East of England Neonatal ODN
(Hosted by Cambridge University Hospitals)

Clinical Guideline: Management of Hypotension in the Neonate

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For use in: Eastern Neonatal Units
Guidance specific to the care of neonatal patients

Used by: Medical Staff

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Approved by:

Neonatal Clinical Oversight Group	
Clinical Lead Sajeev Job	*S.Job*

Audit Standards:

1. All infants meeting the BAPM intensive care category, should have an admission
   blood pressure (BP) recorded.
2. Infants being treated for hypotension should have 15 minutely recordings of BP.
3. Infants should not receive a bolus of saline unless there is documented evidence to support a clinical suspicion of hypovolaemia.

1. Introduction:

Arterial hypotension (AH) is a frequent problem in neonates with the potential to affect both short- and long-term outcomes.

Clinical conditions associated with cardiovascular instability and low arterial pressure (AP) in preterm neonates include difficulties with adaptation to extrauterine circulation during the first 72 h after birth and severe neonatal complications, such as sepsis, necrotizing enterocolitis (NEC), persistent pulmonary hypertension of the neonate (PPHN), perinatal asphyxia, congenital heart disease, and patent ductus arteriosus (PDA).[41]

2. Definition of Hypotension:

There is no standard definition of AH in neonates. The definitions being used in clinical practice and research are mostly based on gestational age (GA). Some studies defined AH as the mean AP less than the mean or 5th percentile of GA-related reference values.[41]

However, the reference ranges of AP defined after the GA and postnatal age vary widely. The use of gestational age based systolic and diastolic blood pressure centiles is helpful to guide management.[41]

Finally, the definition that is most often used is based on the AP range reported by the Joint Working Group of the British Association of Perinatal Medicine (BAPM), which recommended that the mean AP should be kept at or over the GA in weeks.[47]

See Table 1 and Table 2 for blood pressure values by gestational age.[45]

Table 1

Table 1 Normal blood pressure values by gestational age for day one (early) (Mean +/- 95th CI for highest and lowest values)

Gestational age	Systolic			Diastolic			Mean (calculated)			Pulse pressure		
Weeks	95th	50th	5th	95th	50th	5th	95th	50th	5th	95th	50th	5th
22	55	39	22	31	23	14	39	28	17	18	12	8
23	56	40	23	32	24	15	40	29	18	18	12	8
24	57	42	25	33	25	16	41	31	19	18	12	8
25	58	43	26	34	26	17	42	32	20	18	12	8
26	60	44	27	35	27	18	43	33	21	18	12	8
27	61	45	29	36	28	19	44	34	22	18	12	8
28	63	47	31	37	29	20	46	35	24	19	13	9
29	64	48	33	38	30	21	47	36	25	19	13	9
30	66	50	35	39	31	22	48	37	26	19	13	9
31	68	51	36	40	32	23	49	38	27	20	14	10
32	69	52	37	41	33	24	50	39	28	20	14	10
33	70	53	38	42	34	25	51	40	29	20	14	10
34	71	55	40	43	35	26	52	42	31	20	14	10
35	73	57	41	44	36	27	54	43	32	20	14	10
36	75	59	42	45	37	28	55	44	33	20	14	10
37	76	60	44	46	38	29	56	45	34	20	14	10
38	77	61	46	47	39	30	57	46	35	21	15	12
39	79	62	47	48	40	31	58	47	36	21	15	12
40	81	64	48	49	41	32	60	49	37	21	15	12
41	82	65	50	50	42	33	61	50	39	22	15	12
42	84	67	51	51	43	34	62	51	40	22	15	12

Zubrow et al. Philadelphia Neonatal Blood Pressure Study Group. p. J of perinatology 1995

Table 2

Table 2: Normal blood pressure values by corrected post conceptional age (Mean +/- 95th CI for highest and lowest values)

