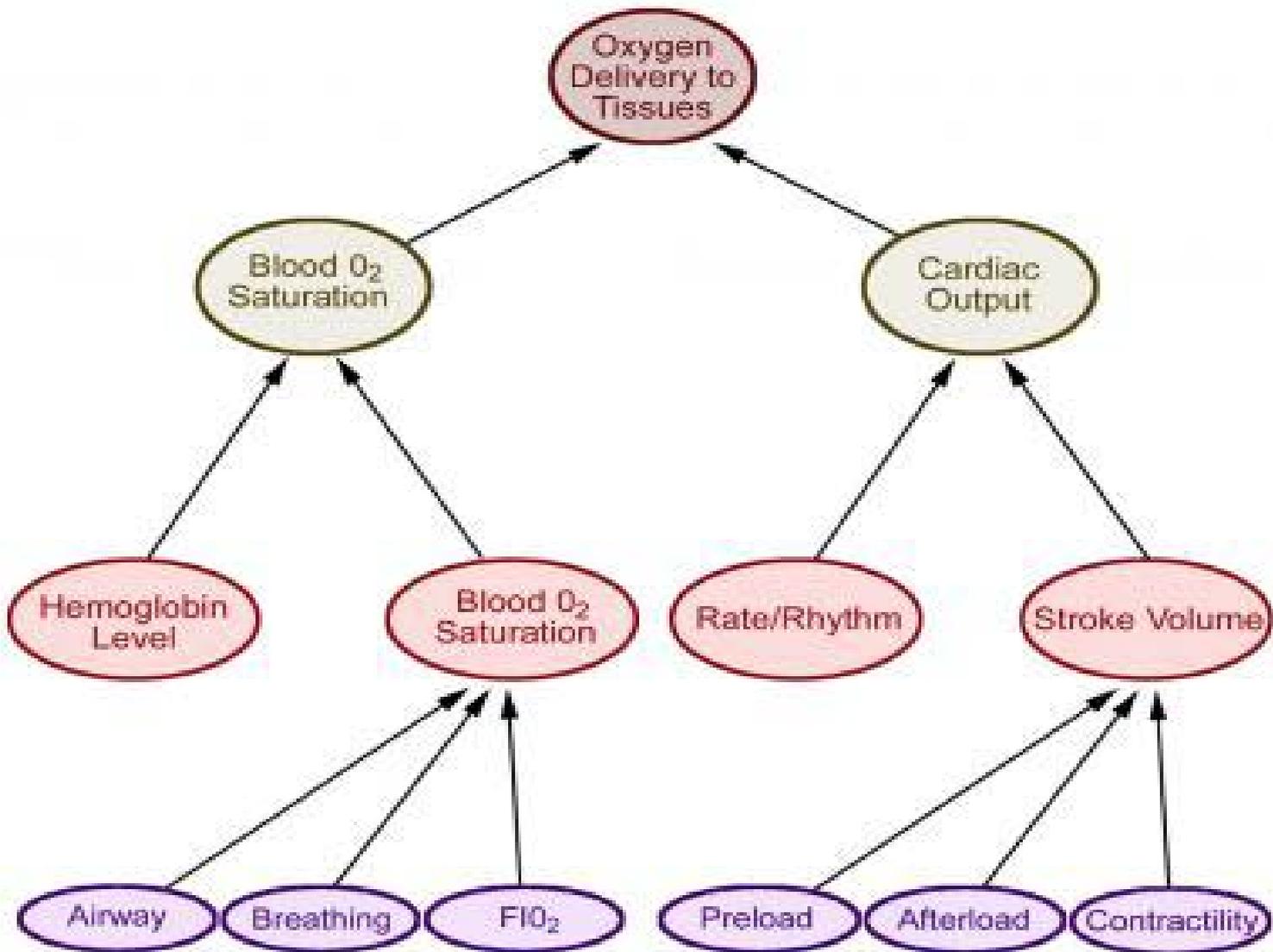


SHOCK Assessment

- Shock is defined as a state of cellular and tissue hypoxia due to :
reduced oxygen delivery
and/or increased oxygen consumption
or inadequate oxygen utilization
- The effects of shock are initially reversible but can rapidly become irreversible, resulting in multi-organ failure (MOF) and death
- Thus, when a patient presents with undifferentiated hypotension and/or is suspected of having shock, it is important that the clinician rapidly identify the etiology so that appropriate therapy can be administered to prevent MOF and death



[9]

Determinants of cardiac function and oxygen delivery to tissues

WHEN TO SUSPECT SHOCK

Clinical manifestations

- Hypotension
- Tachycardia
- Oliguria
- Abnormal mental status
- Cool, clammy, cyanotic skin
- Metabolic acidosis

