IMOET National Meeting
Tuesday 30th September 2014
Dublin Castle

Standardisation of multidisciplinary obstetric emergency training nationally.

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

IMOET
Irish Multidisciplinary
Obstetric Emergency Training

Eclampsia

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IMOET
Irish Multidisciplinary
Obstetric Emergency Training

Outline

- Purpose and scope
- Definition
- Incidence
- Current guidelines- national and international
- Management
- Quality standards

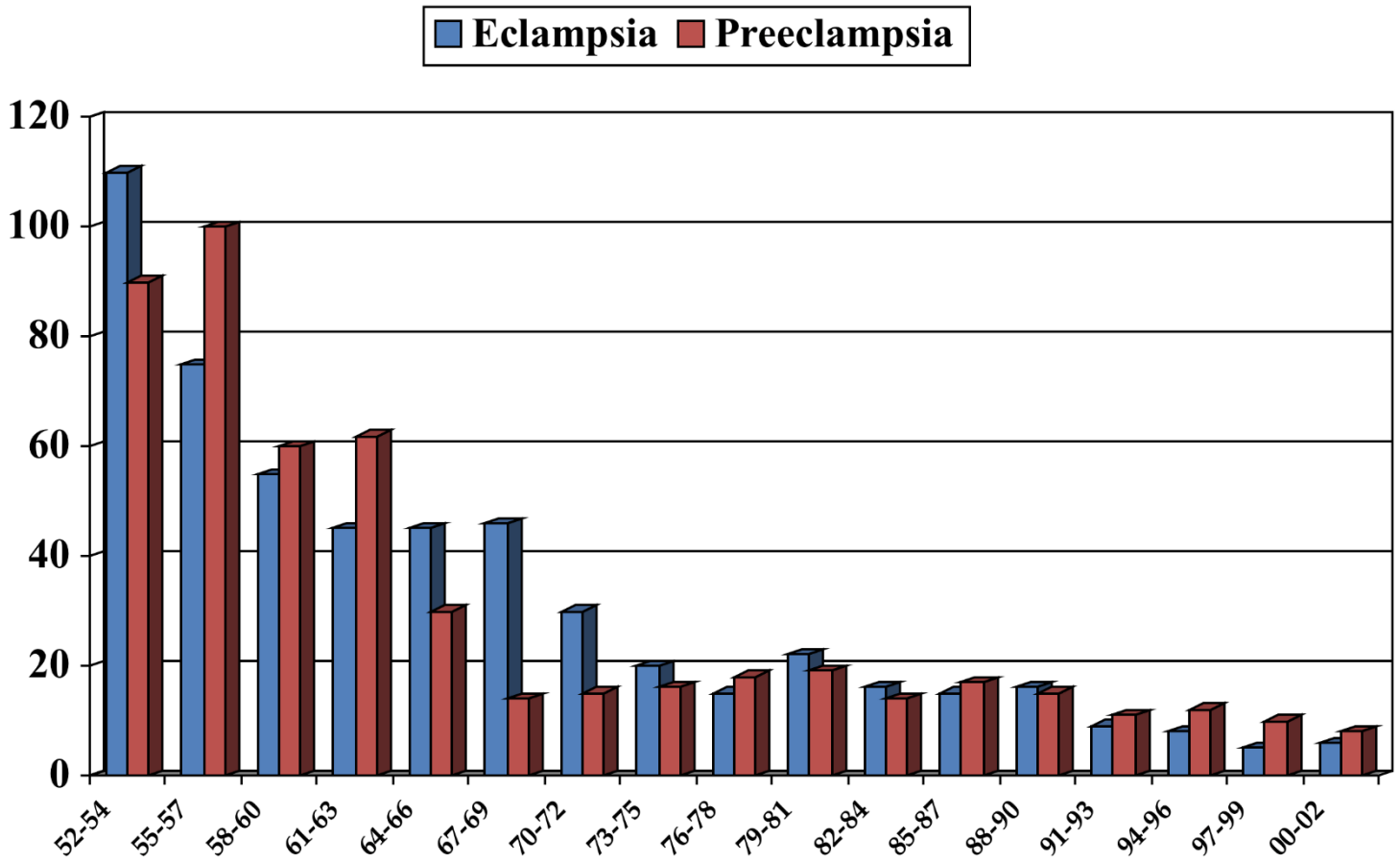
Purpose and scope

- Appreciation of the morbidity and mortality associated with eclampsia
- Appreciation of complexity
- Review of international best practice and our national guideline
- What next?

Definition

- Eclampsia is defined as seizure activity unrelated to other cerebral conditions in a pregnant woman with pre-eclampsia.
- Greek εκ/ec(=forth)+λάμπω/lampo(=to shine)
- Literally meaning: shine forth
- Coined: In 1619 in treatise on gynaecology of Varandaeus who based upon the flashing lights or spots before the eyes of pregnant women with pre-eclampsia

Incidence


Eclampsia
Preeclampsia
120
100
80
60
40
20
0
52-54
55-57
58-60
61-63
64-66
67-69
70-72
73-75
76-78
79-81
82-84
85-87
88-90
91-93
94-96
97-99
00-02

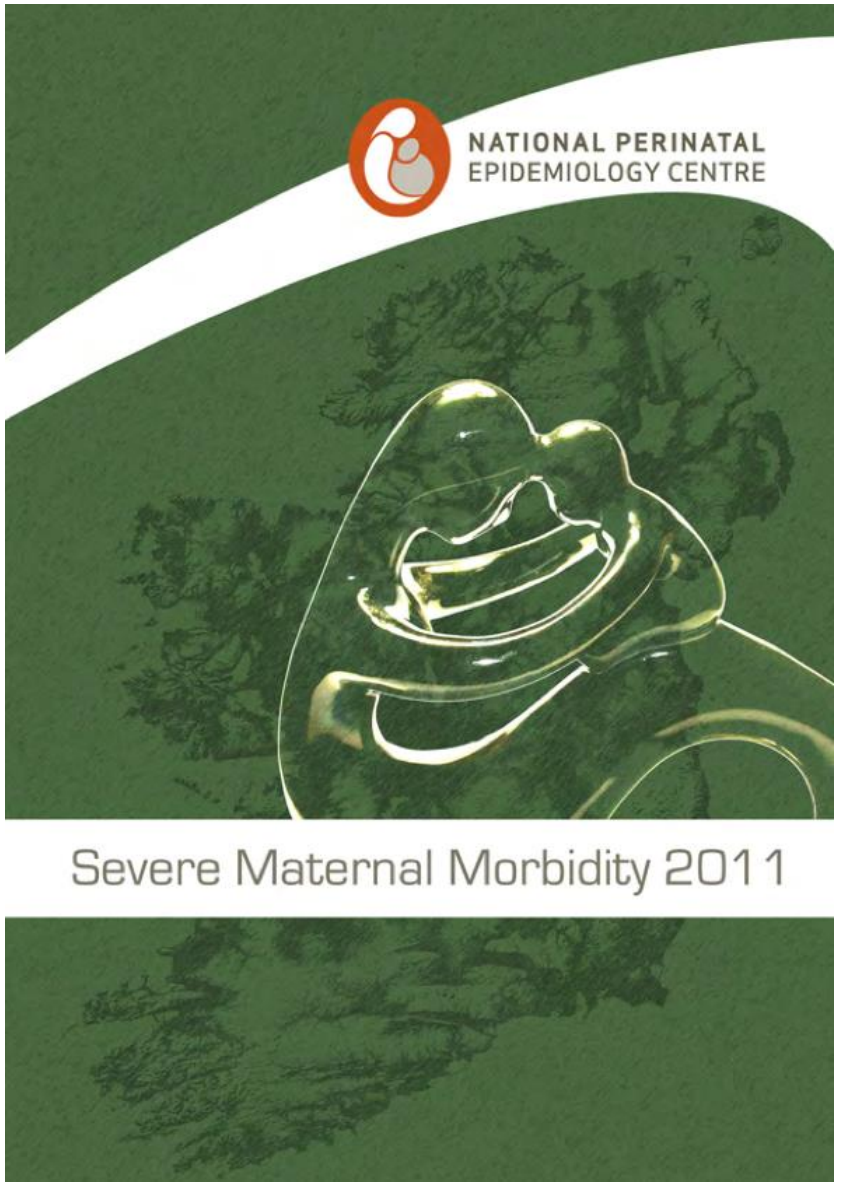
Incidence

- 287 000 maternal deaths occurred in 2010[1]
- Hypertensive disorders of pregnancy account for nearly 18% of all maternal deaths world-wide, with an estimated 62 000–77 000 deaths per year[2]
- **Eclampsia** complicates 0.28% of pregnancies in low resource settings[3] cf 2.7 cases per 10,000 maternities in the UK[4] (Incidence in 1992 4.9 per 10,000 95% CI 4.5-5.4)[5]

