

Normal Pediatric Vital Signs

AGE	HR	SBP	DBP	RR
Newborn	70-190	55-80	30-50	30-50
6 mos	80-160	75-108	43-70	24-40
12 mos	80-160	75-108	43-70	24-40
2 yrs	80-130	78-113	48-78	24-32
4 yrs	80-120	78-113	48-78	22-28
6 yrs	75-115	78-115	48-78	22-28
8 yrs	70-110	84-122	53-82	20-24
10 yrs	70-110	88-130	55-85	20-24
12 yrs	65-110	94-136	57-88	16-22
14 yrs	60-105	98-144	60-90	16-22

THIS BLOOD PRESSURE IS AN ESTIMATION AND MAY NOT BE USEFUL FOR EVALUATION OF EVERY CHILD

Basic Pediatric Intravenous Fluid Management

MAINTENANCE FLUID: Fluid requirement with enough H₂O, glucose and electrolytes to prevent deterioration of body stores. Takes into account normal insensible losses, sweat, urine, stool. Higher requirements for preterm, low birth wt, fever, hyperventilation, sweating, hyperthermia.

Fluid type:

D5 0.2NS + 20 mEq/L KCl (i.e., "D5 quarter NS") used for most kids
(**Caution:** Serum Na concentration must be monitored in certain respiratory and CNS infectious conditions which affect ADH secretion. Kidney function should be taken into account when adding KCl into fluids.)

Fluid rate (daily):

Based on body weight in kg:
1-10 kg: 100 ml/kg
11-20 kg: 1000 ml + 50 ml/kg for each kg >10 kg
>20 kg: 1500 ml + 20 ml/kg for each kg >20 kg

DEFICIT: Dehydration, loss of intravascular volume. (i.e., vomit, diarrhea, sepsis with capillary leak, osmotic diuresis). **Estimate degree of dehydration:**

--History: pre-illness wt? PO intake? UOP? SOP? Emesis? High fever?
--PE: HR? BP? Current wt? Mental status? Mucous membranes? Tears? Cap refill? Sunken fontanelle? Skin turgor? Perfusion?
--Labs: urine spec grav >1.020, BUN/Cr >20, high Hct, serum Na, glucose
Isotonic Dehydration? If yes, proceed below. If no, consult other sources.

Estimate degree of dehydration (mild 3-5%, mod 6-10%, severe >11%) & fluid deficit (i.e., 10 kg child, 10% dry, 1 kg "down" = 1 L fluid deficit)

Bolus with isotonic fluid (NS or LR) to improve effective circulating volume
20 ml/kg x 1 over 20-30 min (except in heart & kidney disease, use 10 ml/kg), then reassess.
Repeat 20ml/kg prn if pt remains hypovolemic without much change in PE.

Continue Deficit Replacement but at a slower rate using D5 0.45NS over next 24 hours, adding in KCl if +UOP. Subtract bolus amount from initial deficit calculation
Replace first half of remaining deficit in **first 8 hours**
Replace second half of remaining deficit in **second 16 hours**

ONGOING LOSSES: continuing losses in form of vomit, diarrhea, cap leak, etc.

--As a general rule, **most GI losses** can be replaced with **D5 0.45NS**
--Most kids will start to drink a bit once they are feeling better while they are rehydrating
--Calculate ongoing losses over some regular interval and replace back into IVF prn

FOOTNOTES

1. Hepatitis B vaccine (HepB). (Minimum age: birth)

At birth:

- Administer monovalent HepB to all newborns before hospital discharge.
- If mother is hepatitis B surface antigen (HBsAg)-positive, administer HepB and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth.

If mother's HBsAg status is unknown, administer HepB within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if HBsAg-positive, administer HBIG (no later than age 1 week).

After the birth dose:

- The HepB series should be completed with either monovalent HepB or a combination vaccine containing HepB. The second dose should be administered at age 1 or 2 months. The final dose should be administered no earlier than age 24 weeks.
- Infants born to HBsAg-positive mothers should be tested for HBsAg and antibody to HBsAg (anti-HBs) after completion of at least 3 doses of the HepB series, at age 9 through 18 months (generally at the next well-child visit).

4-months dose:
Administration of 4 doses of HepB to infants is permissible when combination vaccines containing HepB are administered after the birth dose.

2. Rotavirus vaccine (RV). (Minimum age: 6 weeks)

- Administer the first dose at age 6 through 14 weeks (maximum age: 14 weeks 6 days). Vaccination should not be initiated for infants aged 15 weeks or older (i.e., 15 weeks 0 days or older).
- Administer the final dose in the series by age 8 months 0 days.

If Rotarix[®] is administered at ages 2 and 4 months, a dose at 6 months is not indicated.

3. Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP). (Minimum age: 6 weeks)

- The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.
- Administer the final dose in the series at age 4 through 6 years.

4. Haemophilus influenzae type b conjugate vaccine (Hib). (Minimum age: 6 weeks)

- If PRP-OMP (PedvaxHIB[®] or Comvax[®] [HepB-Hib]) is administered at ages 2 and 4 months, a dose at age 6 months is not indicated.
- TriHIBit[®] (DTaP/Hib) should not be used for doses at ages 2, 4, or 6 months but can be used as the final dose in children aged 12 months or older.

5. Pneumococcal vaccine. (Minimum age: 6 weeks for pneumococcal conjugate vaccine [PCV]); 2 years for pneumococcal polysaccharide vaccine [PPSV])

- PCV is recommended for all children aged younger than 5 years.

Administer 1 dose of PCV to all healthy children aged 24 through 59 months who are not completely vaccinated for their age.

- Administer PPSV to children aged 2 years or older with certain underlying medical conditions (see MMWR 2000;49[No. RR-8]), including a cochlear implant.