Age	Systolic			Diastolic			Mean (calculated)			Pulse pressure (calculated)		
Weeks	95th	50th	5th	95th	50th	5th	95th	50th	5th	95th	50th	5th
24	68	49	33	46	29	14	53	36	20	25	16	12
25	69	51	36	47	30	15	54	37	22	25	16	12
26	70	52	38	48	31	17	55	38	24	25	16	14
27	71	54	40	49	32	18	56	39	25	25	16	14
28	72	55	41	50	33	19	57	40	26	27	17	15
29	73	56	42	51	34	20	58	41	27	27	17	15
30	75	59	43	52	35	21	60	43	28	28	18	15
31	78	61	46	53	36	22	61	44	30	28	20	17
32	80	62	48	54	37	23	63	45	31	28	20	17
33	81	63	50	55	38	24	64	46	33	28	20	17
34	83	66	51	56	39	25	65	48	34	30	21	18
35	84	69	52	57	40	26	66	50	35	30	21	18
36	87	71	55	58	41	27	68	51	36	30	22	18
37	89	72	57	59	42	28	69	52	38	30	22	18
38	90	75	59	60	43	29	70	54	39	30	22	18
39	91	78	60	60	44	30	70	55	40	30	22	18
40	92	80	61	61	44	30	71	56	40	33	25	20
41	93	81	62	62	46	31	72	58	41	33	25	20
42	95	82	63	63	47	32	74	59	42	33	25	20
43	97	83	65	64	48	33	75	60	44	33	25	20
44	98	86	67	65	49	34	76	61	45	33	25	20
45	100	88	69	66	50	35	77	63	46	33	25	20
46	102	89	71	66	51	36	78	64	48	33	25	21

Zubrow et al. Philadelphia Neonatal Blood Pressure Study Group. p. J of perinatology 1995

3. Measurement of Blood Pressure

Proper measurement of blood pressure (BP) in neonates and infants can be technically challenging.

Currently, the gold standard method of BP measurement in neonates is through an in-dwelling intra-arterial catheter. But the method is associated with technical difficulties and is invasive in nature.
Advances in the design of non-invasive BP monitoring, including Oscillo metric devices, has resulted in their increasing use in neonatal intensive care units.[46]

Fig. 1. Proper method to determine the correct blood pressure cuff size in neonates. Illustration by Robert Pintilie. [46]