Hypotension

- Systolic blood pressure <90 mmHg
mean arterial pressure <65 mmHg
- A drop in systolic blood pressure >40 mmHg
- Orthostatic >20 mmHg fall in systolic pressure or >10 mmHg fall in diastolic pressure with standing
- Importantly, patients in the early stages of shock can be normotensive or hypertensive, such that **hypotension does not have to be present for the diagnosis**
- Conversely, not every patient who has hypotension has shock (eg, chronic hypotension, drug-induced hypotension, autonomic dysfunction, vasovagal syncope, peripheral vascular disease , **(supine hypotensive syndrome)**)

Tachycardia

- Tachycardia is an early compensatory mechanism in patients with shock
- It can be isolated or occur in association with hypotension
- Importantly, compared with older patients, younger patients develop severe and persistent tachycardia before becoming hypotensive late in the course of shock

Oliguria

Oliguria in shock can be due to :

- shunting of renal blood flow to other vital organs
- direct injury to the kidney (eg, aminoglycoside toxicity)

Mental status changes

- Altered sensorium in shock is usually due to poor perfusion or metabolic encephalopathy. It is a continuum that begins with agitation, progresses to confusion or delirium, and ends in obtundation or coma



Understanding AVPU Mnemonic for first responders

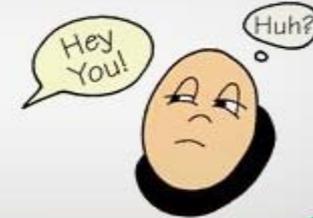
A

Alert



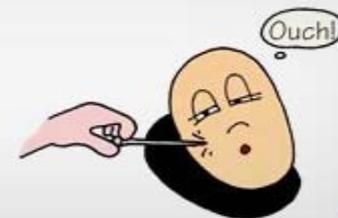
V

Verbal Stimuli



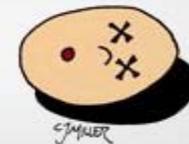
P

Painful Stimuli



U

Unresponsive



Cool skin

- Cool, clammy skin is due to compensatory peripheral vasoconstriction
- A cyanotic, mottled appearance is a late and worrisome feature of shock
- Cool, Clammy or Cyanotic skin may also be due to, or exacerbated by, ischemia from underlying peripheral arterial vascular disease
- Warm, hyperemic skin may be present in patients with early distributive shock (prior to the onset of compensatory vasoconstriction) or terminal shock (due to failure of compensatory vasoconstriction)

Metabolic acidosis

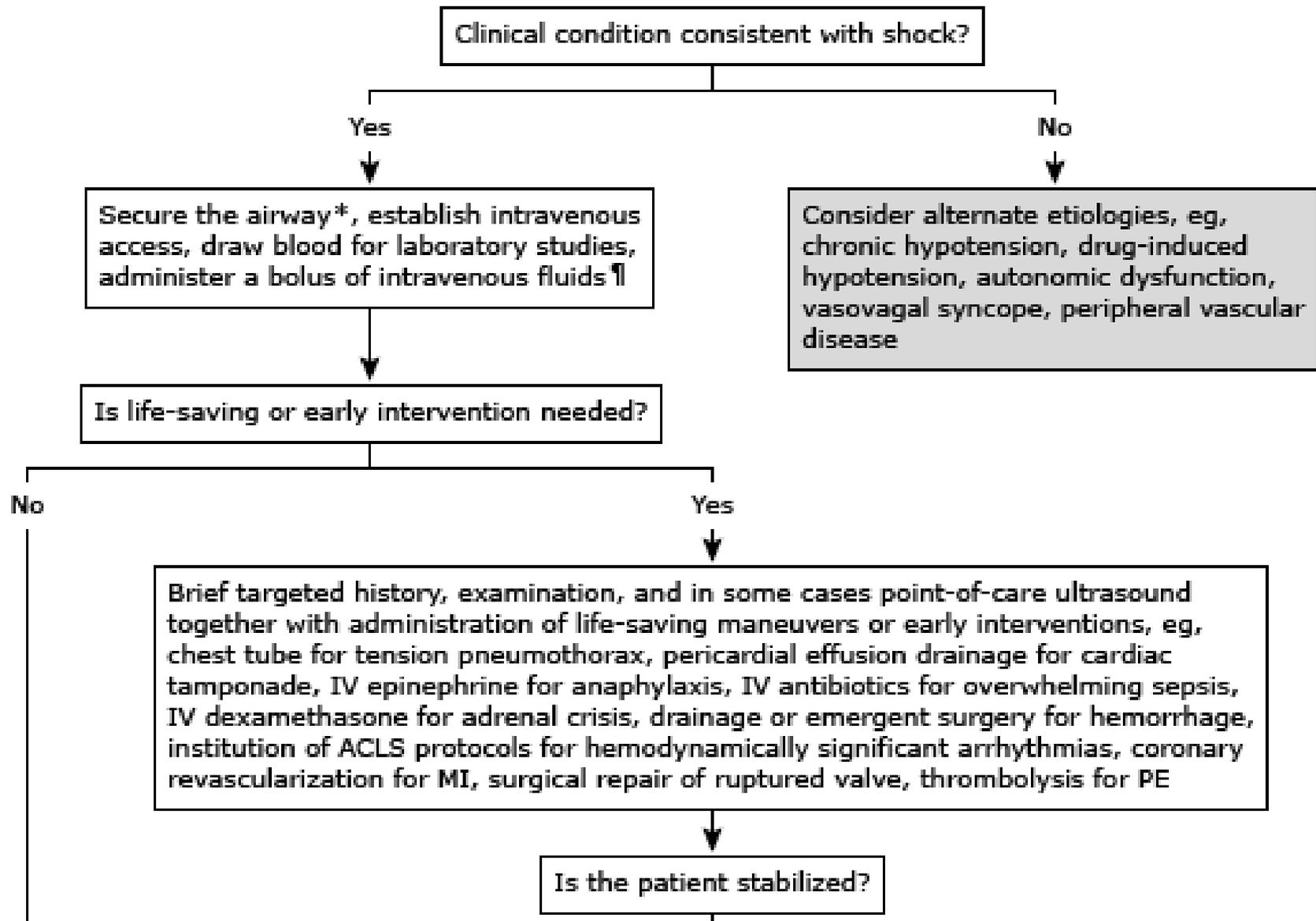
- In general, the demonstration of a high anion gap metabolic acidosis, specifically an elevated lactate, should always raise the clinical suspicion for the presence of shock
- Importantly, the presence of a metabolic acidosis in states of shock is not specific and can also be due to acute kidney injury or toxin ingestion