6. Influenza vaccine. (Minimum age: 6 months for trivalent inactivated influenza vaccine [TIV]); 2 years for live attenuated influenza vaccine [LAIV])

- Administer annually to children aged 6 months through 18 years.
- For healthy nonpregnant persons (i.e., those who do not have underlying medical conditions that predispose them to influenza complications) aged 2 through 49 years, either LAIV or TIV may be used.

Children receiving TIV should receive 0.25 mL if aged 6 through 35 months or 0.5 mL if aged 3 years or older.

- Administer 2 doses (separated by at least 4 weeks) to children aged younger than 9 years who are receiving influenza vaccine for the first time or who were vaccinated for the first time during the previous influenza season but only received 1 dose.

7. Measles, mumps, and rubella vaccine (MMR). (Minimum age: 12 months)

- Administer the second dose at age 4 through 6 years. However, the second dose may be administered before age 4, provided at least 28 days have elapsed since the first dose.

8. Varicella vaccine. (Minimum age: 12 months)

- Administer the second dose at age 4 through 6 years. However, the second dose may be administered before age 4, provided at least 3 months have elapsed since the first dose.

For children aged 12 months through 12 years the minimum interval between doses is 3 months. However, if the second dose was administered at least 28 days after the first dose, it can be accepted as valid.

9. Hepatitis A vaccine (HepA). (Minimum age: 12 months)

- Administer to all children aged 1 year (i.e., aged 12 through 23 months). Administer 2 doses at least 6 months apart.
- Children not fully vaccinated by age 2 years can be vaccinated at subsequent visits.

HepA also is recommended for children older than 1 year who live in areas where vaccination programs target older children or who are at increased risk of infection. See MMWR 2006;55(No. RR-7).

10. Meningococcal vaccine. (Minimum age: 2 years for meningococcal conjugate vaccine [MCV] and for meningococcal polysaccharide vaccine [MPSV])

- Administer MCV to children aged 2 through 10 years with terminal complement component deficiency, anatomic or functional asplenia, and certain other high-risk groups. See MMWR 2005;54(No. RR-7).
- Persons who received MPSV 3 or more years previously and who remain at increased risk for meningococcal disease should be revaccinated with MCV.

FOOTNOTES

1. Tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap). (Minimum age: 10 years for BOOSTRIX[®] and 11 years for ADACEL[®])

- Administer at age 11 or 12 years for those who have completed the recommended childhood DTP/DaP vaccination series and have not received a tetanus and diphtheria toxoid (Td) booster dose.

Persons aged 13 through 18 years who have not received Tdap should receive a dose.

A 5-year interval from the last Td dose is encouraged when Tdap is used as a booster dose; however, a shorter interval may be used if pertussis immunity is needed.

2. Human papillomavirus vaccine (HPV). (Minimum age: 9 years)

- Administer the first dose to females at age 11 or 12 years.
- Administer the second dose 2 months after the first dose and the third dose 6 months after the first dose (at least 24 weeks after the first dose).

Administer the series to females at age 13 through 18 years if not previously vaccinated.

3. Meningococcal conjugate vaccine (MCV).

- Administer at age 11 or 12 years, or at age 13 through 18 years if not previously vaccinated.
- Administer to previously unvaccinated college freshmen living in a dormitory.

MCV is recommended for children aged 2 through 10 years with terminal complement component deficiency, anatomic or functional asplenia, and certain other groups at high risk. See MMWR 2005;54(No. RR-7).

Persons who received MPSV 5 or more years previously and remain at increased risk for meningococcal disease should be revaccinated with MCV.

4. Influenza vaccine.

- Administer annually to children aged 6 months through 18 years.
- For healthy nonpregnant persons (i.e., those who do not have underlying medical conditions that predispose them to influenza complications) aged 2 through 49 years, either LAIV or TIV may be used.

Administer 2 doses (separated by at least 4 weeks) to children aged younger than 9 years who are receiving influenza vaccine

for the first time or who were vaccinated for the first time during the previous influenza season but only received 1 dose.

5. Pneumococcal polysaccharide vaccine (PPSV).

- Administer to children with certain underlying medical conditions (see MMWR 1997;46[No. RR-8]), including a cochlear implant. A single revaccination should be administered to children with functional or anatomic asplenia or other immunocompromising condition after 5 years.

6. Hepatitis A vaccine (HepA).

- Administer 2 doses at least 6 months apart.
- HepA is recommended for children older than 1 year who live in areas where vaccination programs target older children or who are at increased risk of infection. See MMWR 2006;55(No. RR-7).

7. Hepatitis B vaccine (HepB).

- Administer the 3-dose series to those not previously vaccinated.
- A 2-dose series (separated by at least 4 months) of adult formulation Recombivax HB[®] is licensed for children aged 11 through 15 years.

8. Inactivated poliovirus vaccine (IPV).

- For children who received an all-IPV or all-oral poliovirus (OPV) series, a fourth dose is not necessary if the third dose was administered at age 4 years or older.

If both OPV and IPV were administered as part of a series, a total of 4 doses should be administered, regardless of the child's current age.

9. Measles, mumps, and rubella vaccine (MMR).

- If not previously vaccinated, administer 2 doses or the second dose for those who have received only 1 dose, with at least 28 days between doses.

For persons aged 7 through 18 years without evidence of immunity (see MMWR 2007;56[No. RR-4]), administer 2 doses if not previously vaccinated or the second dose if they have received only 1 dose.

For persons aged 7 through 12 years, the minimum interval between doses is 3 months. However, if the second dose was administered at least 28 days after the first dose, it can be accepted as valid.

For persons aged 13 years and older, the minimum interval between doses is 28 days.