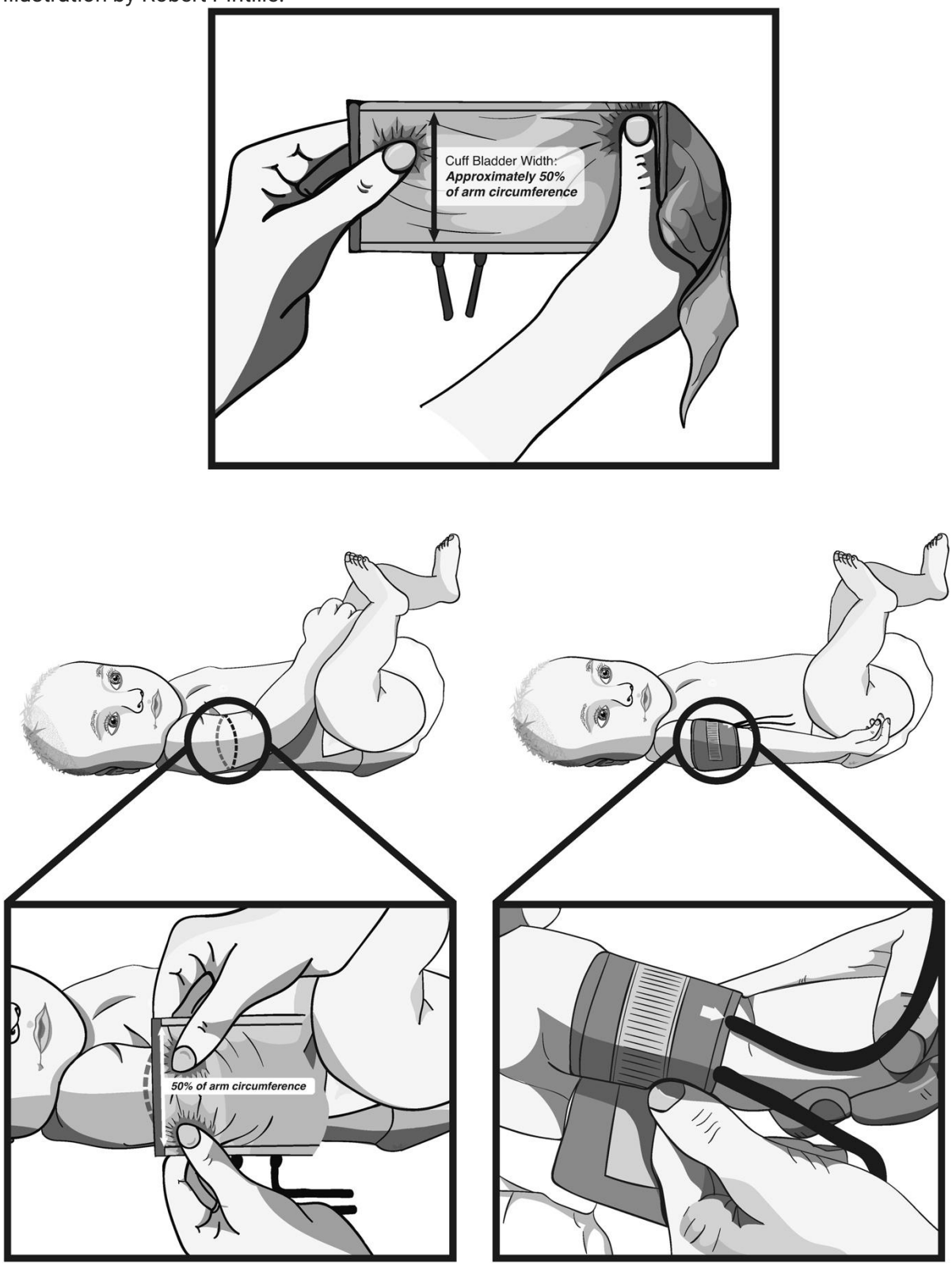


Table II. International Neonatal Consortium recommendations for measurement of BP in neonates

Aspects	Recommendations
Cuff	Use a BP cuff with a cuff width to arm circumference ratio closest to 0.5 for noninvasive BP measurements obtained by the oscillometric method.
Location	Right upper arm BPs are the recommended location for oscillometric measurements.
	Calf BPs may be considered only in the first few days of life or if there is a contraindication to arm BP measurements.
	Right upper arm is preferred to the left in case of coarctation of the thoracic aorta.
Method	Oscillometric devices may be used to screen for BP abnormalities, but if there are concerns with values that are too low, too high, or do not seem to correlate with the clinical condition of the infant, intra-arterial BP values should be obtained.
	When oscillometric devices are used, MAP should be compared to normative values as the most accurate BP value in these devices.
	Use oscillometric devices with caution in neonates with a MAP of <30 mm Hg because they are less accurate in these infants.
	For both intra-arterial and oscillometric measurements, repeated measures of BP should be used for clinical decision making owing to BP variability.

Transduced intra-arterial blood pressure monitoring systems also need to be interpreted with care:

- The small diameter of the catheter may lead to loss of higher frequencies and under-reading (damping)
- Small air bubbles will result in excessive damping leading to low systolic and high diastolic readings
- The position of the catheter itself will impact on the reading e.g. if the catheter tip is resting against the vessel wall[11] or if a pedal artery is accessed the systolic pressure may appear higher and possibly lead to poor detection of circulatory shock[12].
- The position of the transducer should be level with the heart
- The arterial line should be re-zeroed before acting on a hypotensive reading

4. Risk Factors for Hypotension

- Prematurity
- Positive Pressure Ventilation
- Large Patent Ductus Arteriosus (PDA) – stealing blood from the systemic circulation
- Lack of antenatal steroids prior to delivery
- Sepsis
- Haemorrhage – eg APH, cord prolapse, twin to twin transfusion syndrome, large intracranial haemorrhage, large pulmonary haemorrhage
- Congenital cardiac disease
- Adrenal insufficiency[13]

- Surgical intervention
- Hypoxic ischaemic encephalopathy (HIE)
- Persistent pulmonary hypertension of the newborn (PPHN)
- Drugs – eg maternal labetalol

5. Complications of Hypotension

- Intraventricular haemorrhage
- Periventricular leukomalacia[3,14,15]
- Long term neurological impairment
- Other end-organ dysfunction e.g. renal, hepatic or gut ischaemia

6. Diagnosis

6.1 Clinical Assessment

Signs and symptoms of inadequate tissue perfusion may include:

- Urine output <1ml/kg/hr
- Central capillary refill >3 seconds (a poor indicator alone but useful if associated with other features e.g. low blood pressure)
- Base deficit >5
- Lactate >2mmol/L
- Pallor
- Tachycardia
- Cold extremities
- Weak pulses (femoral palpation best in hypotensive infants[13])
- Apnoea and bradycardia
- Low blood pressure for gestational age as defined above (rule out technical problems such as air bubbles, inadequate cuff size etc)

6.2 Monitoring

Infants with hypotension should ideally be monitored closely:

