How do we treat ……
Coronary disease in pregnancy

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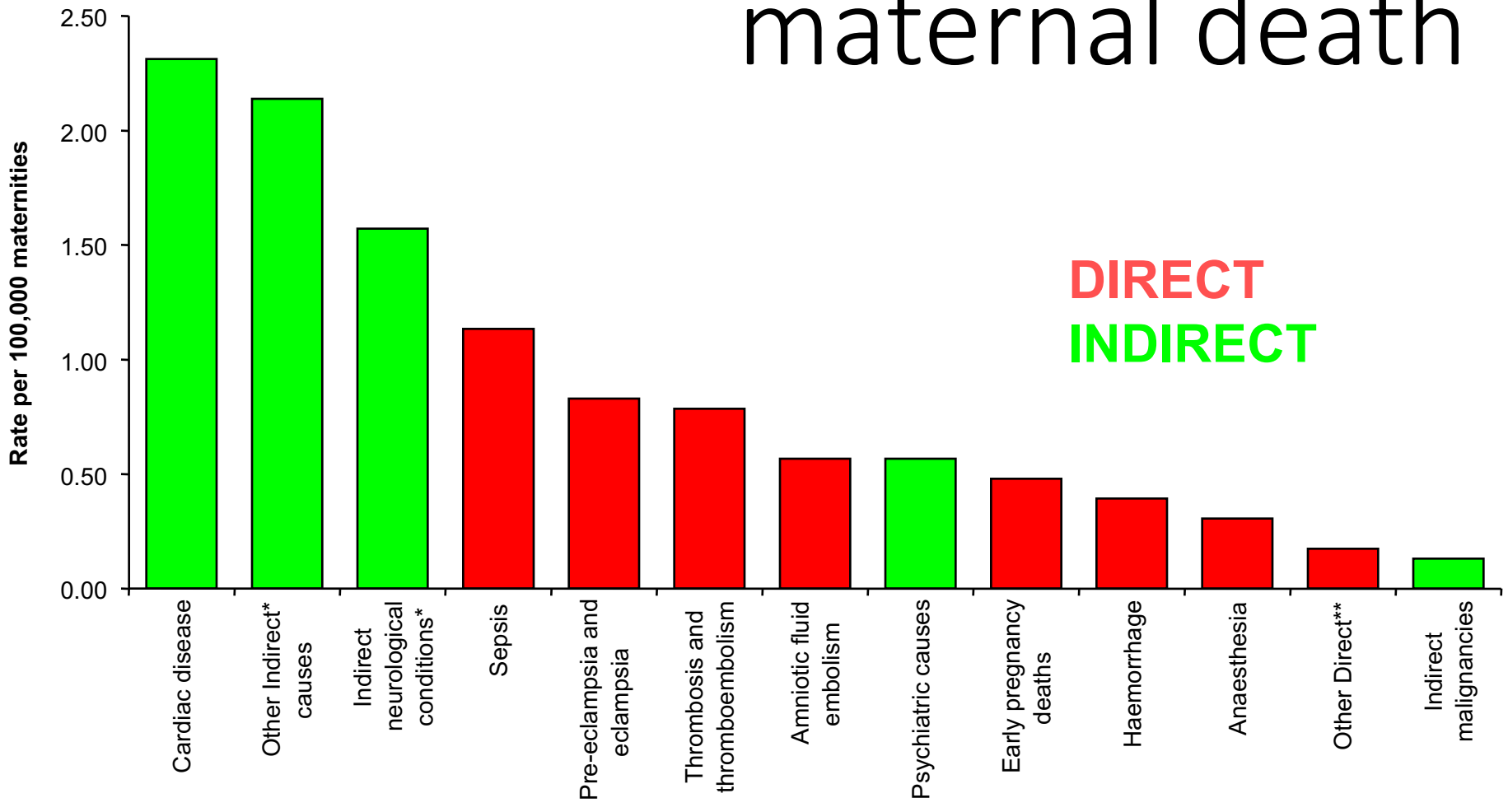
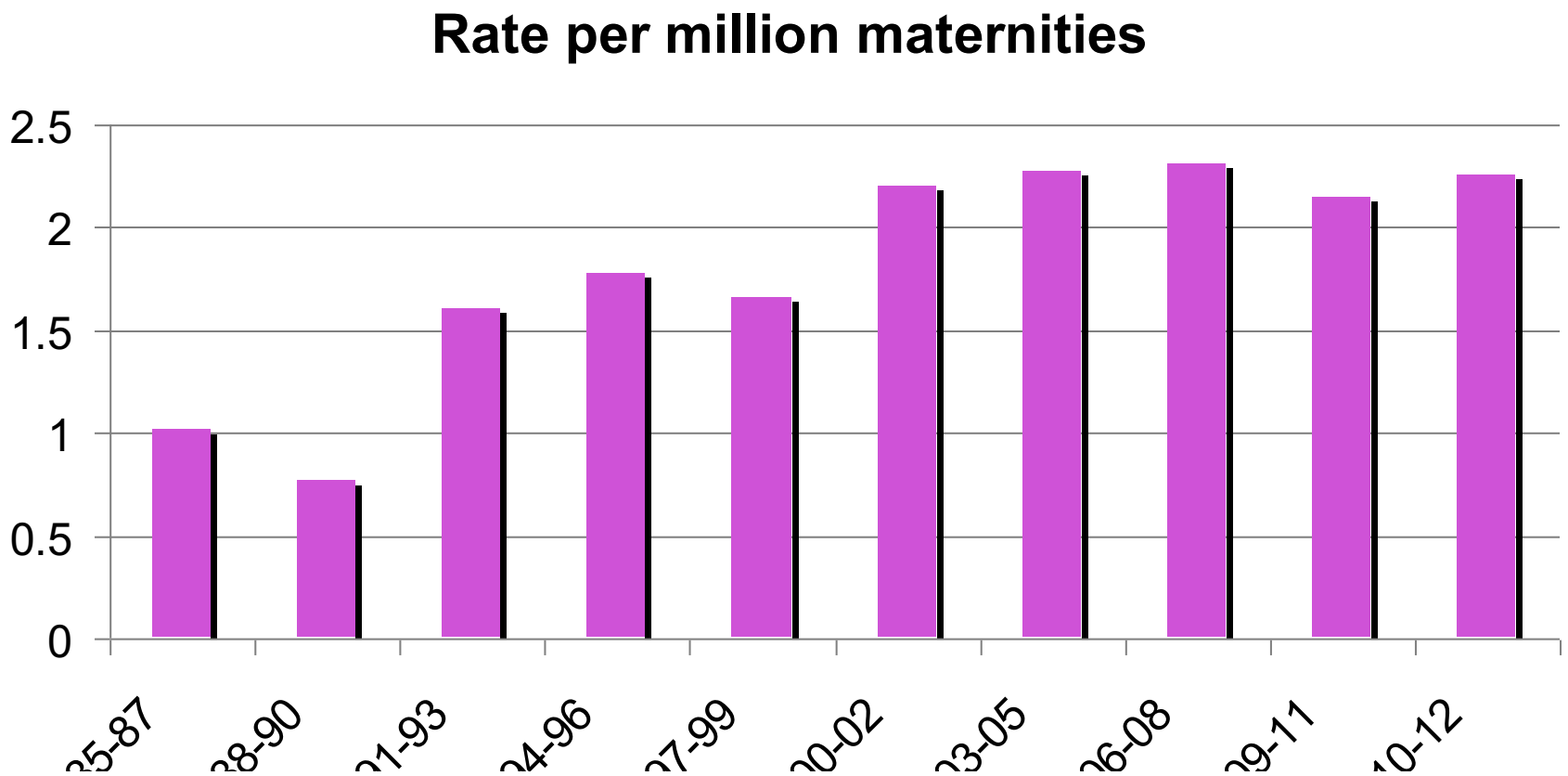
No conflict of interest to declare ….

