Treatment Guidelines for Common Paediatric and Neonatal Diseases at Haydom Lutheran Hospital - Tanzania

by

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Preface / Acknowledgement

This booklet is an attempt to summarise possible treatment schedules at Haydom Lutheran Hospital (HLH), and to aid medical personnel in proper treatment of newborns, infants and children. It does not replace any textbook and needs to be revised from time to time due to the rapid changes in medical science!

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Paediatrics

Treatment Schedules for "Common" Paediatric Diseases

I. Life-threatening and severe diseases

<u>Acute cardiac failure:</u> if due to **hypovolaemia** give i.v. 10-30 ml/kg/dose 0.9% NaCl or Ringer's Lactate in 30 min if due to **anaemia** give slowly (over 6-8 hours) blood transfusion 10-20 ml/kg

if due to **cardiogenic shock** give Adrenaline/Epinephrine i.v. (in the vial you get 1:1000 dilution: make 1:10000 dilution = 1 ml Adrenaline and 9 ml NaCl): give 0.1 (-0.5) ml/kg/dose i.v. (=0.01-0.05 mg/kg), repeat as needed

(may be Atropine 0.01-0.03 mg/kg/dose, repeat as needed)

if due to **septic shock** give antibiotics and steroids and vasoconstrictors and fluids as in hypovolaemia

- <u>Anaemia (severe)</u>: Hb below 4.5 g/dl (Hct/PCV < 14%) or Hb below 5.5 g/dl (Hct/PCV < 17%) <u>with</u> signs of heart failure - blood transfusion 15-20 ml/kg over 4-6 hours, may be repeated next day; Frusemide is <u>not</u> absolutely necessary! Afterwards give Folic acid and Ferrous sulfate for 4 weeks (see below)
- <u>Coma:</u> exclude hypo-/hyperglycaemia, hypoxia, malaria, meningitis, status epilepticus, head trauma, respiratory and/or cardiac arrest
- <u>Diabetic ketoacidosis:</u> 0.9% NaCl i.v. 100-150 ml/kg/day + KCl 3 mval (=ml)/kg/day, first half in first 8 hours, next half in remaining 16 hours; change to 5% Glucose i.v. if blood sugar is below 10 mmol/l Actrapid (fast-acting insulin) 0.1 IU/kg/dose i.v./s.c. initially (not when blood sugar < 10 mmol/l), later according to blood sugar change as fast as possible to Insulin lente s.c. and oral nutrition!

Foreign body aspiration: immediately removal by stiff bronchoscopy

Gastroenteritis with severe dehydration: see WHO/IMCI treatment schedules (pages 16-18)

<u>Hypertensive crisis:</u> Nifedipine p.o. 0.25-0.5 mg/kg/dose Frusemide i.v. 1-5 mg/kg/dose Hydralazine p.o. 0.25-1 mg/kg/dose, maximal dose 7.5 mg/kg/day in 3 doses Diazoxide i.v. or p.o. 5 mg/kg/dose (max. 150 mg), may be repeated after 15-25 min

- Hypoglycaemia: Glucose 10% i.v. 5 ml/kg/dose stat, followed by continuous Glucose 10% infusion
- Intoxications: gastric lavage 10 ml/kg warm 0.9% NaCl per one in-out cycle through NGT in some intoxications (like rat poison) Atropine i.v. 0.05 mg/kg/dose up to every hour

Laryngotracheobronchitis: offer enough oral fluid, place child in cool air, calm down the child,

infusion not necessary, antibiotic (like Amoxycillin) only optional (virus!)

- 1.) Inhalation over 15 min: Adrenaline 1 ml and 0.9% NaCl 1 ml over nebulizer (Pariboy), can be repeated every 2-4 hours
- 2.) Dexamethasone i.v./i.m. 0.5 mg/kg/dose up to 3 doses per day for 2-4 days
 - or Prednisolone p.o. 2-4 mg/kg/day in 3-4 doses for 2-4 days
- Lung oedema: Frusemide i.v. 1-2 mg/kg/dose stat, repeat as needed (3-4 doses/day)

<u>Malaria (severe)</u>: Quinine i.v. 20 mg/kg loading dose over 4 hrs, afterwards i.v. 10 mg/kg/dose every 12 hrs over 2 hrs in 10% Glucose; fluid restriction: 80-100% of normal requirements; change as soon as possible to Quinine p.o. 30 mg/kg/day in 3 doses (10 mg/kg/dose)

<u>Malnutrition:</u> see extra guidelines (page 13)

<u>Meningitis:</u> < 2 months old: Ampicillin i.v. 200-300 mg/kg/day in 4 doses plus Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses (later oral Amoxycillin 100-150 mg/kg/day in 3-4 doses)