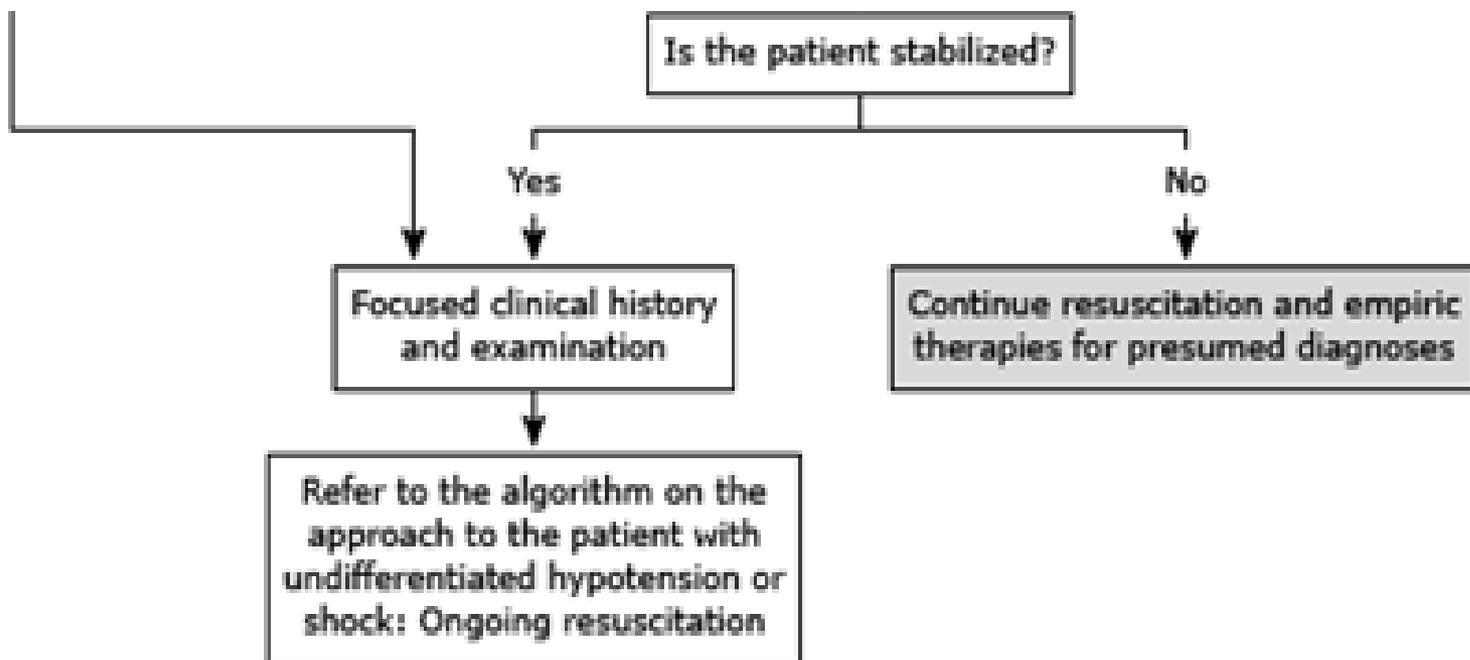
Factors leading to the underlying cause

- History and clinical examination
- Laboratory tests
- Imaging

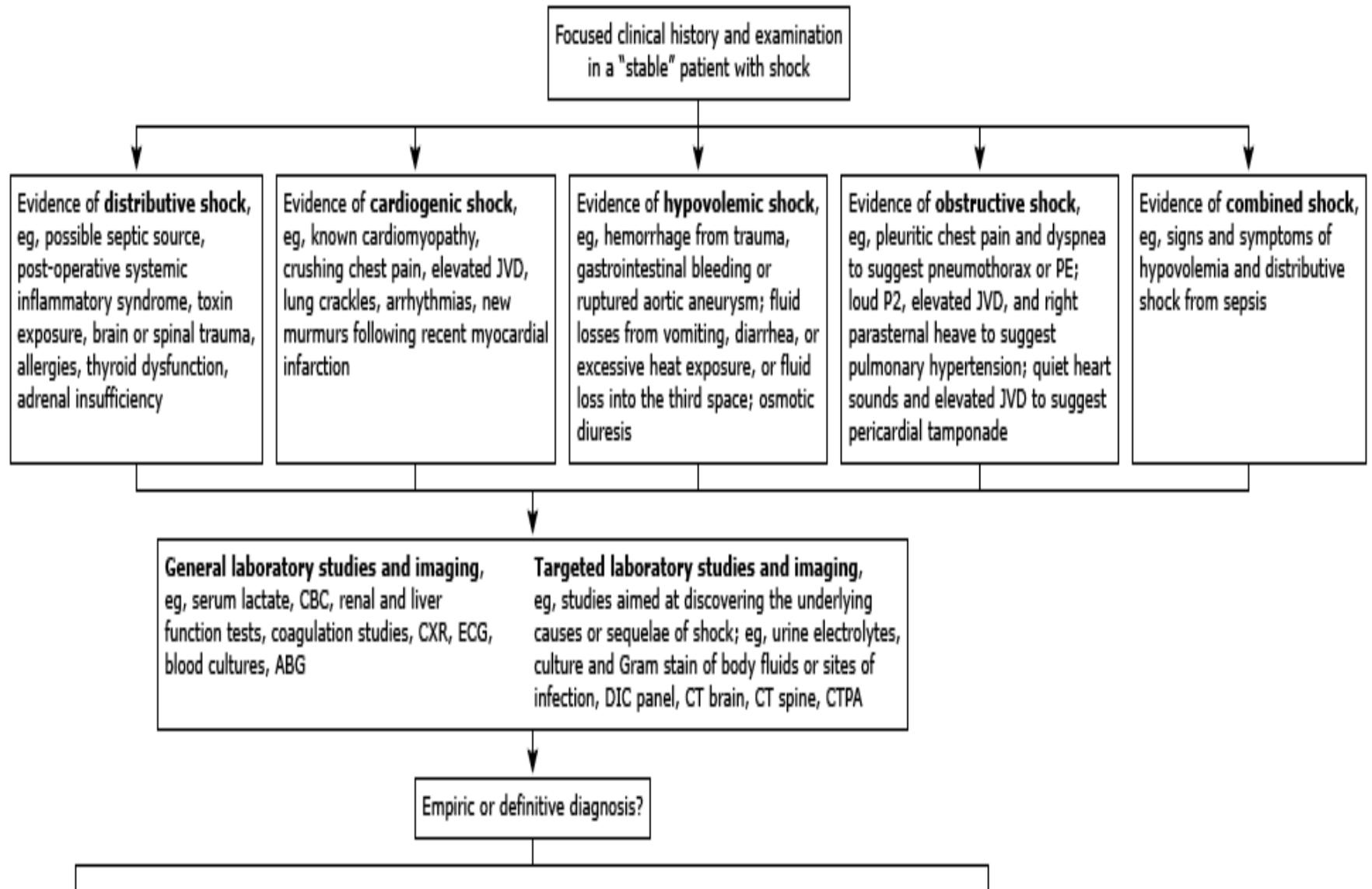
- When feasible, a multidisciplinary, team-based approach is preferred because it allows the simultaneous evaluation and administration of therapy to patients with hypotension and shock