- Mean arterial pressure continuously (if has arterial access)
- Cuff BP set to 15minute readings which are recorded.
- Heart rate continuously
- Peripheral perfusion especially where the infant has a peripheral arterial line
- Urine output.
- Core-peripheral temperature gap

6.3 Echocardiography

Echocardiography if expertise is available may indicate the presence of:

- PDA which may be contributing to hypotension
- Decreased systemic blood flow
- Pulmonary hypertension (PPHN)
- Poor contractility

6.4 Consider other conditions

- Blood loss
- Pneumothorax
- Sepsis
- PDA[17]
- High mean airway pressure on mechanical ventilation
- Adrenocortical insufficiency[18,19]

If any of these is diagnosed, therapy specific to the cause of hypotension should be started in conjunction with treatment for the hypotension.

7. Management of Hypotension:

Intervention should be considered for infants with clinical and laboratory evidence (see 6.1) of hypotension plus echocardiographic evidence (if available) of low systemic blood flow [20]. Do not over interpret cuff blood pressure measurements in otherwise well babies with no signs of cardiovascular compromise.

Recent evidence has also concluded that antihypotensive therapy in the extremely preterm neonate is independently associated with increased risk of death and neurodevelopmental impairment/developmental delay when controlling for risk factors known to affect those outcomes[21].

7.1 Inotropes[27,28,29,30,31]

Dopamine at low dose (2-4 micrograms/kg/min) increases myocardial contractility and renal blood flow and at high doses (10-20 micrograms/kg/min) it increases vascular resistance. Dopamine is more effective than Dobutamine in the short term at raising the blood pressure in preterm infants, but this may not correlate with improving organ perfusion

Dobutamine is a direct-acting inotropic agent which stimulates the ß-receptors of the heart and blood vessels causing increased cardiac output, vasodilation and reduced vascular resistance.

Epinephrine[32]
Low doses of epinephrine cause systemic and pulmonary vasodilation with an increase in the heart rate, stroke volume and contractility. Low doses of epinephrine have been shown to be as effective as low/moderate doses of dopamine[33].

Note: High doses of both Epinephrine (c. ≥ 500-600 Nanogram/kg/min) and Dopamine (c. ≥ 15 Microgram/kg/min) can cause intense systemic vasoconstriction.

Inotropes should be administered in line with the East of England Neonatal Drug Infusion Guideline, using standard concentrations of infusions.

Where dopamine is used, it is recommended to use the licensed pre-prepared preparation, Neoatricon, which is available in a 1.5mg/mL and 4.5mg/mL concentration in line with the regional infusion concentrations.

In addition is it recommended that inotropes should be prepared in 20mL or 30mL syringes, as these will provide more reliable drug delivery than use of 50mL syringes

Drug	Category	Mode of Action	Haemodynamic effect	Dose
Dobutamine	Inotrope	Beta adrenergic agonist	Enhanced myocardial contractility and output	**IVI 5-20 micro-grams/kg/minute**
Dopamine	Inotrope/ vasopressor	Alpha and beta adrenergic agonist	Peripheral vasoconstriction Enhanced myocardial contractility and output	**IVI 5-20 micro-grams/kg/minute**
Epinephrine	Inotrope/ vasopressor	Alpha and beta adrenergic agonist	Enhanced myocardial contractility and output; peripheral vasoconstriction	**IVI 100nanograms/kg/minute – 1.5micrograms/kg/minute**
Norepinephrine	Vasopressor	Alpha(and beta) adrenergic agonist	Peripheral vasoconstriction	**IVI 20-100nanograms/kg/minute Maximum 1microgram/kg/minute**
Milrinone	Lusitrope	Increases cAMP	Increase myocardial contractility Decreases vascular tone in systemic and pulmonary arteries.	**Loading dose IV 50-75 micro-grams/kg over 30-60 minutes then IVI 0.2 – 0.75 microgram/kg/min**

7.2 Volume expansion

Volume expansion should be given **only** if there is significant clinical suspicion of hypovolaemia, increased capillary leak or blood loss. Giving fluid boluses can be counterproductive if there is an already poorly functioning myocardium or a PDA. Early use of Dopamine is more successful than colloid in increasing the blood pressure[22]. Yet there is insufficient evidence to determine whether infants with cardiovascular compromise benefit from volume expansion[23] and extensive use is associated with significant untoward effects especially in preterm infants[24]. **10mls/kg of 0.9% sodium chloride x 1 should be given over 20-30 minutes if volume is chosen to treat hypotension[25,26].** Blood or Fresh Frozen Plasma should only be considered instead of normal saline if the baby is actively bleeding and has deranged coagulation.