1. World Health Organization, UNICEF, UNFPA and the World Bank. Trends in Maternal Mortality: 1990 to 2010. Geneva: World Health Organization, 2012
2. Khan KS, Wojdyla D, Say L, Gulmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. Lancet 2006;367:1066–74.
3. WHO Multicountry Survey on Maternal and Newborn Health Research Network. Pre-eclampsia, eclampsia and adverse maternal and perinatal outcomes: a secondary analysis of the World Health Organization Multicountry Survey on Maternal and Newborn Health. BJOG 2014; 121(Suppl. 1): 14–24.
4. Knight, M. (2007), Eclampsia in the United Kingdom 2005. BJOG: An International Journal of Obstetrics & Gynaecology, 114: 1072–1078
5. Douglas and Redman 1994 BMJ 309:1395-1400

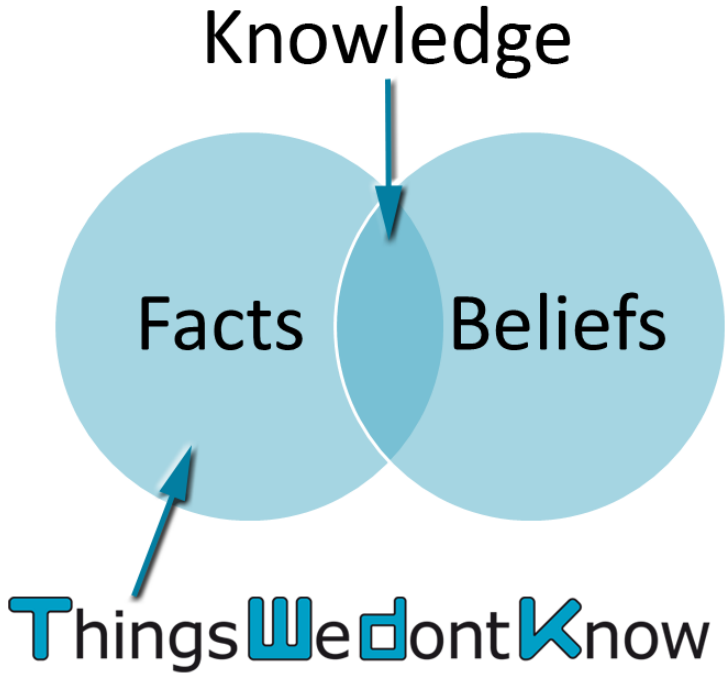
Incidence

- 0.2 per 1000 maternities in Ireland (12 cases within the report)
- Compares favorably with 2005 figures from UK of 0.27 per 1000 maternities



Pathophysiology

- cerebral vasoconstriction or vasospasm
- hypertensive encephalopathy
- cerebral oedema or infarction
- cerebral haemorrhage
- metabolic encephalopathy



Early detection: presentation

Symptom	Study		
	Douglas and Redman[3] (N = 325)	Katz et al[7] (N = 53)	Chames et al[8] (N = 89)
Headache	50	64	70
Visual changes	19	32	30
RUQ/epigastric pain	19	Not reported	12
At least one of the above	59	Not reported	75

RUQ, right upper quadrant.
Data are presented as percentage.

Early detection: presentation

Most common prodromal neurological symptoms (regardless of the degree of hypertension OR whether the seizure occurred antepartum or postpartum):

- Headaches (80%)
- Visual disturbance (45%)
- 20% of women with eclampsia reported no neurologic symptoms before the seizure

Cooray SD, Edmonds SM, Tong S, et al. Characterization of Symptoms Immediately Preceding Eclampsia. Obstetrics & Gynecology, Vol 118(5):1000-1004, November 2011.

Early detection: timing

	Study			
	Douglas and Redman[3] (N = 383)	Katz et al[7] (N = 53)	Mattar and Sibai[6] (N = 399)	Chames et al[8] (N = 89)
Antepartum	38	53	53	67*
Intrapartum	18	36	19	. . .
Postpartum	44	11	28	33
≤ 48 h	39	5	11	7
> 48 h	5	6	17	26

Data are presented as percentage.

* Includes antepartum and intrapartum cases.

Mortality

- Maternal mortality from eclampsia ranges from approximately 1% in the developed world, to as high as 15% in the developing world
- BUT….mortality is the tip of the iceberg
  - The UK eclampsia population based study (Knight 2005) revealed that the perinatal mortality rate for babies still in utero at the onset of convulsions was nearly 6%
  - The long term maternal consequences of pre-eclampsia and eclampsia in particular are not well quantified

Standards of care: CMACE 2011

- Remains 2nd most common cause of Direct Death – rate unchanged over last 2 reports
- 22 deaths (including 3 from AFLP)
- 9 due to intracranial haemorrhage directly related to uncontrolled blood pressure
- 5 after eclamptic fit
- 3 from cardiac arrest post fit and 2 unknown cause

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Standards of care: CMACE 2011

- 20 of the 22 cases demonstrated substandard care
- In 14 cases this was classed as ‘major’
- *“There were, undoubtedly, avoidable deaths”*

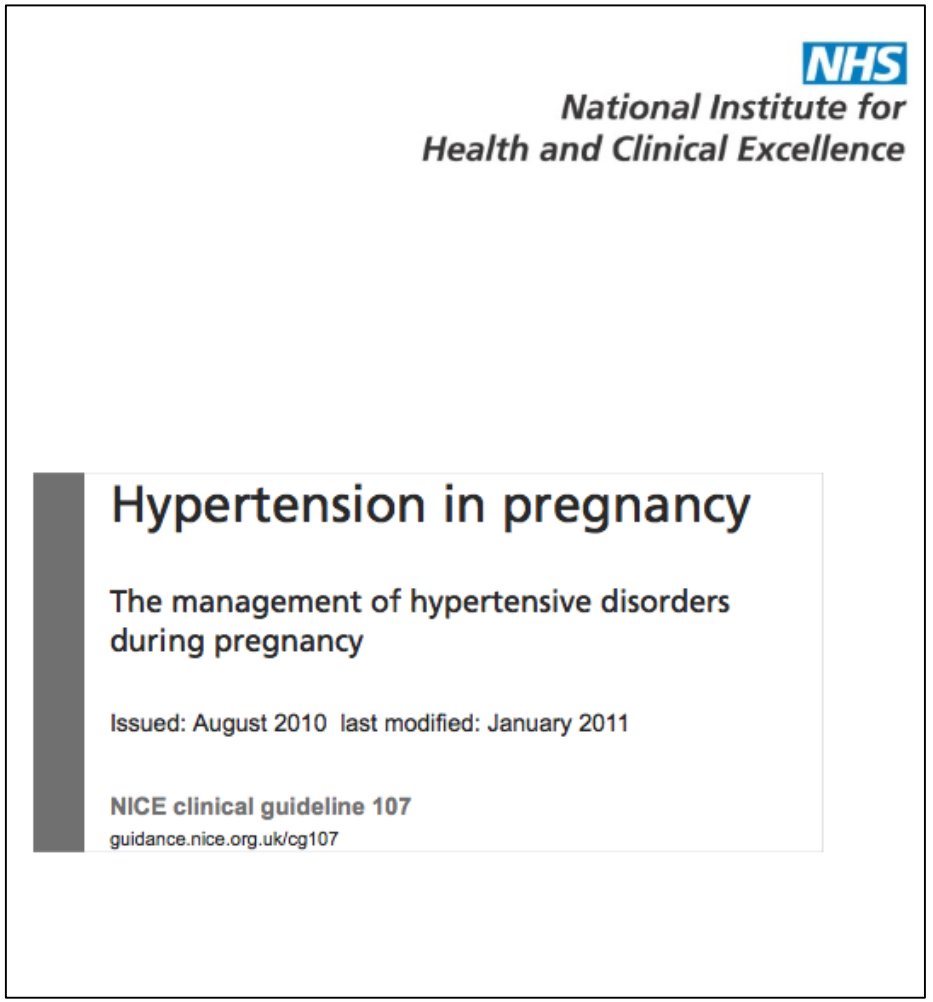
Standards of care: World Health Organization Multicountry Survey on Maternal and Newborn Health

