

Neonatal Handbook

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Introduction

The recognition and treatment of hypotension are particularly important to avoid complications such as cerebral ischaemic injury or intraventricular haemorrhage. On the other hand, hypertension in the newborn is increasingly seen as a complication in infants with bronchopulmonary dysplasia and who are receiving steroid treatment.

Arterial blood pressure (BP) is determined by

- cardiac output
- peripheral vascular resistance

In general hypotension indicates inadequate systemic blood flow or left ventricular output and therefore inadequate tissue perfusion, although this is not always the case.

Method of Blood Pressure Measurement

Unless the baby has an in-dwelling arterial line, the only reliable and accurate way of measuring blood pressure indirectly is by using the oscillometric method (eg Dynamap). To **minimise** errors of **noninvasive** BP measurements, the following guidelines are recommended

- cuff width to arm (or calf) circumference ratio as indicated on cuff
- if possible, obtain BP measurement during quiet or sleep state
- obtain average of two or three measurements if making management decisions
- use mean BP to monitor changes as less likely to be erroneous
- noninvasive BP may overestimate BP measurements in VLBW

To **minimise** errors when using **in-dwelling** arterial lines, the following factors should be noted

- narrow catheters will underestimate systolic BP
- occlusion of the tip of the catheter (vessel wall or clot) may dampen wave and underestimate BP
- even small air bubbles may have an effect on measurement
- peripheral lines read higher than umbilical lines

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'Normal' Blood Neonatal Blood Pressure Values

Blood pressure increases with

- gestation
- birth weight

- postnatal age

There is no significant difference between arm and calf blood pressure in normal infants.

It is difficult to define 'normal' BP values in ELBW infants.

In clinical practice, the infant's blood pressure is generally considered to be adequate as long as urine output (> 1ml/kg/hr) and capillary refill (< 3 seconds) are within normal limits and there is no metabolic acidosis. However, these are not reliable indicators of tissue perfusion.

Arbitrary definitions of hypertension are as follows

- term infant: systolic > 90 mmHg, diastolic > 60 mmHg
- preterm infant: systolic > 80 mmHg, diastolic > 50 mmHg

Low birthweight infants

Birthweight (g)	Systolic range (mmHg)	Diastolic range (mmHg)
501-750	50-62	26-36
751-1000	48-59	23-36
1001-1250	49-61	26-35
1251-1500	46-56	23-33
1501-1750	46-58	23-33
1751-2000	48-61	24-35

Preterm infants

Gestation (wk)	Systolic range (mmHg)	Diastolic range (mmHg)
<24	48-63	24-39
24-28	48-58	22-36
29-32	47-59	24-34
>32	48-60	24-34

Preterm infants

Day	Systolic range (mmHg)	Diastolic range (mmHg)
1	48-63	25-35
2	54-63	30-39
3	53-67	31-43
4	57-71	32-45
5	56-72	33-47
6	57-71	32-47
7	61-74	34-46

Term infants

Age	Systolic (mmHg)	Diastolic (mmHg)	Mean (mmHg)
1 hour	70	44	53
12 hour	66	41	50
Day 1 (Asleep)	70+/-9	42+/-12	55+/-11
Day 1 (Awake)	71+/-9	43+/-10	55+/-9
Day 3 (Asleep)	75+/-11	48+/-10	59+/-9
Day 3 (Awake)	77+/-12	49+/-10	63+/-13
Day 6 (Asleep)	76+/-10	46+/-12	58+/-12
Day 6 (Awake)	76+/-10	49+/-11	62+/-12
Week 2	78+/-10	50+/-9	
Week 3	79+/-8	49+/-8	
Week 4	85+/-10	46+/-9	

Tables in Adobe Acrobat format, suitable for printing. If you do not have a copy of [Acrobat Reader](#) to view this file, the latest version is available for free download from www.adobe.com



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Areas of Uncertainty in Clinical Practice

Definitions of 'normal' blood pressure in low birthweight and preterm infants are based on small numbers. Although these are 'healthy' infants, a variety of devices have been used to produce the measurements. There is very good evidence to suggest that blood pressure cannot necessarily be equated with normal systemic flow or a normal circulating blood volume.

References

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Other Reading/Web links

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