7.3 Corticosteroids

Preterm infants may have a relative cortisol deficiency secondary to the immature hypothalamic–pituitary axis and subsequent suboptimal response to stress. They may be useful agents in refractive hypotension or when significant blood loss/asphyxia is likely to affect the perfusion of the adrenal glands. Corticosteroids may act by increasing the sensitivity of adrenergic receptors to catecholamines, increasing catecholamine receptor expression, increasing the availability of cytosolic calcium in vascular smooth muscle and reducing the production of local vasodilators such as nitric oxide and prostaglandins. Corticosteroids can also promote the release of vasoactive catecholamines (such as norepinephrine) from the adrenal glands. Despite their association with NEC and intestinal perforation, they can be considered following failure to respond to two inotropes or if there is evidence of adrenal insufficiency.[40]

Babies at highest risk are those:
- Under 30 weeks
- Under 14 days of age
- Concurrent perinatal stress (RDS, mechanical ventilation, surgery)

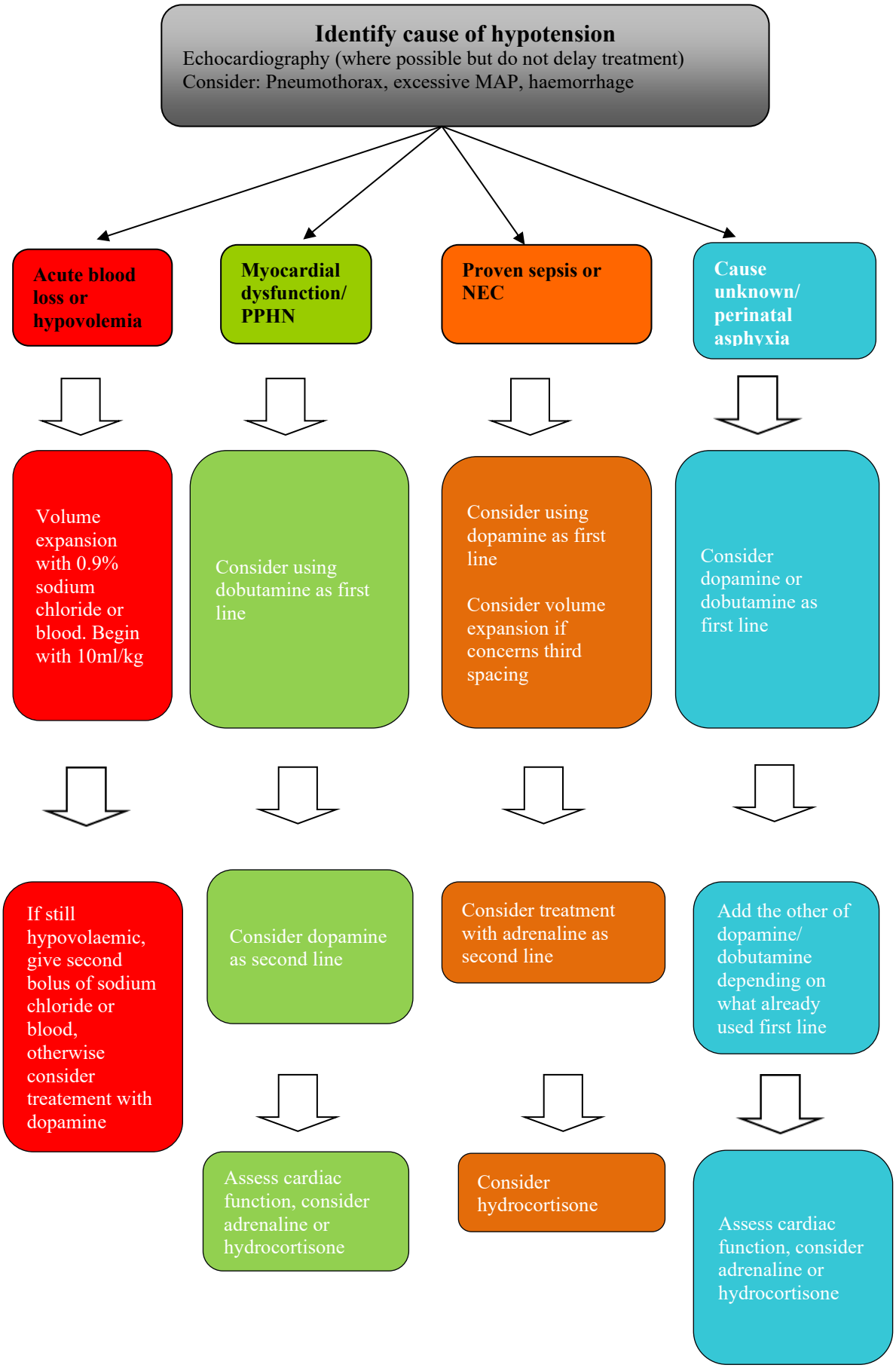
A cortisol level can be useful in babies with refractory hypotension if taken before giving hydrocortisone and for assessing response to therapy. An unstimulated cortisol level <200nmol/L is suggestive of a degree of adrenal insufficiency. Whilst it is useful to have the cortisol level, the decision to start hydrocortisone should not depend on the result which may take hours or days to come back.