- Maternal near-miss cases were:
  - eight times more frequent in women with pre-eclampsia
  - increased to up to 60 times in women with eclampsia, when compared with women without these conditions

Management

Clinical practice guidelines

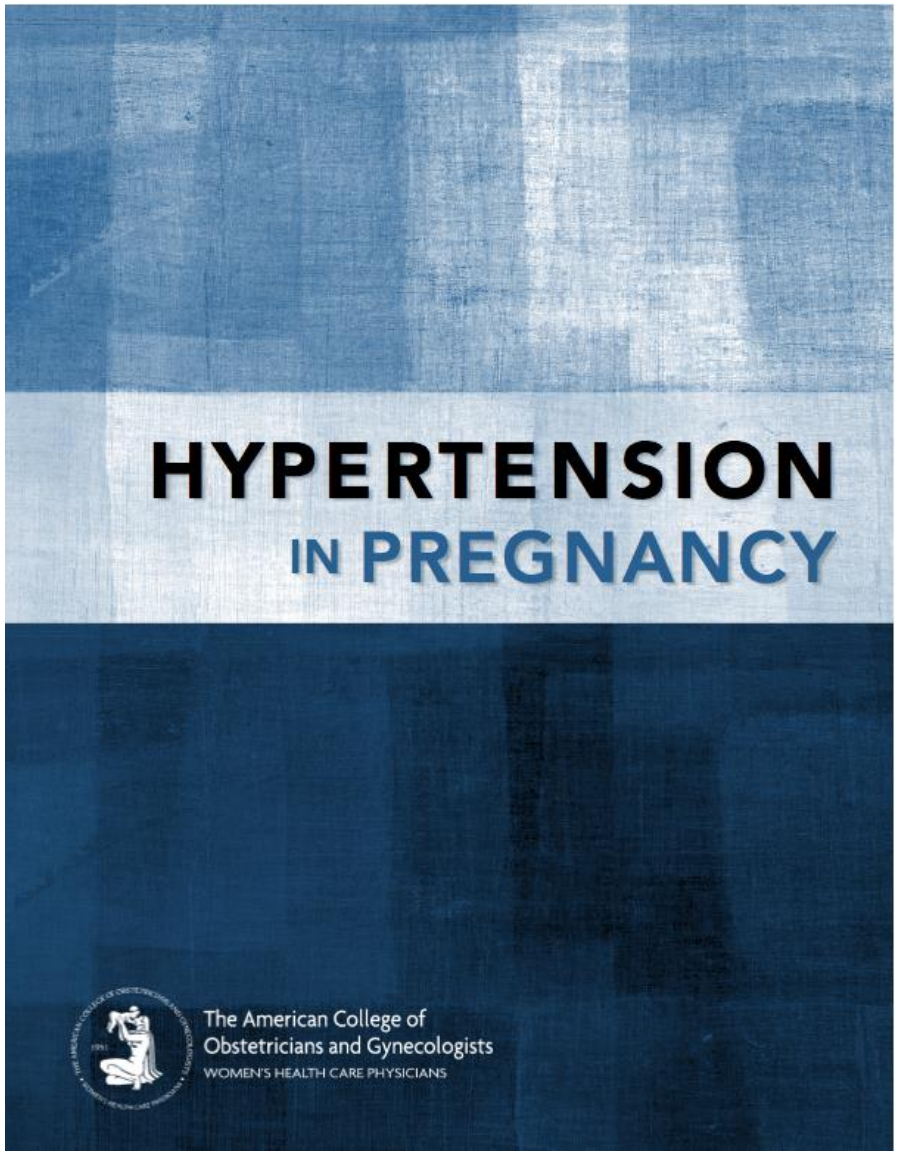
- National Institute for Health and Clinical Excellence (NICE, UK), “Hypertension in Pregnancy”
- Revised January 2011



Clinical practice guidelines

- The American College of Obstetricians and Gynecologists "Hypertension in Pregnancy"

- Published 2013



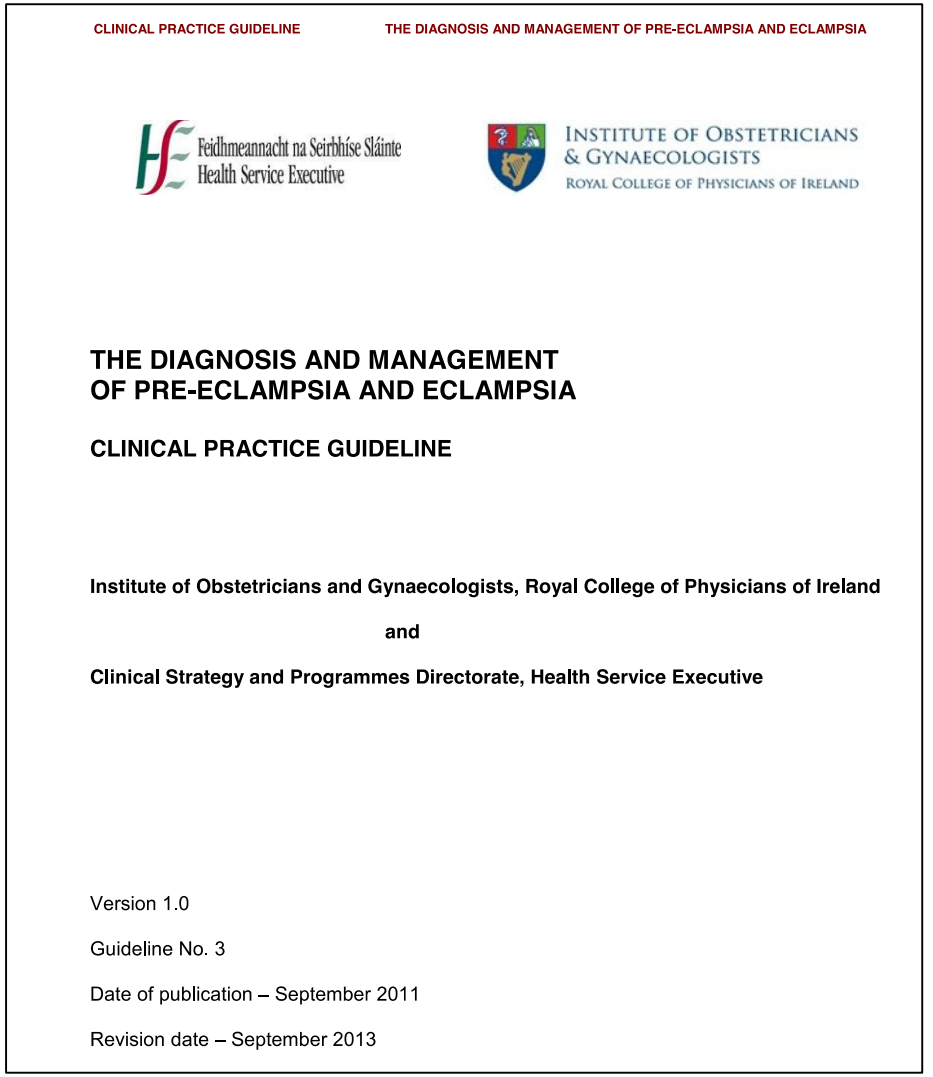
Clinical practice guidelines

- Hypertension Guideline Committee of the Society of Obstetricians and Gynaecologists of Canada “Diagnosis, Evaluation and Management of Hypertensive Disorders of Pregnancy”
- Published 2008