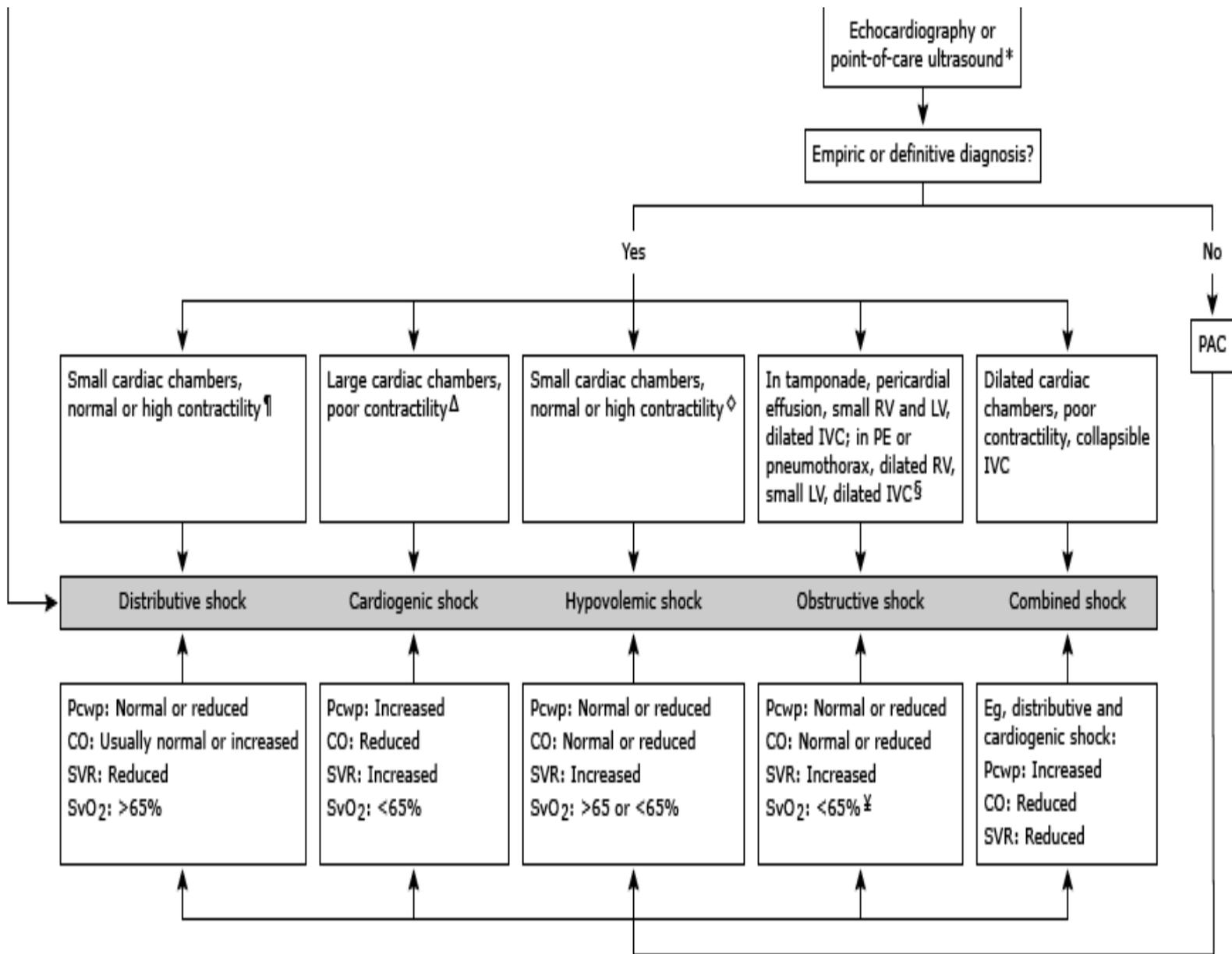
Approach to the patient with undifferentiated hypotension or shock: Initial approach





Approach to the patient with undifferentiated hypotension or shock: Ongoing resuscitation





SHOCK IN PREGNANCY

Table 1. Physiological and physical changes in pregnancy

	Changes in pregnancy	Impact on resuscitation
Cardiovascular system		
Plasma volume	Increased by up to 50%	Dilutional anaemia <u>Reduced oxygen-carrying capacity</u>
Heart rate	Increased by 15–20 bpm	<u>Increased CPR circulation demands</u>
Cardiac output	Increased by 40% Significantly reduced by pressure of gravid uterus on IVC	<u>Increased CPR circulation demands</u>
Uterine blood flow	10% of cardiac output at term	Potential for rapid massive haemorrhage
Systemic vascular resistance	Decreased	<u>Sequesters blood during CPR</u>
Arterial blood pressure	Decreased by 10–15 mmHg	<u>Decreased reserve</u>
Venous return	Decreased by pressure of gravid uterus on IVC	Increased CPR circulation demands <u>Decreased reserve</u>

