

Table 5-10 ■ Normal Pediatric Vital Signs

Normal pediatric heart rates¹⁷⁶

Age	Awake heart rate (per min)	Sleeping heart rate (per min)
Neonate	100-180	80-160
Infant (6 mo)	100-160	75-160
Toddler	80-110	60-90
Preschooler	70-110	60-90
School-age child	65-110	60-90
Adolescent	60-90	50-90

Always consider patient's normal range and clinical condition. Heart rate will normally increase with fever or stress.

Normal pediatric respiratory rates

Age	Rate (breaths per min)
Infants	30-60
Toddlers	24-40
Preschoolers	22-34
School-aged children	18-30
Adolescents	12-16

Your patient's normal range should always be considered. Also, the child's respiratory rate is expected to increase in the presence of fever or stress.

Normal pediatric blood pressures*

Age	Systolic pressure (mm Hg)	Diastolic pressure (mm Hg)
Birth (12 hr, <1000 g)	39-59	16-36
Birth (12 hours, 3 kg weight)	50-70	25-45
Neonate (96 hr)	60-90	20-60
Infant (6 mo)	87-105	53-66
Toddler (2 yr)	95-105	53-66
School age (7 yr)	97-112	57-71
Adolescent (15 yr)	112-128	66-80

*Blood pressure ranges taken from the following sources:

Neonate: Versmold H and others: Aortic blood pressure during the first 12 hours of life in infants with birth weight 610-4220 gms, *Pediatrics* 67:107, 1981. 10th-90th percentile ranges used.

Others: Horan MJ, chairman: Task Force on Blood Pressure Control in Children, report of the second task force on blood pressure in children, *Pediatrics* 79:1, 1987 50th-90th percentile ranges indicated.

■ ESTIMATION OF MEDIAN AND LOWEST ACCEPTABLE SYSTOLIC BLOOD PRESSURE IN CHILDREN⁷⁵

Median (50th percentile) systolic blood pressure:

$$90 \text{ mm Hg} + [2 \times \text{age in years}] = \text{_____ median systolic BP}$$

Lowest (5th percentile) systolic blood pressure

$$70 \text{ mm Hg} + [2 \times \text{age in years}] = \text{_____ lowest systolic BP}$$

fail to reflect a rapidly falling or a very low blood pressure accurately.^{120,240} Auscultated blood pressure may be difficult to obtain when shock is present because the Korotkoff sounds may be muffled or impossible to hear. The auscultated cuff pressure actually may *underestimate* intraarterial blood pressure when shock is present⁸⁵; however, underestimation is probably more prudent than overestimation of blood pressure during the assessment of the patient in shock.

Intraarterial pressure monitoring is the preferred method of blood pressure monitoring for the unstable critically ill child. This method of blood pressure measurement is the most accurate, provided the transducer is levelled, zeroed, and calibrated appropriately and assuming that the catheter and tubing system provide an uninterrupted fluid column between patient and transducer (without kinks, air, clot, or loose connections). (For further information regarding intraarterial pressure monitoring the reader is referred to Chapter 14).

Simultaneous examination of the electrocardiogram and arterial waveform can yield information about the ventricular stroke volume. If the stroke volume and cardiac output are adequate the upstroke of the child's arterial waveform will be sharp, and a well-defined dicrotic notch will be visible. The pulse pressure will be appropriate for age (refer to Table 5-10, if needed). When stroke volume is small and cardiac output is diminished the upstroke of the arterial waveform usually is dampened with a more horizontal upstroke, resembling a sine wave, and the pulse pressure is narrow (particularly if cardiogenic