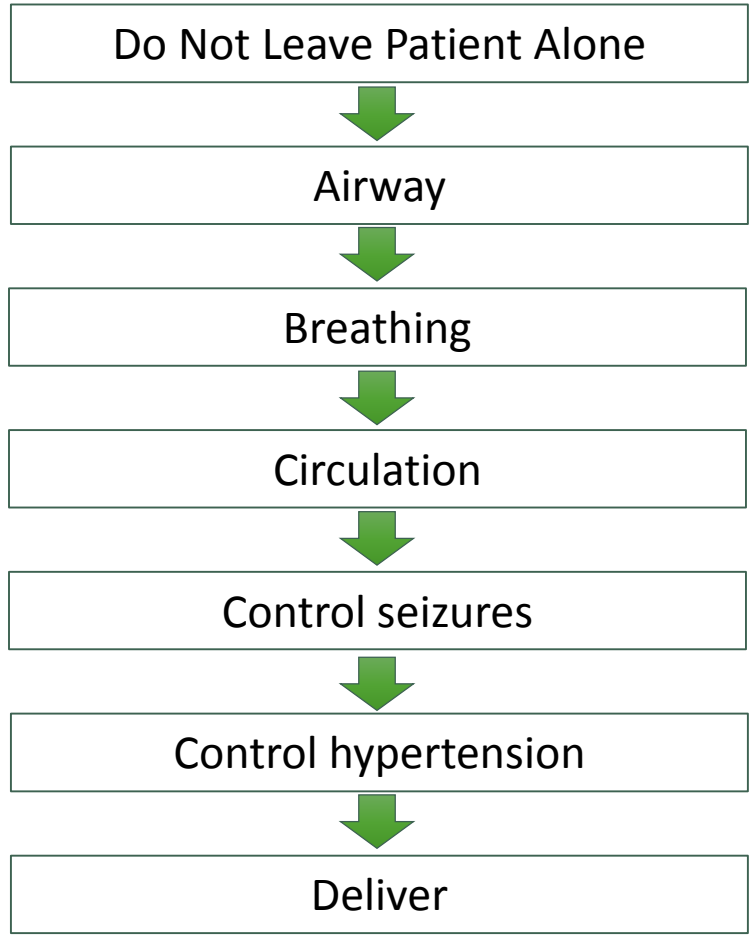
Clinical practice guidelines

- HSE & Institute of Obstetricians and Gynaecologist's Guideline on "The Diagnosis and Management of Pre-eclampsia and Eclampsia"

- Published September 2011

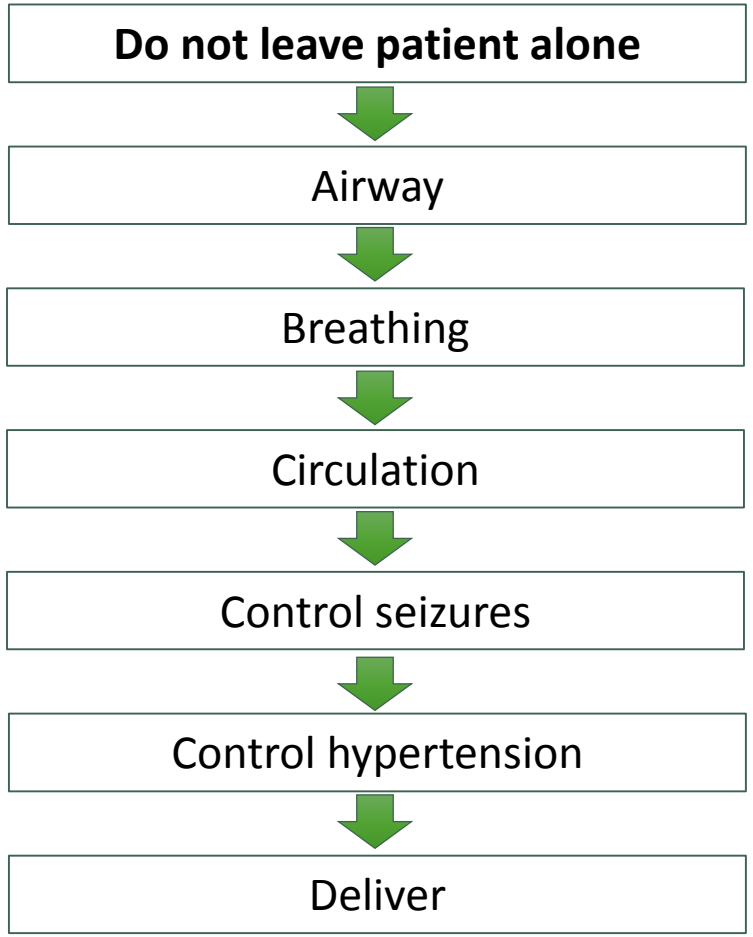


Management: basic algorithm



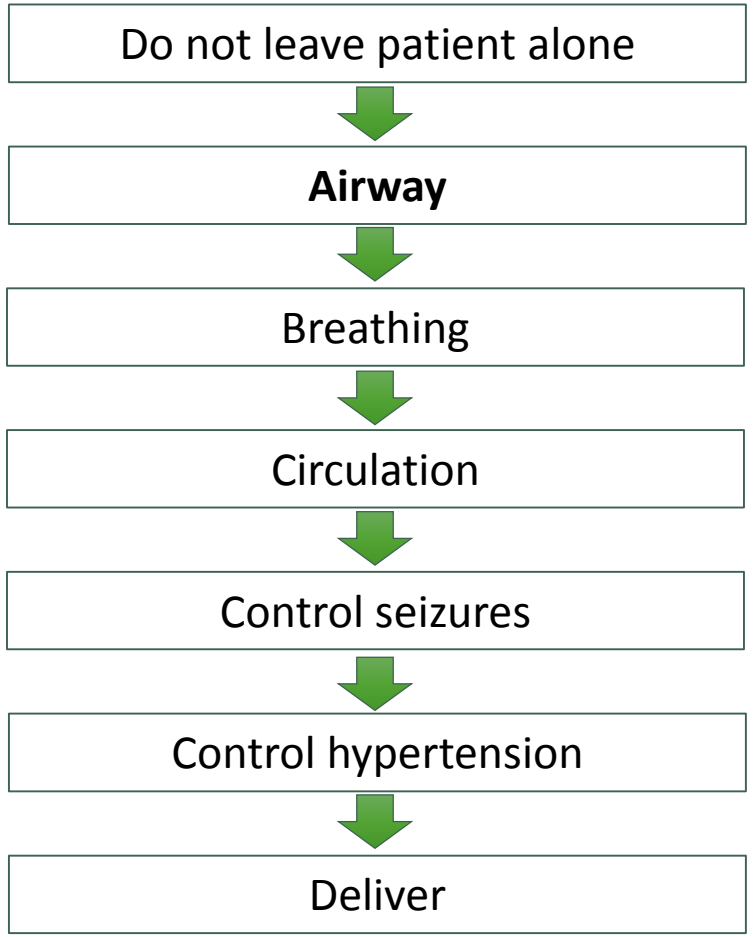
Do not leave the patient alone

- Place in semi-prone position
- Call for HELP – duty obstetric and anaesthetic SpRs; senior midwife
- Inform consultants – obstetrician and anaesthetist