An initial dose of Hydrocortisone 2.5mg/kg can be repeated at 4 hours if required, followed by 2.5mg/kg every 6 hours for 48hrs or until BP recovers. Then reduce treatment over at least 48hrs[38].

7.4 Flow chart for management

The following flow chart is adapted from the Luton and Dunstable guideline[39] and is considered as a guide only. There may be differences in the choice of dopamine or dobutamine as first line where the cause of hypotension is unknown depending on unit experience and preference.

The most recent Cochrane review of Dopamine vs. Dobutamine would suggest using dopamine as first line therapy based on the fact that it is more likely to result in an increase in blood pressure and if this fails the addition of Dobutamine may be considered. The evidence that dopamine is more effective only extends as far as the short-term effect on blood pressure and there is an argument that dobutamine may be more likely to increase systemic blood flow. If there is a significant PDA present or if there is echo evidence of cardiac dysfunction the use of dobutamine before dopamine may be more logical[31].


Identify cause of hypotension
Echocardiography (where possible but do not delay treatment)
Consider: Pneumothorax, excessive MAP, haemorrhage
Acute blood loss or hypovolemia
Myocardial dysfunction/ PPHN
Proven sepsis or NEC
Cause unknown/ perinatal asphyxia
Volume expansion with 0.9% sodium chloride or blood. Begin with 10ml/kg
Consider using dobutamine as first line
Consider using dopamine as first line
Consider volume expansion if concerns third spacing
Consider dopamine or dobutamine as first line
If still hypovolaemic, give second bolus of sodium chloride or blood, otherwise consider treatement with dopamine
Consider dopamine as second line
Consider treatment with adrenaline as second line
Add the other of dopamine/ dobutamine depending on what already used first line
Assess cardiac function, consider adrenaline or hydrocortisone
Consider hydrocortisone
Assess cardiac function, consider adrenaline or hydrocortisone

References

1. Dempsey EM, Barrington KJ. Treating hypotension in the preterm infant: when and with what: a critical and systematic review. J Perinatol 2007;27:469–78. doi:10.1038/sj.jp.7211774

2. Faust K, Härtel C, Preuß M for the Neocirculation project and the German Neonatal Network (GNN), et al. Short-term outcome of very-low-birthweight infants with arterial hypotension in the first 24 h of life. Archives of Disease in Childhood - Fetal and Neonatal Edition 2015;100:F388-F392

3. Watkins AM, West CR, Cooke RW. (1989) Blood pressure and cerebral haemorrhage and ischaemia in VLBW infants. *Early Human Development.* May;19(2):103-10 [III]

4. Nuntnarumit P, Yang W, Bada-Ellzey HS. (1999) Blood pressure measurements in the newborn. *Clinics in Perinatology*. December; 26(4):981-96. [IV]

5. Cunningham S, Symon AG, Elton RA, Zhu C, McIntosh N. (1999) Intra-arterial blood pressure reference ranges, death and morbidity in very low birthweight infants during the first seven days of life. *Early Human Development*. 56:151-165. [III]

6. Diprose GK, Evans DH, Archer LN, Levene MI. (1986) Dinamap fails to detect hypotension in very low birthweight infants. *Archives of Disease in Childhood.*August;61(8):771-3. [III]

7. Wareham JA, Haugh LD, Yeager SB, Horbar JD. (1987) Prediction of arterial *blood pressure in the premature neonate using the oscillometric method. American Journal of Disease in Childhood.* October;141(10):1108-10. [III]