Respiratory system

Oxygen consumption

Increased by 20%

Hypoxia develops more quickly

Residual capacity

Decreased by 25%

Decreased buffering capacity, acidosis more likely

Arterial PCO_2

Decreased

Decreased buffering capacity, acidosis more likely

Laryngeal oedema

Increased

Difficult intubation

Other changes

Gastric motility	Decreased	<u>Increased risk of aspiration</u>
Lower oesophageal sphincter	Relaxed	<u>Increased risk of aspiration</u>
Uterus	Enlarged	Diaphragmatic splinting reduces residual capacity and <u>makes ventilation more difficult</u> <u>Aortocaval compression causes supine hypotension, reduces venous return and significantly impairs CPR</u>
Weight	Increases	Large breasts may interfere with intubation <u>Makes ventilation more difficult</u>

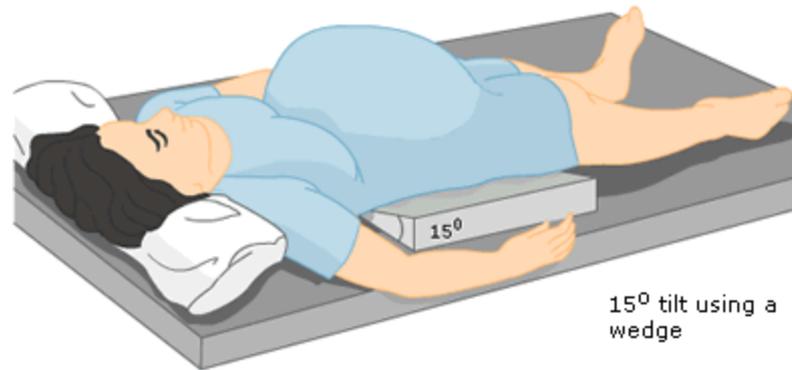
What is the optimal initial management of maternal collapse?

- Maternal resuscitation should follow the Resuscitation guidelines using the **standard A, B,C** approach, with some modification
- **Tilt** : From 20 weeks of gestation onwards, the pressure of the gravid uterus must be relieved from the inferior vena cava and aorta
- **Airway** : The airway should be protected **as soon as possible** by intubation with a cuffed endotracheal tube
- **Breathing** : Supplemental oxygen should be administered **as soon as possible**
- **Circulation** : In the absence of breathing despite a clear airway, chest compressions should be commenced immediately
- **Two wide-bore cannulae** should be inserted as soon as possible
There should be an aggressive approach to volume-
above the DIAPHRAGM





15° tilt using the operating table



15° tilt using a wedge

A



B



A, Manual LUD, performed with one-handed technique. **B**, Two-handed technique during resuscitation.

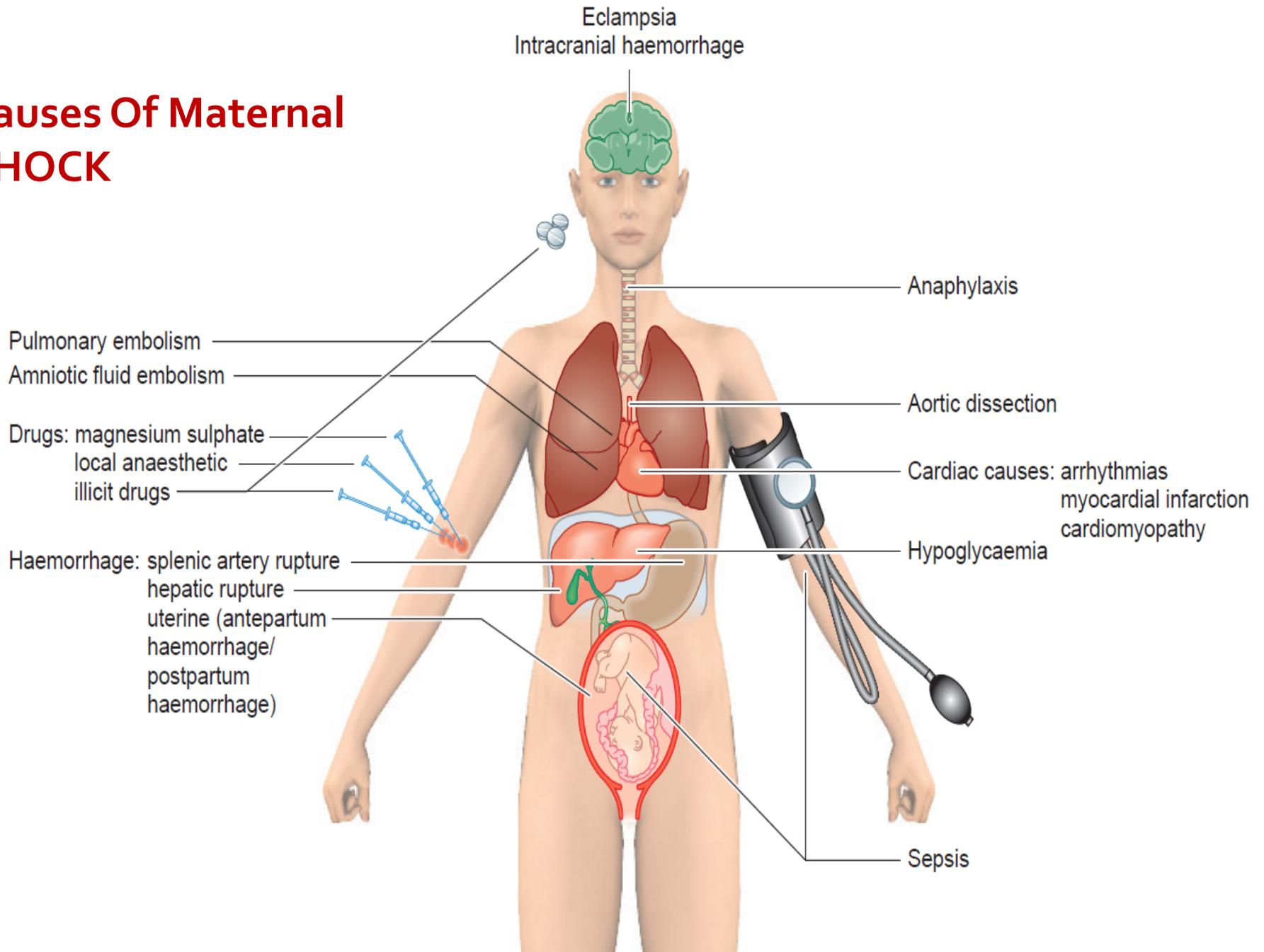
When, where and how should perimortem caesarean section be performed?