But content based upon experience, personal and shared, and very little literature or data !

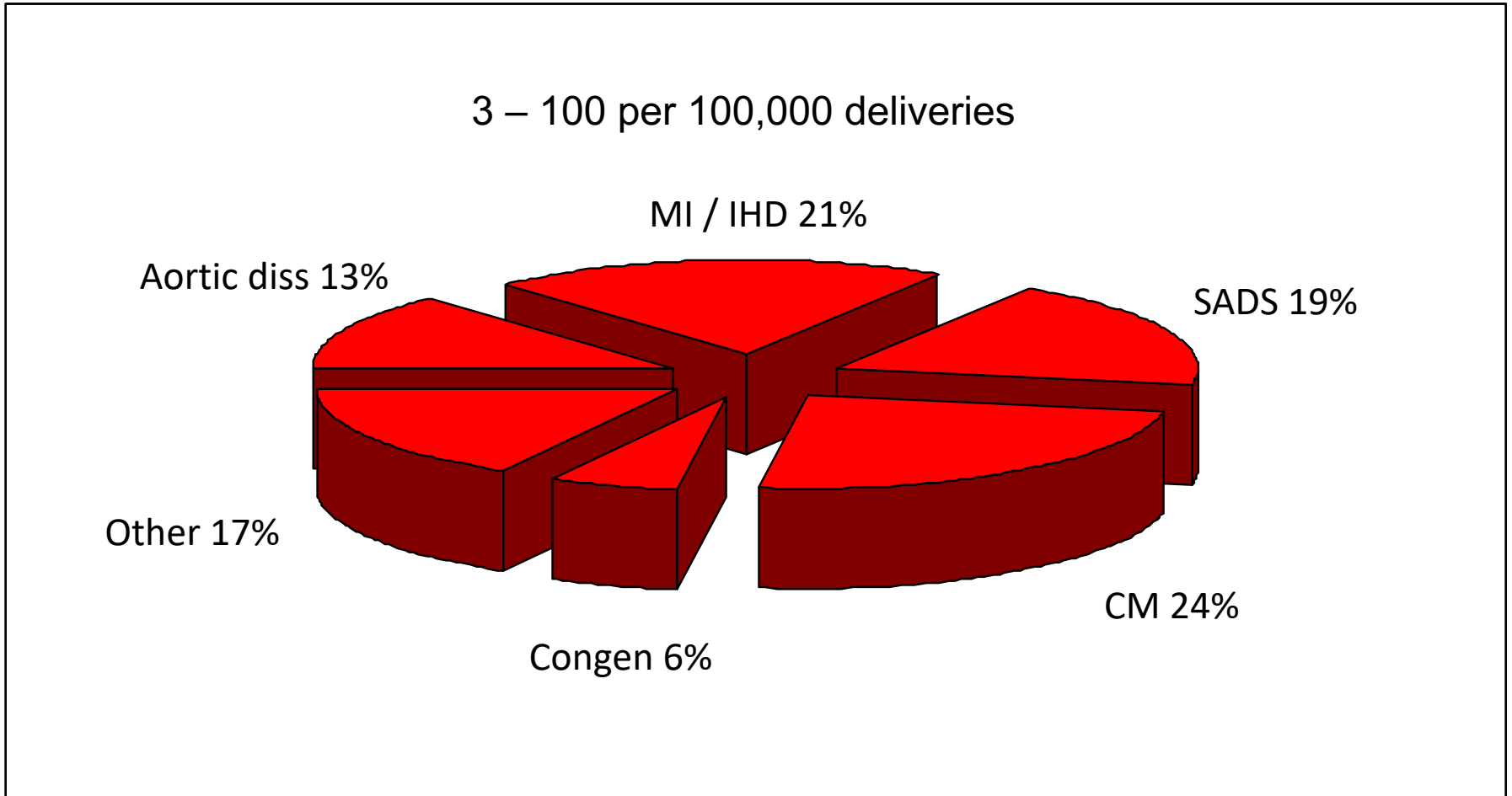
Leading cause of maternal death



Maternal deaths from cardiac disease



Cause of Cardiac Mortality



Clinical presentation

- 36 female diabetic and smoker
- Presented to UHCW ED with chest pains
- ECG confirms Anterolateral STEMI
- But she tells us she is 8/52 weeks pregnant…….