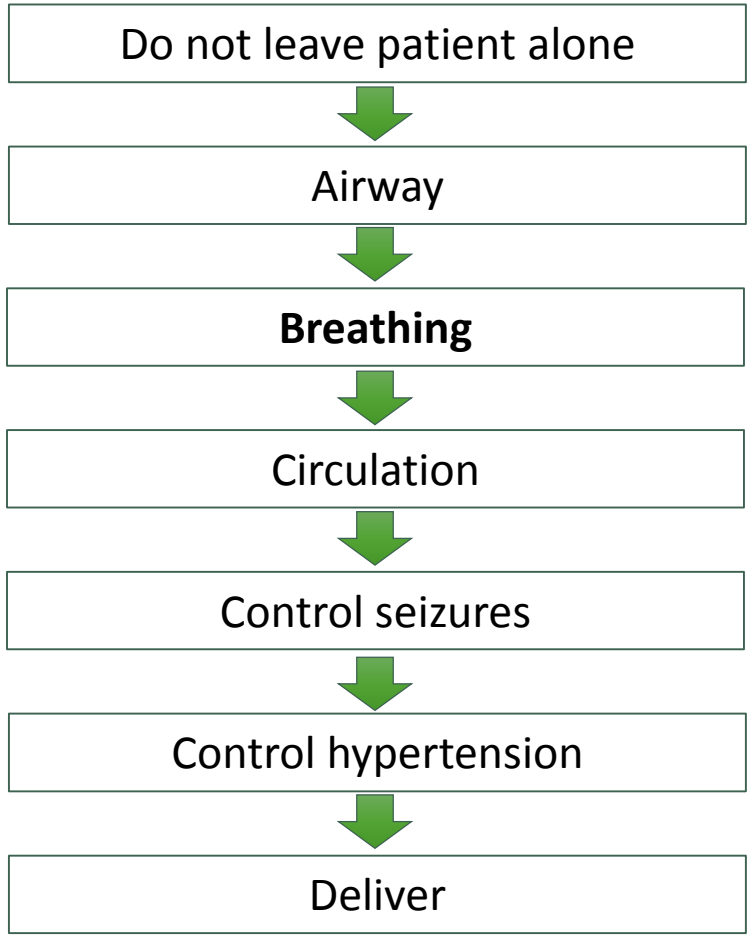
Airway

- Assess
- Maintain patency
- Apply oxygen



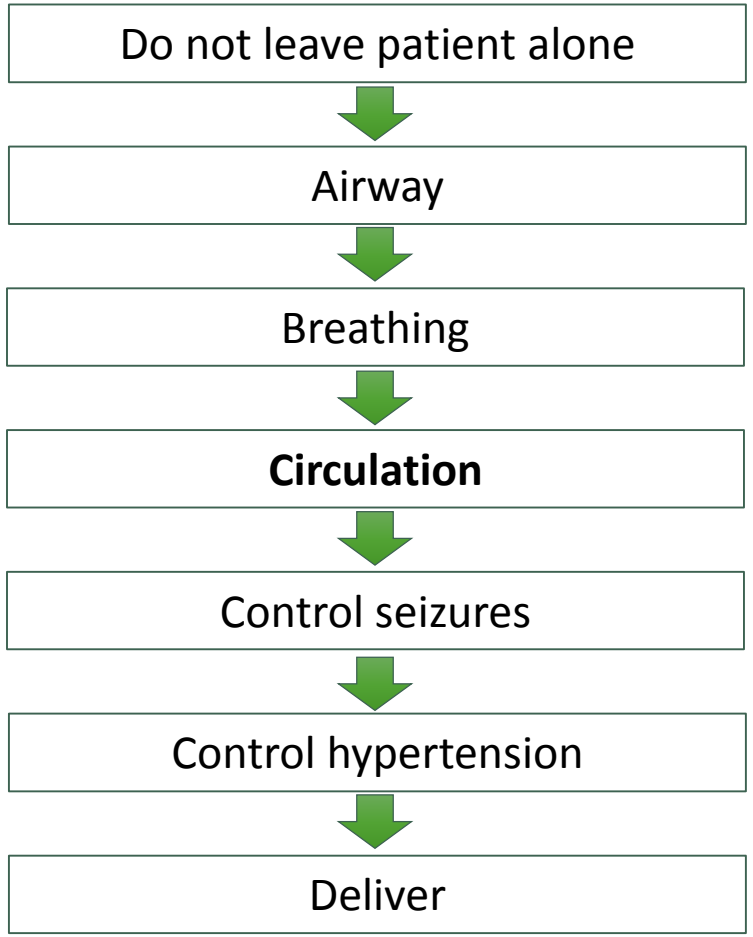
Breathing

- Assess
- Protect airway
- Ventilate as required



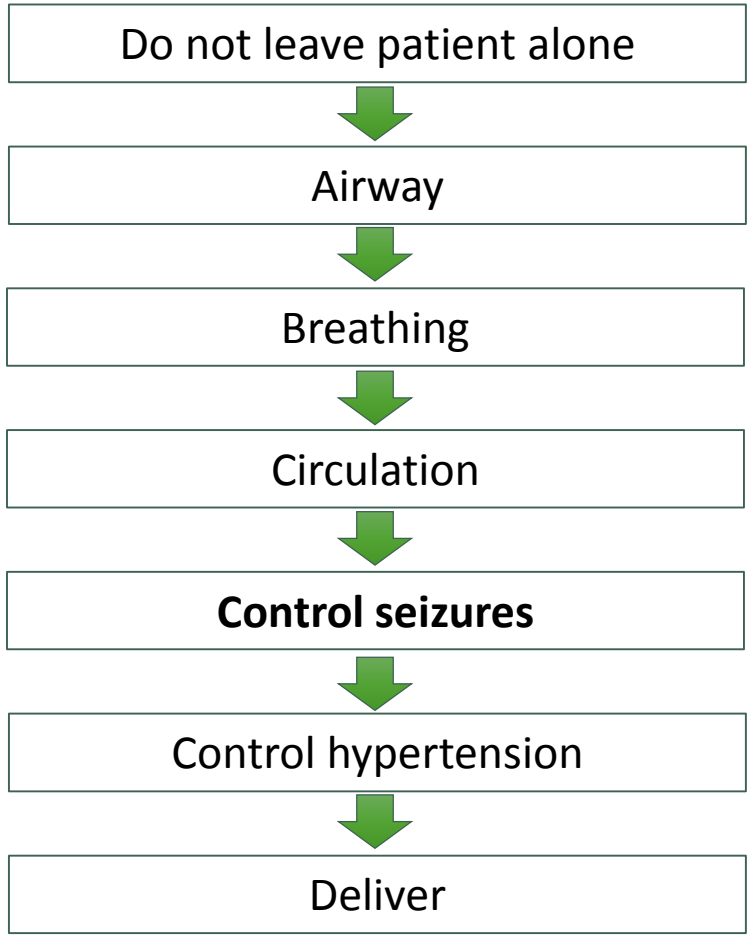
Circulation

- Evaluate pulse and BP
- If absent, initiate CPR and call the arrest team
- Secure IV access as soon as safely possible



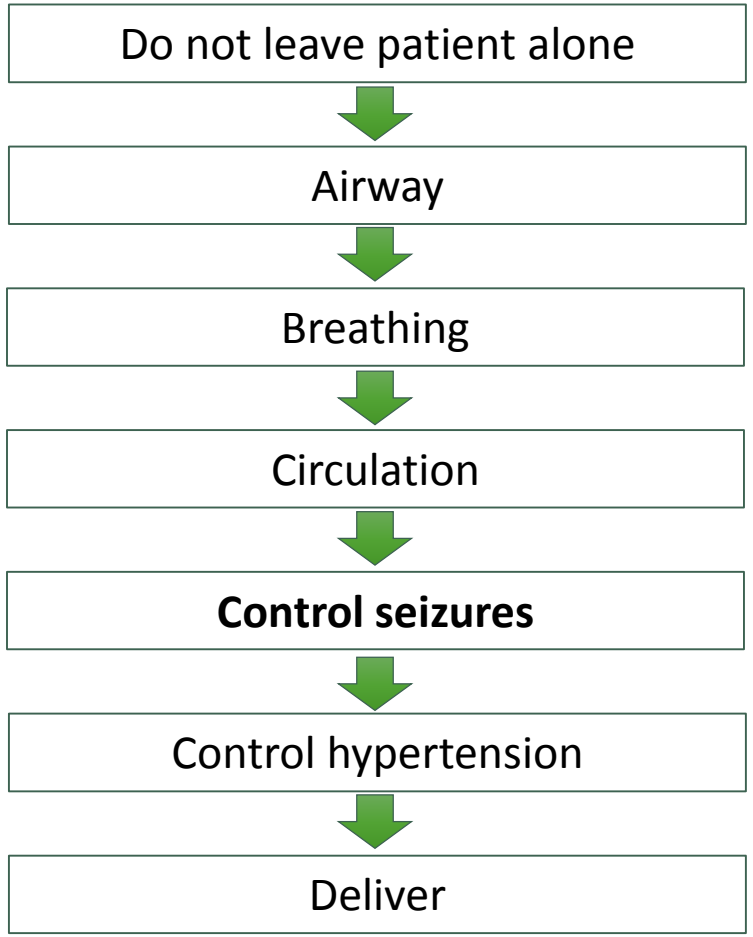
Control seizures

- To avoid drug prescription and administration errors, magnesium sulphate should be administered in pre-mixed solutions.
- Loading dose: Magnesium sulphate 4g in 50ml intravenously over 10 minutes
- Maintenance dose: Magnesium sulphate 20g in 500ml via a volumetric pump at 25ml/hour (i.e. 1g/hour of magnesium sulphate)