8. Gevers M, van Genderingen HR, Lafeber HN, Hack WW. (1996) Accuracy of oscillometric blood pressure measurement in critically ill neonates with reference to the arterial pressure wave shape. *Intensive Care Medicine.* March; 22(3):242-8. [IIa]

9. Danniveg I, Dale HC, Liestol K, Lindenmann R. (2005) Blood pressure in the neonate: three non-invasive oscillometric pressure monitors compared with invasively measured blood pressure. *Acta Paediatrica.* February;94(2):191-6.[Ia]

10. Sonesson SE, Broberger U. (1987) Arterial blood pressure in the very low birthweight neonate. *Acta Paediatrica Scandinavia.* March;76(2):338-41. [III]

11. Moniaci V, Kraus M. (1997) Determining the relationship between invasive and non-invasive blood pressure values. *Neonatal Network.* February;16(1):51-6.[IIb]

12. Park MK, Rotham JL, German VF. (1983) Systolic pressure amplification in pedal arteries in children. *Critical Care Medicine.* April;11(4):286-289. [IIb]

13. Ng PC. Adrenocortical insufficiency and refractory hypotension in preterm infants. *Archives of Disease in Childhood - Fetal and Neonatal Edition* 2016;101:F571-F576.

14. Miall-Allen VM, De Vries LS, Whitelaw AGL. (1987) Mean arterial blood pressure and neonatal cerebral lesions. *Archives of Disease in Childhood.* October; 62(10):1068-9. [III]

15. Bada HS, Korones SB, Perry EH et al. (1990) Mean arterial blood pressure changes in premature infants and those at risk for intraventricular haemorrhage. *Journal of Pediatrics*. October; 117(4):607-14. [III]

16. Sarti A, Savron F, Ronfani L, Pelizzo G, Barbi E. (2006) Comparison of three sites to check the pulse and count the heart rate in hypotensive infants. *Paediatric Anaesthesia.* April; 16(4):394-8. [III]

17. Evans N, Moorcraft J. (1992) Effect of patency of the ductus arteriosus on blood pressure in very preterm infant. *Archives of Disease in Childhood.* October; 67(10 Spec No): 1169-73. [III]

18. Helbock HJ, Insoft RM, Conte FA. (1993) Glucocorticoid-responsive hypotension in extremely low birth weight newborns. *Pediatrics.* November; 92(5):715-7. [III]

19. Korte C, Styne D, Merritt AT, Mayes D, Wertz A, Helbock HJ.(1996) Adrenocorticoid function in the very low birth weight infant: Improved testing sensitivity and association with neonatal outcome. *Journal of Pediatrics*. February; 128(2):257-263. [Ib]

20. Subhedar NV. (2003) Treatment of hypotension in newborns. *Seminars in Neonatology.* 8:413-423.[IV]

21. Batton B, Li L, Newman NS for the Eunice Kennedy Shriver National Institute of Child Health & Human Development Neonatal Research Network*, et al.* Early blood pressure, antihypotensive therapy and outcomes at 18–22 months' corrected age in extremely preterm infants *Archives of Disease in Childhood - Fetal and Neonatal Edition* 2016;**101:**F201-F206.

22. Dasgupta SJ, Gill AB. (2003) Hypotension in the very low birthweight infant: the old, the new and the uncertain. *Archives of Disease in Childhood Fetal & Neonatal Ed.* 88; F450-454. [IV]

23. Osborn DA, Evans N. (2004) Early volume expansion for prevention of morbidity and mortality in very preterm infants. *Cochrane Database of Systematic Reviews.* (2):CD002055. [Ia]

24. Seri I, Evans J. (2001) Controversies in the diagnosis and management of hypotension in the newborn infant. *Current Opinion in Pediatrics.* April; 13(2):116-23. [IV]

25. BAPM (1999) *Guidelines for good practice in the management of neonatal respiratory distress syndrome.* [IV]

26. Oca MJ, Nelson M, Donn SM. (2003) Randomized trial of normal saline versus 5% albumin for the treatment of neonatal hypotension. *Journal of Perinatology.* September; 23(6):473-6. [Ia]

27. Seri I, Rudas G, Bors Z, Kanyicska B, Tulassay T. (1993) Effects of low-dose dopamine infusion on cardiovascular and renal functions, cerebral blood flow and plasma catecholamine levels in the sick preterm infant. *Pediatric Research.* December;34(6):742-9. [III]

28. Roze JC, Tohier C, Maingueneau C, Lefevre M, Mouzard A. (1993) Response to dobutamine and dopamine in the hypotensive very preterm infant. *Archives of Disease in Childhood.* July; 69(1 Spec No):59-63. [Ia]

29. Seri I. (1995) Cardiovascular, renal, and endocrine actions of dopamine in neonates and children. *Journal of Pediatrics.* March; 126(3):333-44.