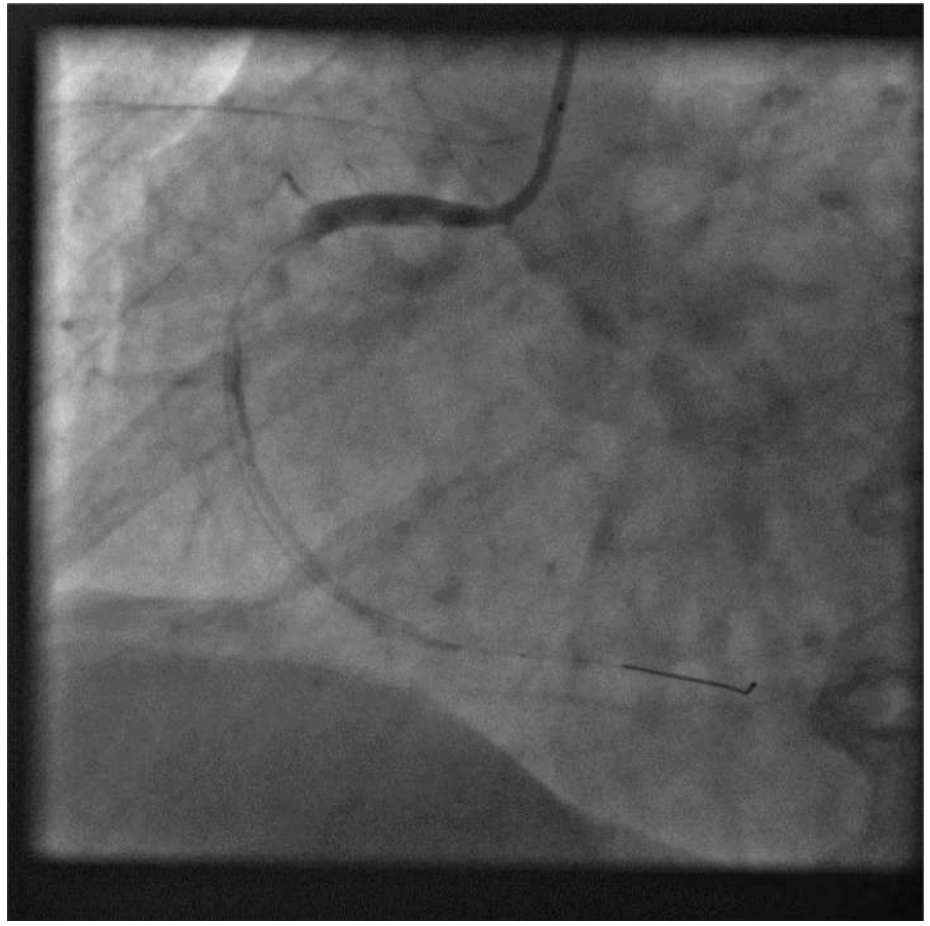

What
Do I Do
Now


KEEP
CALM
AND
RUN
KeepCalmAndPosters.com

- DO WHAT YOU WOULD DO IF SHE WASN'T PREGNANT
- THE MOTHER ALWAYS TAKES PRIORITY
- But there may be ways we can reduce fetal & maternal risk ….

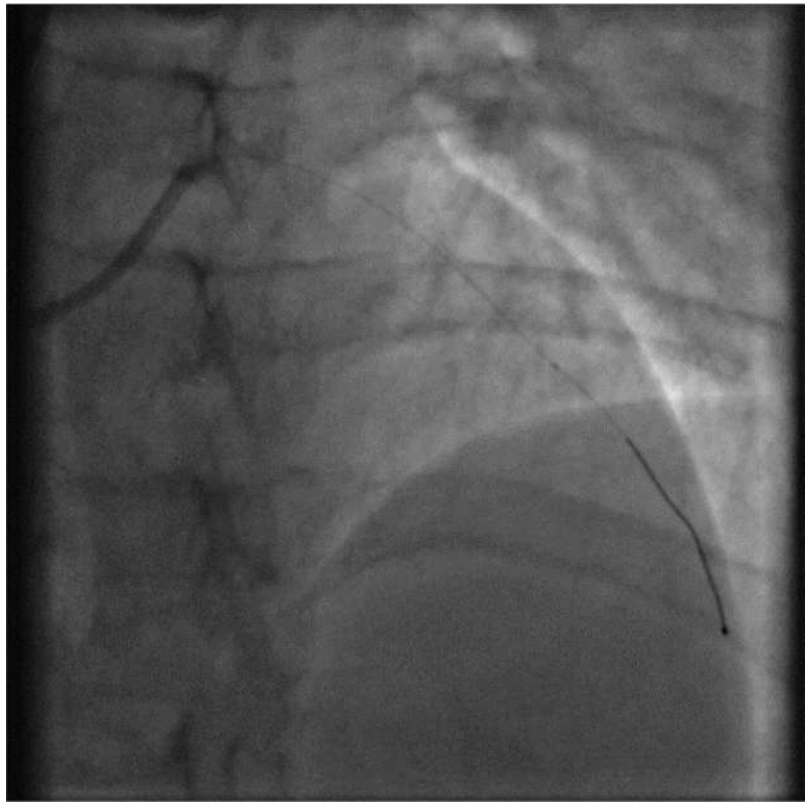
What do we know about ACS in pregnancy ?