- In women beyond 20 weeks of gestation →
no response to correctly performed CPR **within 4 minutes** of maternal collapse →
delivery should be achieved within 5 minutes of the collapse
- The rationale for this timescale is that the pregnant woman becomes hypoxic more quickly than the nonpregnant woman, and **irreversible brain damage can ensue within 4–6 minutes**
- Delivery of the fetus and placenta reduces oxygen consumption, improves venous return and cardiac output, facilitates chest compressions and makes ventilation easier
- Should be considered a resuscitative procedure to be performed **primarily in the interests of maternal, not fetal, survival**
- Perimortem caesarean section should not be delayed by moving the woman – it should be performed where resuscitation is taking place

Common clinical targets in shocked patients

Variable	Goal
SpO ₂	≥93%
Central venous pressure (CVP) self-ventilating	≥8 mmHg
CVP non-invasive/invasive mechanical ventilation	≥12 mmHg
Mean arterial pressure	65–90 mmHg
Urine output	≥0.5 ml/kg/hour

Causes Of Maternal SHOCK



DRUGS

- Vasoactive drugs : **Dopamine – Ephedrine**
(Shown to increase both maternal BP and uterine blood flow)
- **Calcium Gluconate 10%** : The antidote to magnesium toxicity is 10 ml 10% calcium gluconate given by slow intravenous injection
- **Intra lipid 20%** : Lipid rescue should be used in cases of collapse secondary to local anaesthetic toxicity-
(IV bolus 1.5ml/kg /min = 100ml for 70kg
then IV infusion at 0.25ml/kg/min=400ml in 20 min)

OBSTETRIC EARLY WARNING CHART

CONTACT DOCTOR FOR EARLY INTERVENTION IF PATIENT TRIGGERS ONE RED OR TWO YELLOW SCORES AT ANY ONE TIME

Date														Time	
RESP (with rate in comp. box)	>36	[Red]												>30	
	34-36	[Yellow]												24-30	
	31-34	[Yellow]												11-20	
	0-31	[Red]												0-10	
Saturation	95-100%	[Red]												11-20	
	<95%	[Red]												05-100%	
Administered O ₂ (L/min)														%	
TEMP	39	[Red]												39	
	38	[Red]												38	
	37	[Red]												37	
	36	[Yellow]												36	
	35	[Yellow]												35	
HEART RATE	170	[Red]												170	
	160	[Red]												160	
	150	[Red]												150	
	140	[Red]												140	
	130	[Red]												130	
	120	[Red]												120	
	113	[Yellow]												110	
	100	[Yellow]												100	
	90	[Red]												90	
	80	[Red]												80	
	70	[Red]												70	
	60	[Red]												60	
	50	[Red]												50	
	40	[Yellow]												40	
	Cyclic blood pressure	200	[Red]												200
		190	[Red]												190
		180	[Red]												180
170		[Red]												170	
160		[Red]												160	
150		[Yellow]												150	
140		[Red]												140	
130		[Red]												130	
120		[Red]												120	
110		[Red]												110	
100		[Yellow]												100	
90		[Red]												90	
80		[Red]												80	
70		[Red]												70	
60		[Red]												60	
50		[Red]												50	
Diastolic blood pressure		130	[Red]												130
	120	[Red]												120	
	110	[Red]												110	
	100	[Red]												100	
	90	[Yellow]												90	
	80	[Red]												80	
	70	[Red]												70	
	60	[Red]												60	
	50	[Red]												50	
	URINE	passed (Y/N)													passed (Y/N)
		Amount													Amount
	Proteinuria	protein ++	[Red]												protein ++
		protein +	[Yellow]												protein +
	Amniotic fluid	Clear/Pink	[Red]												Clear/Pink
		Green	[Red]												Green
	NEURO RESPONSE (✓)	Alert	[Red]												Alert
		Voices	[Yellow]												Voices
Pain		[Red]												Pain	
Pain Scores (0-3)	0-1	[Red]												0-1	
	2-3	[Yellow]												2-3	
Lochia	Normal	[Red]												Normal	
	Heavy / Foul Odorous	[Yellow]												Heavy / Foul Odorous	
Lochia smell	NO (✓)	[Red]												NO (✓)	
	YES (✓)	[Yellow]												YES (✓)	
Total Yellow Scores		[Yellow]													
Total Red Scores		[Red]													