Magnesium sulphate: monitoring

- Formal clinical review should occur at least every 4 hours.
- Hourly IMEWS (Irish Maternity Early Warning System) should be recorded with the following additional observations performed:
  1. Continuous pulse oximetry (alert anaesthetist if O_2 sat<95%)
  2. hourly urine output
  3. deep tendon reflexes (every 4 hours)



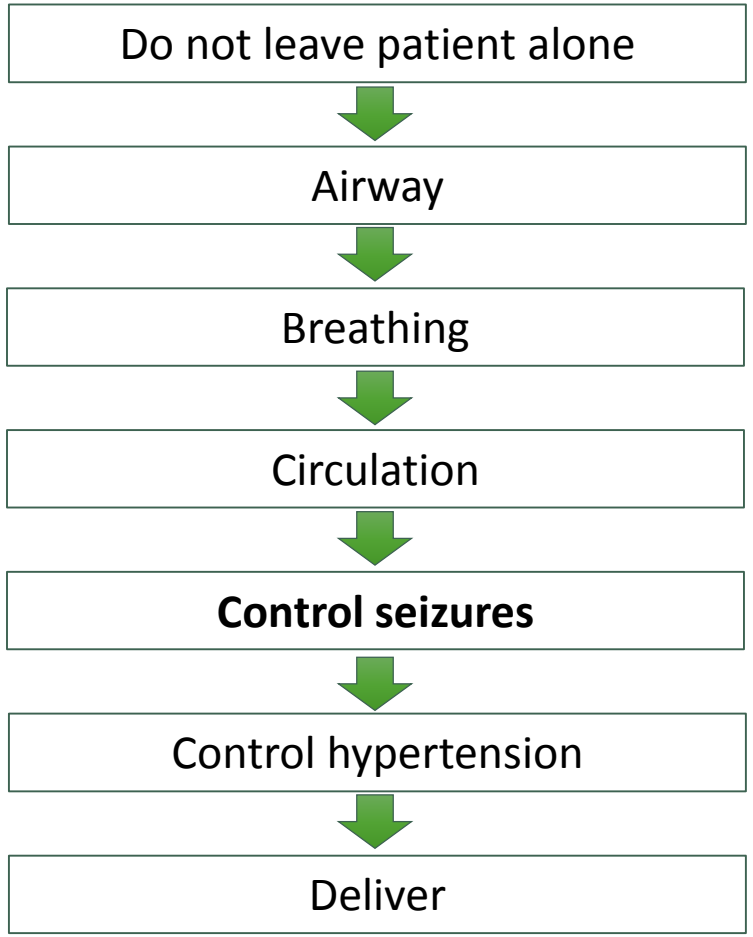
Magnesium sulphate: toxicity

- Check magnesium levels and review management with consultant if:
- Urine output < 100 ml in 4 hours

or/if deep tendon reflexes are absent

or/if respiratory rate < 12/minute

or/if oxygen saturation < 90%

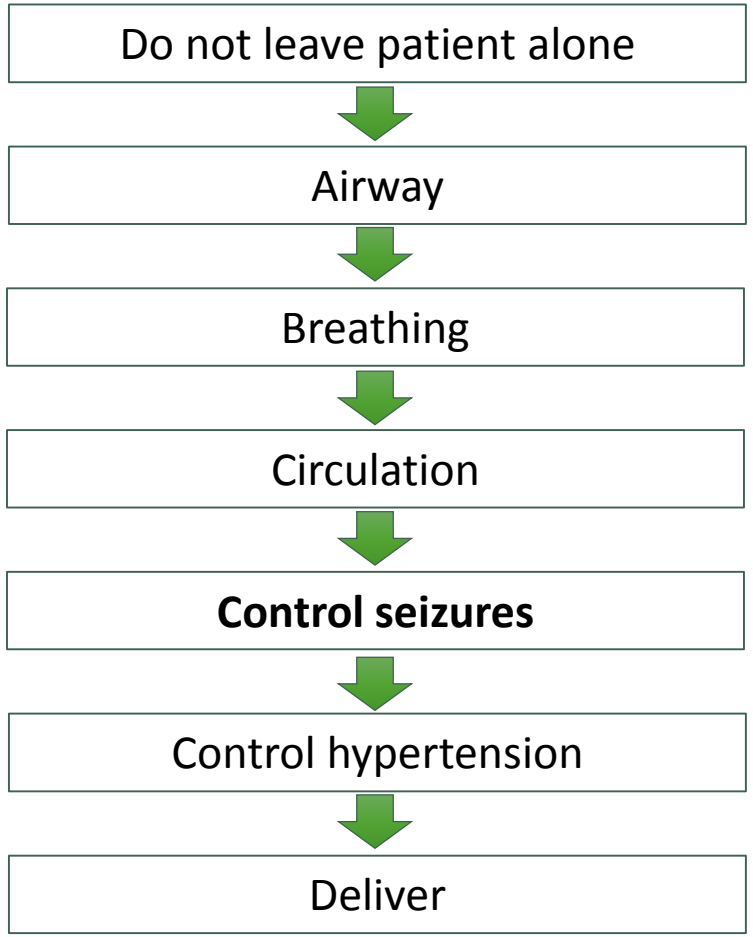


Levels at which magnesium sulphate toxicity occur

Symptoms	$MgSO_4$ level (mmol/l)
Feeling of warmth, flushing, double vision, slurred speech	3.8–5.0
Loss of tendon reflexes	> 5.0
Respiratory depression	> 6.0
Respiratory arrest	6.3–7.0
Cardiac arrest	> 12.0