Presentation in pregnancy - thrombus



- Pregnancy is a pro-thrombotic state
- Thrombi can occur in any individual especially those with additional risk factors
- Can occur on normal coronary arteries

Presentation in pregnancy - dissection



- Spontaneous dissection is due to sheer forces along vessel walls.

- 20% UKOSS patients whom had angio had dissection

General measures

- Lie mother on left lateral side (use Cardiff wedge if available – pillow in cardiac terms)
  - Increases venous return to heart
- Ensure both mother monitored appropriately ie remove from obstetric unit in most cases
- Insert large cannula & give oxygen

Antiplatelets

Aspirin

- Load as normal 300mg then 75mg / day
- ASA is safe in pregnancy and is used to reduce risk of pre-eclampisa
- Safe to breast feeding on aspirin

Clopidogrel

- Increasing experience with clopidogrel use, appears safe
- Load with 300mg/600mg, maintain with 75mg/day
- FDA data shows no adverse reproductive effects in rats and rabbits upto 78 times normal dose!
- No data on breast feeding but probably safe

Heparin

- UFH and LMWH do not cross the placenta.
- Both have been shown to be safe in pregnancy
- No data for bivalirudin

GIIbIIIa inhibitors

Very limited data

- Case reports of success with little complications

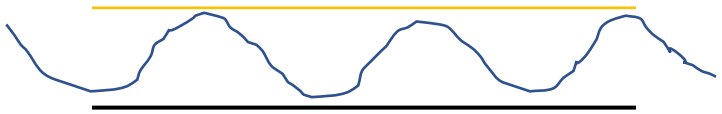
- FDA suggests that tirofiban and eptifibitide (Cat B) are safer than abciximab (Cat C) BUT they recommend C Section to avoid fetal intercranial haemorrhage if given peri-partum

Radiation measures

- PCI uses approx 50 -100 times less radiation than required to significantly harm a fetus
- Reduce flouro frame rate for parts of procedure which don't require high quality imaging eg passing catheters up arm
- Do more "store flouro" and less acquisition
- Collimation ++

Lead aprons

- No real consensus across UK
  - Concern that if abdomen encased in lead, then it can increase the radiation to fetus