30. Klarr JM, Faix RG, Pryce CJ, Bhatt Mehta V. (1994) Randomised, blind trial of dopamine versus dobutamine for treatment of hypotension in preterm infants with respiratory distress syndrome. *Journal of Pediatrics.* July; 125(1):117-22. [Ia]

31. Suhedar NV, Shaw NJ. (2003) Dopamine versus dobutamine for hypotensivie preterm infants. *Cochrane Database of Systematic Reviews.* (3):CD001242. [Ia]

32. Heckmann M, Trotter A, Pohlandt F, Lindner W. (*2002*) Epinephrine treatment of hypotension in very low birth weight infants. *Acta Paediatrica.* 91(5):566-70. [III]

33. Valverde E, Pellicer A, Madero R, Elorza D, Quero J, Cabanas F. (2006) Dopamine versus epinephrine for cardiovascular support in low birth weight infants: analysis of systematic effects and neonatal clinical outcomes. *Pediatrics.* June; 117(6) e1213-22. [Ib]

34. Watterberg KL. (2002) Adrenal insufficiency and cardiac dysfunction in the preterm infant. *Pediatric Research.* April; 51(4):422-424. [IV]

35. Scott SM, Watterberg KL. (1995) Effect of gestational age, postnatal age and illness on plasma cortisol concentrations in premature infants. *Pediatric Research.* January; 37(1):112-6. [III]

36. Ng PC, Lam CW, Fok TF, Lee CH, Ma KC, Chan IH, Wong E. (2001) Refractory hypotension in preterm infants with adrenocortical insufficiency. *Archives of Disease in Childhood Fetal Neonatal Ed*. March; 84(2):F122-4. [III]

37. Seri I, Tan R, Evans J. (2001) Cardiovascular effects of hydrocortisone in preterm infants with pressor resistant hypotension. *Pediatrics.* May;107(5):1070-74. [III]

38. British National Formulary March 2017.

39. Pahuja A, Chetcuti Gando C, Somisetty S, Egyepong J: Guideline for the management of Neonatal Hypotension; Luton and Dunstable Hospital, January 2015.

40. Mullaly R, El-Khuffash AF. Arch Dis Child Fetal Neonatal Ed 2024;109:F120–F127. https://doi.org/10.1136/archdischild-2022-324935

41. Chatziioannidis, I.; Kontou, A.; Stathopoulou, T.; Chotas, W.; Sarafidis, K. An Update on Pharmacologic Management of Neonatal Hypotension: When, Why, and Which Medication. Children 2024, 11, 490. https://doi.org/10.3390/children11040490

42. Kluckow M. Low Systemic Blood Flow and Pathophysiology of the Preterm Transitional Circulation. Early Hum. Dev. 2005;81:429–437. doi: 10.1016/j.earlhumdev.2005.03.006. [DOI] [PubMed] [Google Scholar]

43. Dempsey E.M., Al Hazzani F., Barrington K.J. Permissive Hypotension in the Extremely Low Birthweight Infant with Signs of Good Perfusion. Arch. Dis. Child. Fetal Neonatal. Ed. 2009;94:F241–F244. doi: 10.1136/adc.2007.124263. [DOI] [PubMed] [Google Scholar]

44. Gill A.W. Postnatal Cardiovascular Adaptation. Arch. Dis. Child. Fetal Neonatal. Ed. 2019;104:F220–F224. doi: 10.1136/archdischild-2017-314453. [DOI] [PubMed] [Google Scholar]

45. Hypotension © Neonatal Guidelines 2025–28 (University Hospital of NorthMidlands NHS Trust) The Bedside Clinical Guidelines Partnership in association with the West Midlands Perinatal Network

46. Dionne, Janis M. et al.Method of Blood Pressure Measurement in Neonates and Infants: A Systematic Review and Analysis.The Journal of Pediatrics, Volume 221, 23 - 31.e5 https://doi.org/10.1016/j.jpeds.2020.02.072

47. Joint working group of the BAPM and RCP research unit (1992) Development of audit measures and guidelines for good practice in the management of neonatal respiratory distress syndrome. Archives of Disease in Childhood 1992; 67:1221-1227

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(Hosted by Cambridge University Hospitals)

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