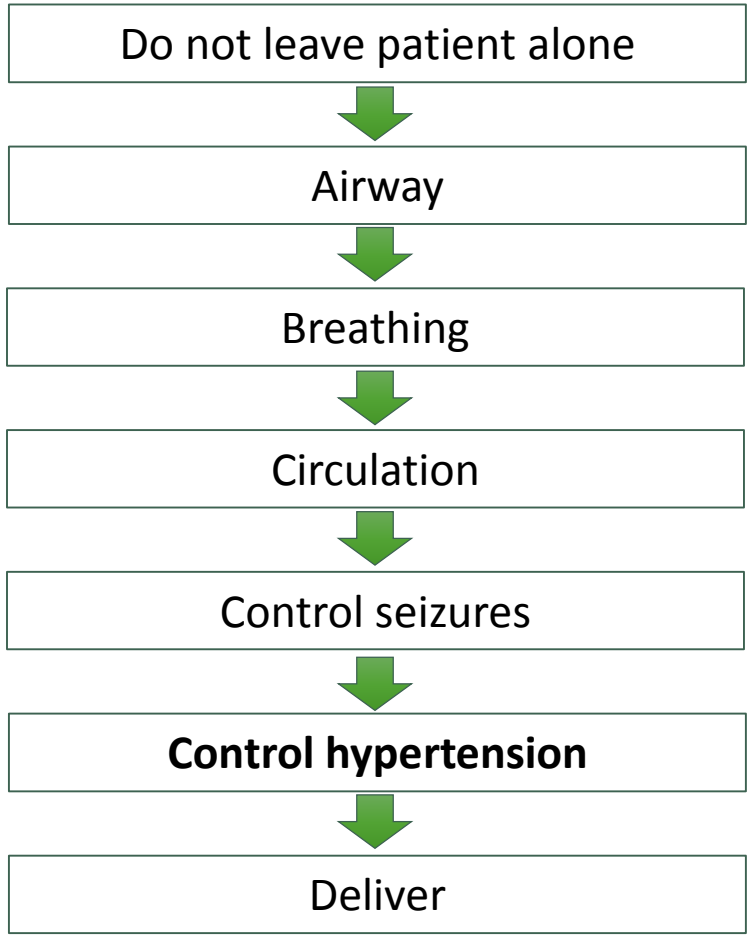
Magnesium sulphate: toxicity

- The antidote is 10ml 10% calcium gluconate given slowly intravenously



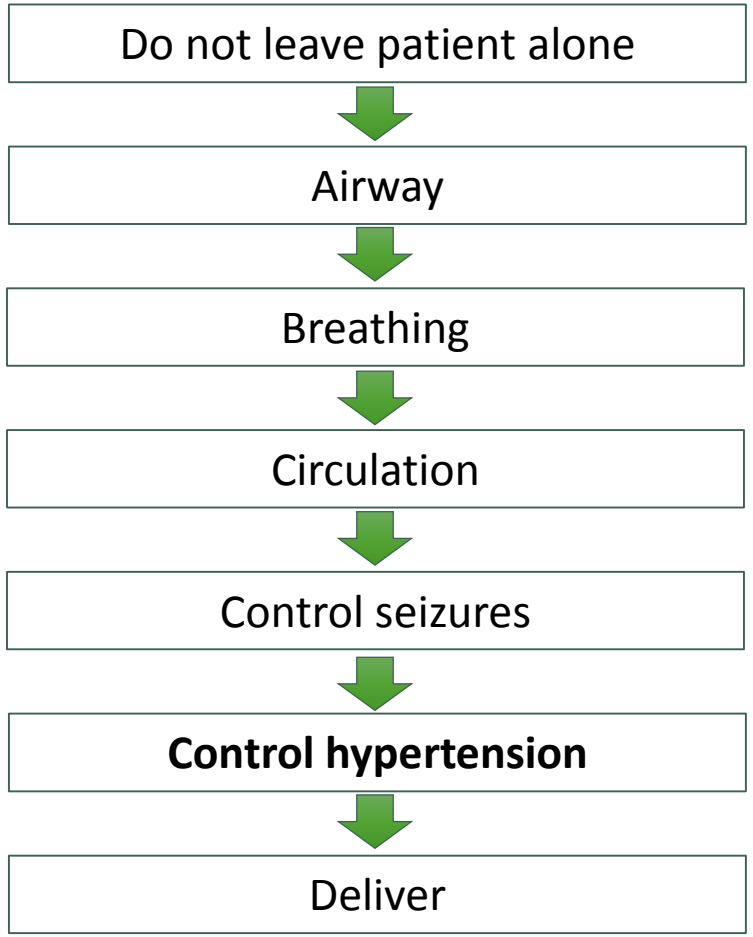
Control hypertension

- Treat hypertension if systolic BP > 160 mmHg or diastolic BP > 105 mmHg or MAP >125 mmHg
- Aim to reduce BP to around 130–140/90–100 mmHg
- Beware maternal hypotension and FHR abnormalities – monitor FHR with continuous CTG



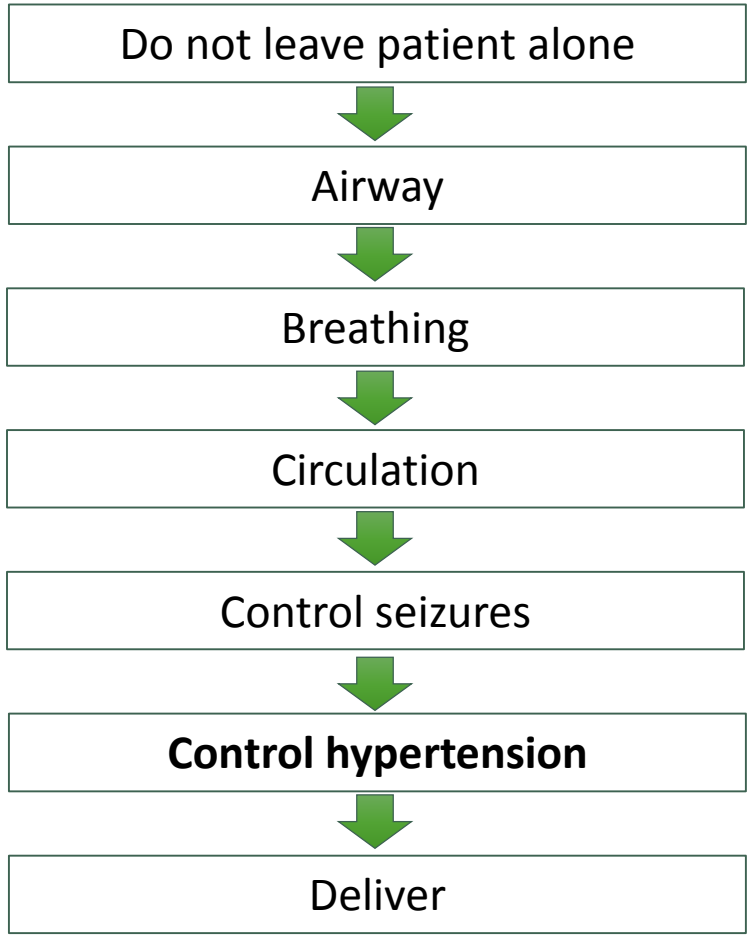
Antihypertensive 1st choice

- Labetalol 50mg (10ml of labetalol 5mg/ml) IV slowly
- If necessary repeat after 20 minutes
- Or commence infusion of labetalol 5mg/ml at a rate of 4ml/hour (20mg/hour) via a syringe pump
- Doubled every half hour to a maximum of 32ml/hour (160mg)/hour until the blood pressure has dropped and stabilised at an acceptable level



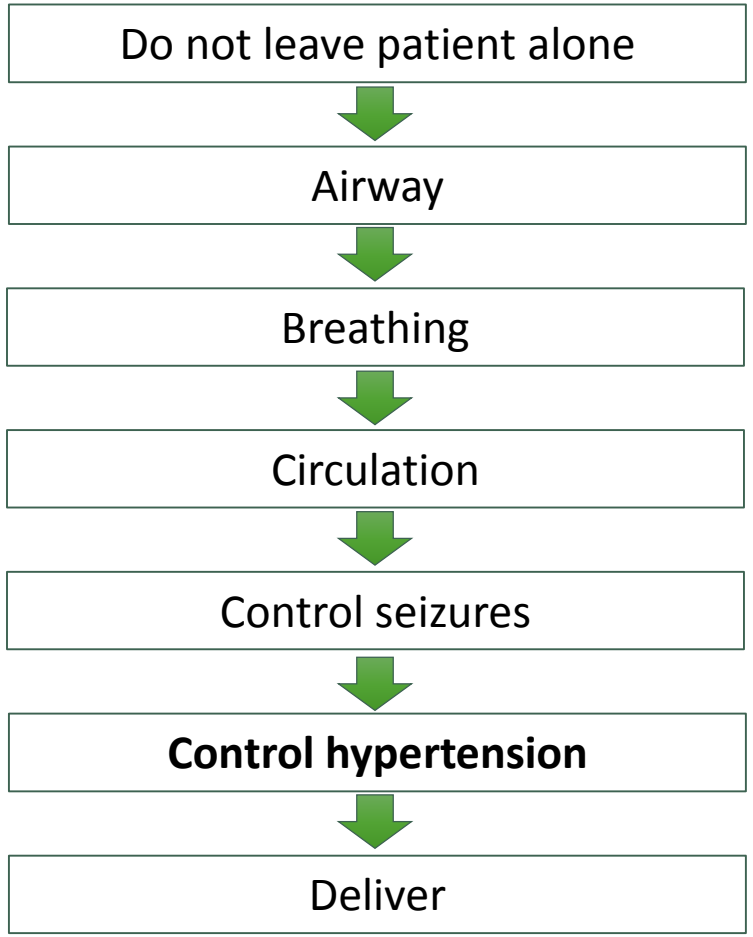
Antihypertensive 2nd choice

- Hydralazine as a bolus infusion 2.5 mg over 5 minutes
- Can be repeated every 20 minutes to a maximum dose of 20 mgs.
- Or an infusion of 40mg of hydralazine in 40 mls of normal saline run at 1-5ml/hr (1-5mg/hr)



