologist) should be informed as soon as labour is confirmed.

Intrapartum

- Continuous intrapartum electronic fetal heart rate monitoring is recommended owing to the increased risk of fetal distress which may necessitate operative delivery

- Women should be kept warm and given adequate fluid during labour.

Intrapartum Management

- Epidural analgesia- pain is risk factor for vasoocclusive crisis
- Continuous warming
- Give oxygen 4-6 liters/min
- Hydration
- Care in positioning the patient for SVD

Intrapartum

- Systematic antibiotic prophylaxis (amoxicillin 2g IV)
- Avoid blood loss as much as possible
- active management of the 3rd stage of delivery), rapid repair of episiotomies
- Reserve 2 units of PRBC for possible blood transfusion

Post partum

- Analgesia to be continued
- Antibiotics: 7 to 10 days
- Neonatal screening – cord blood done at birth
- Maintain maternal oxygen saturation above 94% and adequate hydration based on fluid balance until discharge
- Low-molecular-weight heparin should be administered while in hospital and 7 days post-discharge following vaginal delivery or for a period of 6 weeks following caesarean section.

Post partum

- Antithrombotic stockings are recommended in the puerperium
- Breastfeeding should be encouraged

What postpartum contraceptive advice should women be given?

- Progestogen-containing contraceptives
- Injectable contraceptives Depo-Provera®
- Levonorgestrel intrauterine system Mirena®
- Barrier methods are as safe and effective in women with SCD as in the general population

What is the role of sterility??

- Yes!!
- Don't be afraid to discuss tubal ligation even after one pregnancy regardless of a good outcome!

Summary

- SCD is the most common inherited condition in Jamaica and worldwide
- Contributes largely to the indirect causes of maternal mortality
- Understanding of the disease process and it's interaction with pregnancy and various complications is essential in managing these patients
- A multidisciplinary approach must be taken to management of the woman from preconception to post partum

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Thank You