  - TLD badges are a bonus, but don't delay procedure

Delivery

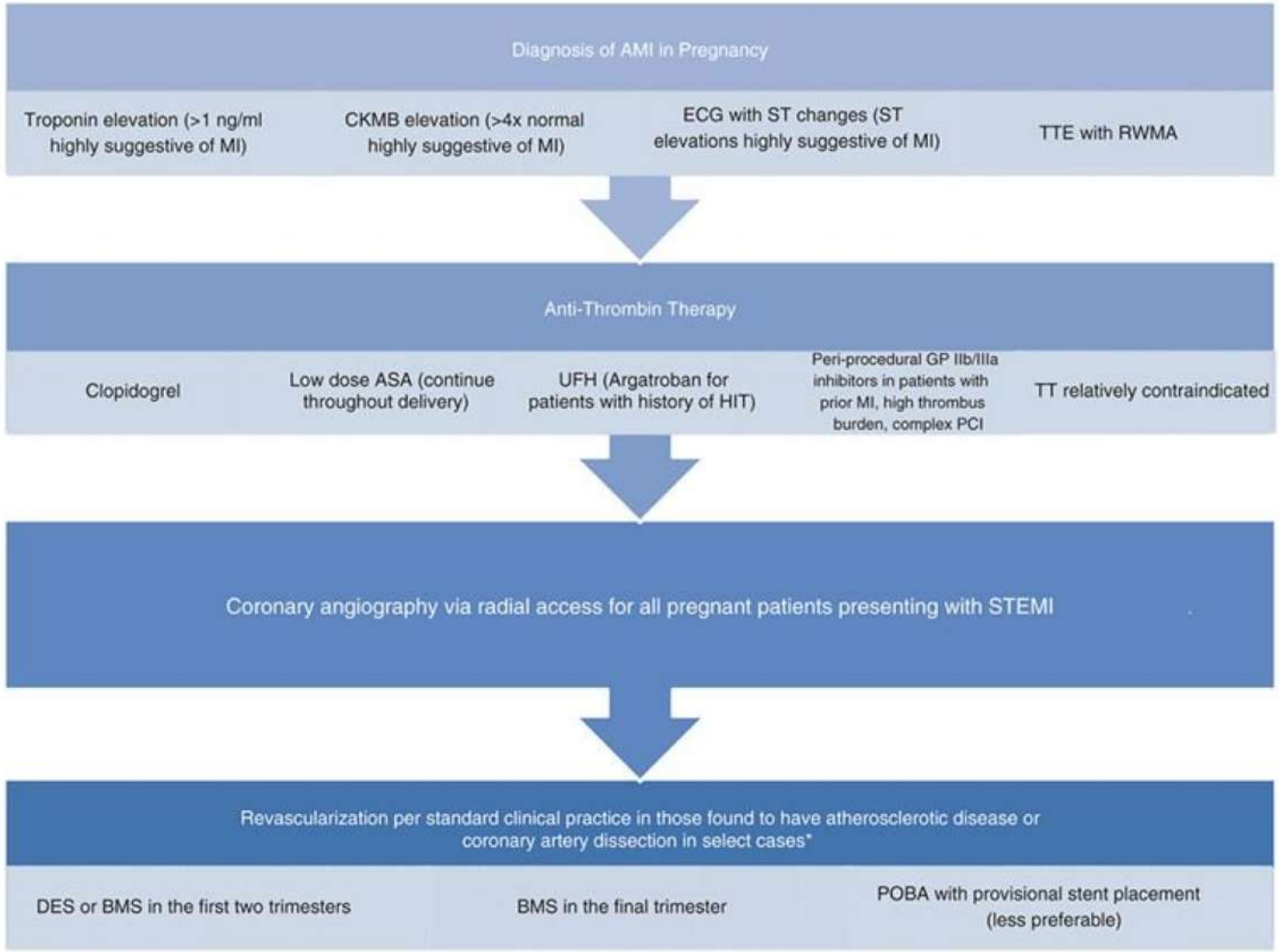
- Vaginal delivery is best for mother and baby !

- DAPT – patients on DAPT cannot have epidural unless stopped for 24 hours therefore need counselling with obstetric anaesthetist re alternative eg PCA, morphine injections, gas and air etc

- Haemodynamic change of delivery can be reduced
  - Epidural if not on DAPT
  - Limiting second stage ie less pushing and obstetrician lifts out the baby
  - Slow syntometrine infusion not bolus to clamp down uterus post delivery
  - Avoidance of certain uterotonics eg ergometrine, misoprostal is best and carboprost if needed.

Which Stent ?

ST-elevation acute myocardial infarction in pregnancy: 2016 update



Clinical Cardiology
Volume 40, Issue 6, pages 399-406, 13 FEB 2017 DOI: 10.1002/clc.22655
http://onlinelibrary.wiley.com/doi/10.1002/clc.22655/full#clc22655-fig-0001

Beta blockers

- Can be used in pregnancy
- Concern re IUGR seems to apply to the use of atenolol when taken in the first trimester (Cochrane review)
- Metoprolol (Cat B) and bisoprolol (Cat C) used regularly by those of us whom are involved with these women.