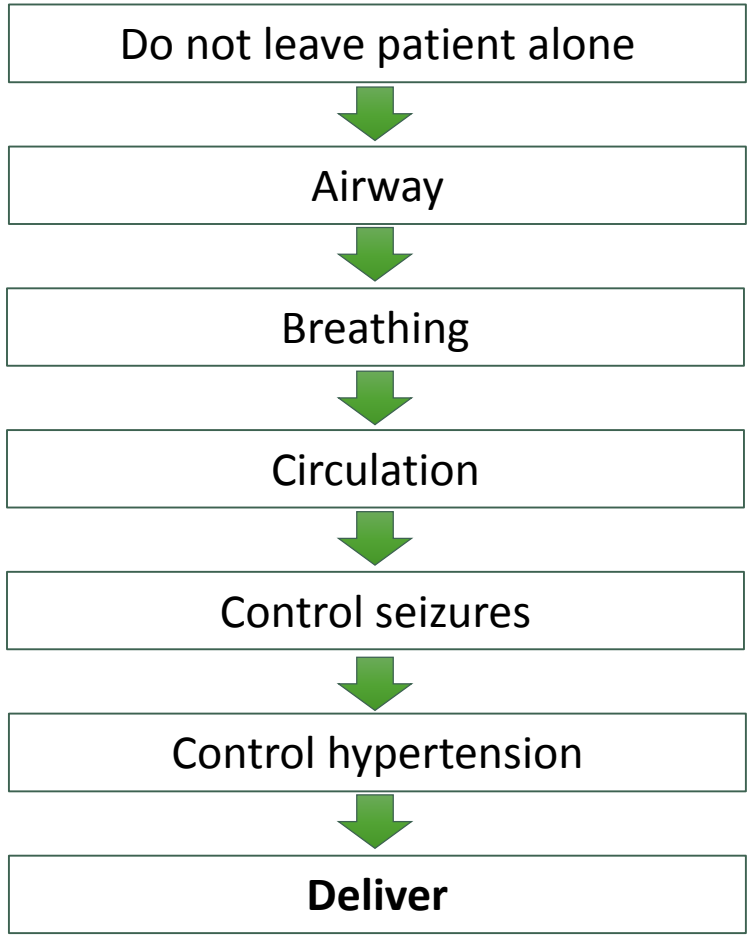
Antihypertensive 3rd choice

- Nifedipine should NOT be given sublingually to a woman with hypertension. Profound hypotension can occur with concomitant use of nifedipine and parenteral magnesium sulphate and therefore nifedipine should be prescribed with caution in women with severe pre-eclampsia



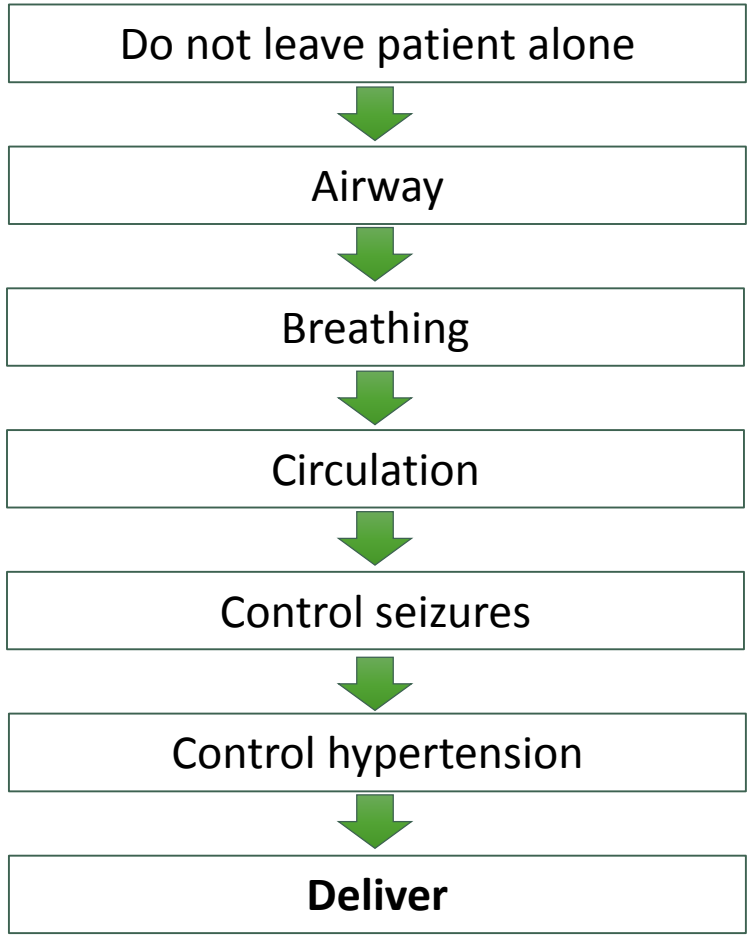
Delivery

"The delivery should be well planned, done on the best day, performed in the best place, by the best route and with the best support team"



Delivery

- The continuation of pregnancy is not an option if eclampsia occurs
- **STABILISE THE MOTHER BEFORE DELIVERY**
- **DELIVERY IS A TEAM EFFORT** involving obstetricians, midwives, anaesthetists and paediatricians
- Ergometrine should not be used in severe pre-eclampsia and eclampsia
- Consider prophylaxis against thromboembolism
- Maintain vigilance as the majority of eclamptic seizures occur after delivery



Blood Tests

Blood should be sent for:

- Serum electrolytes
- Liver function tests
- Full Blood count
- Clotting *
- Group and save serum

All tests should be checked daily or more frequently if abnormal

*questionable in the presence of a normal platelet count

Prevention of Eclampsia

- Magpie Trial Collaboration Group
  - 58% reduction in seizures
  - 45% reduction in maternal death*
  - 33% reduction in placental abruption

*The 45% reduction in maternal death is not statistically significant but clinically important

Altman D, Carroli G, Duley L, et al. The Magpie Trial: a randomized placebo-controlled trial; Lancet 2002;359:1877–90

Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate?

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Practical skills & drills elements

- Eclampsia is rare and complex
- With an estimated incidence of 2.7 cases per 10,000 maternities, each of the busiest 4 hospitals in Ireland will each expect to see 2-4 cases per annum
- Drills are essential!

Practical skills & drills elements

- Use of pre-eclampsia-specific checklists, team training and communication strategies, and continuous process improvement strategies will likely reduce hypertensive related morbidity
- Use of patient education strategies, targeted to the educational level of the patients, is essential for increasing patient awareness of signs and symptoms of pre-eclampsia

Practical skills & drills elements

- Eclampsia Box
  - Loading dose of magnesium sulphate
  - Maintenance dose of magnesium sulphate
  - Cannulas, giving sets, tape etc.

Resources

- MOET
- PROMPT
- ALSO
- **High fidelity simulations are the gold standard**
- Low fidelity solutions can save lives

Summary

- Fitting in the second half of pregnancy or post partum is eclampsia until proven otherwise
- Eclampsia is rare but carries a high fatality rate for mother (and baby)
- It frequently occurs post partum and can occur in the absence of classic symptoms and signs
- A high index of suspicion is needed
- $MgSO_4$ saves lives- use it
- Uncontrolled systolic blood pressure is the leading causes of death- do not ignore it!

Looking forward

If you do only one (three!) thing(s) when you return to your unit:

- Read the HSE/Institute guideline- it's about to be revised- your feedback is essential!
- Check (construct?) your eclampsia box
- Drill, drill and drill again