Can women at risk of Impending collapse be identified early ?

DRAFT (1) Obstetric National Early Warning System

Physiological Parameters / SCORE	3	2	1	0	1	2	3
LOOKS / FEELS UNWELL?				NO		YES	
Respiratory Rate	≤8	8-10		11-20		21-24	≥25
Oxygen Sats (Air)	≤93	93-94	94-95	≥96			
Pulse	≤40		41-50	51-100	101-110	111-130	≥131
Systolic BP	≤80	81-90	91-100	101-139	140-149	150-160	≥160
Diastolic BP				<90	90-99	100-109	≥110
AVPU				Alert			VPU
Temperature (°C)	≤35.0		35.1-36	36.1-37.5	37.6-38	38.1-39	≥39.1
Other: Urine output	<0.5ml/kg/hr	<1ml/kg/hr		>1ml/kg/hr			
Urinary protein				NO		YES	

Concern about a woman should lead to escalation, regardless of the score.

National Early Warning System

Physiological Parameters		3	2	1	0	1	2	3
A	Respiratory rate (bpm)	≤8		9-11	12-20		21-24	≥25
	O ₂ Saturations (%)	≤91	92-93	94-95	≥96			
B	Any supplemental Oxygen		Yes		None			
C	Systolic BP (mmHg)	≤90	91-100	101-110	111-219			≥220
	Pulse (bpm)	≤40		41-50	51-90	91-110	111-130	≥131
D	AVPU score				Alert			VPU
E	Temperature (°C)	≤35.0		35.1-36.0	36.1-38.0	38.1-39.0	≥39.1	

Concern about a patient should lead to escalation, regardless of the score.

Draft Escalation Obstetric NEWS (Version 1) Jan 12

ESCALATION Obstetric NEWS	Minimal Monitoring	Alert ...	Medical Review
0- 2	12 hourly*	Nil	
3-5	1-4 hourly	Midwife in charge and Obs SHO	Within 30 mins: Increased frequency of obs. Inform obs ST3 and obs anaes ST3 (or equiv) & of review outcome. Could this woman have sepsis?
6 = SICK!	1-2 hourly	Obstetric ST3 and Obs anaesthetist	Urgent call to team with primary medical responsibility for the patient (maternity). Simultaneous call to personnel with core competences for acute illness. These competences can be delivered by a variety of models at local level, such as a critical care outreach team, a hospital-at-night team or a specialist trainee in anaesthesia, obstetrics, acute medical or surgical specialty.

9 = NOW	>9	30 mins	Team with critical cre competencies & Obs ST3/Obs anaes ST3/Consultant obstetrician	Emergency call to team with critical care competences and maternity team. The team should include a medical practitioner skilled in the assessment of the critically ill patient, who possesses advanced airway management and resuscitation skills.
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Signs of reduced end organ perfusion

Organ system	Clinical features
Neurological	<ul style="list-style-type: none">• Reduced level of consciousness• Encephalopathy (confusion, agitation and/or drowsiness)
Cardiovascular	<ul style="list-style-type: none">• Reduced capillary refill (>3 seconds)• Cold peripheries• Central pallor
Respiratory	<ul style="list-style-type: none">• Tachypnoea >20 breaths/minute• Central and peripheral cyanosis• Desaturation (SpO₂ (peripheral oxygen saturation) <90%)
Renal	<ul style="list-style-type: none">• Urinary output <0.5 ml/kg/hour

Signs and symptoms attributed to supine hypotensive syndrome in pregnancy

Faintness
Dyspnea
Dizziness
Restlessness
Nausea
Vomiting
Chest pain
Abdominal pain
Visual disturbances
Numbness
Paresthesias
Headache
Cold, clammy skin
Pallor
Cyanosis
Hypotension