Drugs (2)

- ACE inhibitors (Cat C first trimester– category D second and third)
  - Not safe in pregnancy
  - Can cause marked fetal renal hypoperfusion, failure and dysgenesis
- Nitrates
  - No concern in pregnancy apart from women are often vasodilated and underfilled so titrate with caution to prevent vast BP drops

- Statins (Category X)
  - Not safe in pregnancy
  - Drugs inhibit synthesis of mevalonic acid, important for DNA replication and used in synthesis of steroids and cell membranes in fetal development

  - Cholesterol increases 40-60% in pregnancy therefore no point in measuring it

Troponin

- Normal in pregnancy therefore be concerned if raised.
- Troponin levels are higher in women with pre-eclampsia compared to normotensive pregnant women, however, they do not reach the threshold for diagnosis of an ACS outside pregnancy

D-Dimer

- Abnormally high in pregnancy therefore unhelpful

Other bloods

- Relative anaemia
  - 10.5 – 13g/dl normal
- Creatinine
  - GFR increases in pregnancy by 50% therefore creat >80 may reflect renal failure in pregnant woman

ESC Guidelines

Recommendations for the management of coronary artery disease

Recommendations	Class[a]	Level[b]
ECG and measurement of troponin levels are recommended when a pregnant woman has chest pain.[225,227]	I	C
Primary coronary angioplasty is recommended as the preferred reperfusion therapy for STEMI during pregnancy.[226]	I	C
An invasive management strategy should be considered for NSTE-ACS with high risk criteria.[226]	IIa	C
Conservative management should be considered for stable NSTE-ACS with low risk criteria.	IIa	C
Follow-up should be considered over at least the next 3 months.	IIa	C
Breastfeeding is not recommended in mothers who take antiplatelet agents other than low-dose aspirin due to a lack of data (see section 12).	III	C

ECG = electrocardiogram; LV = left ventricular; NSTE-ACS = non-ST-elevation acute coronary syndrome; NSTEMI = non-ST-elevation myocardial infarction; STEMI = ST-elevation myocardial infarction.
[a]Class of recommendation.
[b]Level of evidence.

UKOSS

- Only 60% pregnant women with MI had angiography
- Why?
  - Concern re radiation
  - Morbidity and mortality underestimated

True MDT approach to all pregnant women with heart condition

- Experienced Cardiologist +/- with interest in heart disease in pregnancy
- Cath lab team
- Obstetrician
- Obstetric anaesthetist
- Midwife

Summary

- Acute MI in pregnancy accounts for ~20% of maternal mortality in the UK, and appears to be on the increase over the last few CEMACH reports.
- Aetiology of ACS can include coronary dissection, thrombus as well as ruptured plaque.
- It is a high risk condition for both mother and fetus.
- Mortality however is improving which may reflect an increase towards intervention.

Any questions ?

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CENTRAL ILLUSTRATION: Features of Pregnancy-Associated Spontaneous Coronary Artery Dissection

Spontaneous Coronary Artery Dissection (SCAD)

A coronary artery **hematoma ± tear** limits coronary blood flow to the myocardium

Hematoma

Tear in arterial wall

Pregnancy-associated SCAD (P-SCAD)

- **Frequently occurs in first month postpartum** (majority of these within first week after delivery)
- **P-SCAD presentation often severe:**
  - ST-segment elevation myocardial infarction
  - Reduced left ventricular function
  - Left main and/or multivessel SCAD
- **Compared to non-pregnancy-associated SCAD:**
  - P-SCAD has a higher risk presentation
  - P-SCAD patients are older at time of first childbirth and more frequently have history of multiple pregnancies
  - P-SCAD patients have fewer extracoronary vascular abnormalities

Recommended areas of P-SCAD research:

- Hemodynamic stressors
- Hormonal fluctuations
- Oxytocin release in breastfeeding mothers
- Older, multiparous mothers
- Relationship to:
  - Eclampsia/ pre-eclampsia
  - Peripartum cardiomyopathy
  - Fibromuscular dysplasia and other extracoronary vascular abnormalities

Tweet, M.S. et al. J Am Coll Cardiol. 2017;70(4):426–35.