> 2 months old: Benzylpenicillin i.v. 200000-400000 IU/kg/day in 4 doses plus Chloramphenicol i.v. 100 mg/kg/day in 3-4 doses

(later oral Penicillin V 100-150 mg/kg/day in 3-4 doses)

(later oral Chloramphenicol 75 mg/kg/day in 3-4 doses)

(if available, give Ceftriaxone or Cefotaxime instead of Ampicillin/Penicillin; dosage page 12) optional during the <u>first 4 days</u>: Dexamethasone i.v. 0.6 mg/kg/day in 4 doses 15-20 min <u>before</u> antibiotic!

duration of intravenous treatment at least 7 days, then at least 7 days oral treatment (total at least 14 days!); fluid restriction: 80-100% of normal requirements

Diazepam or Phenobarbitone for convulsions (see Status epilepticus)

<u>Pneumonia (se</u>	<u>ere):</u> < 6 years old: Ampicillin i.v. 100-150 mg/kg/day in 3-4 doses plus Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses for 5-7 days (later oral Amoxycillin 50-75 mg/kg/day in 3-4 doses)
	 6 years old: or Benzylpenicillin 150000-300000 IU/kg/day in 3-4 doses plus Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses for 5-7 days (later oral Penicillin V 75-100 mg/kg/day in 3-4 doses)
	or Chloramphenicol i.v. 75-100 mg/kg/day in 3-4 doses plus Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses for 5-7 days (later oral Chloramphenicol 50-75 mg/kg/day in 3-4 doses)
	Teat for 10-14 days; fluid restriction: 80-100% of normal requirements Staphylococcus aureus pneumonia is more common in Africa and especially in children < 1 /ear of age. When suspected take CXR and give Cloxacillin i.v. 100 mg/kg/day in 3-4 doses n addition.
	(if available, you may give Ceftriaxone or Cefotaxime instead of Ampicillin/Penicillin in exceptional cases; dosage page 12)
Resuscitation:	ABC rules (airway, breathing, circulation) Adrenaline/Epinephrine (in the vial you get 1:1000 dilution: make 1:10000 dilution = 1 ml Adrenaline and 9 ml NaCl): give 0.1-0.5 ml/kg/dose i.v. (=0.01-0.05 mg/kg), you can increase up to 1.0 ml/kg/dose (0.1 mg/kg) (high dose, esp. for endotracheal application), repeat as needed, give in asystole and in bradycardia Volume: 20 ml/kg 0.9% NaCl or Ringer's Lactate i.v. in 20-30 min Atropine: 0.01-0.03 mg/kg/dose i.v., repeat as needed, in bradycardia, not in asystole Sodium bicarbonate (8.4% - dilute to 4.2%): 1-2 ml/kg/dose 4.2% slowly i.v Be cautious, give only if adequate ventilation is established. Glucose 10%: 5 ml/kg/dose i.v.
	Calcium gluconate 10%: 1-2 ml/kg/dose i.v.
<u>Sepsis:</u>	 Benzylpenicillin i.v. 150000-400000 IU/kg/day in 3-4 doses Ampicillin i.v. 150-250 mg/kg/day in 3-4 doses Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses Chloramphenicol i.v. 100 mg/kg/day in 3-4 doses , if > 2 months Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses (occasionally) Metronidazole i.v. 30 mg/kg/day in 3 doses (occasionally) Metronidazole i.v. 30 mg/kg/day in 3 doses (occasionally) Metronidazole i.v. 30 mg/kg/day in 3 doses (occasionally) most severe cases; dosage page 12) n some cases: Dexamethasone i.v./i.m. 1 mg/kg/dose, can be repeated 3-4 times in 24 hrs or Prednisolone p.o. 5-10 mg/kg/dose, can be repeated 3-4 times in 24 hours treat at least for 10 days, measure blood pressure, give fluids in shock
<u>Shock:</u>	ABC rules (airway, breathing, circulation) Adrenaline/Epinephrine (in the vial you get 1:1000 dilution: make 1:10000 dilution = 1 ml Adrenaline and 9 ml NaCl): give 0.1-0.5 ml/kg/dose i.v. (=0.01-0.05 mg/kg), you can increase up to 1.0 ml/kg/dose (0.1 mg/kg) (high dose, esp. for endotracheal application), repeat as needed Volume: 10-20 ml/kg 0.9% NaCl or Ringer's Lactate i.v. in 20-30 min Blood transfusion if necessary
	Dexamethasone i.v./i.m. 1 mg/kg/dose, can be repeated 3-4 times in 24 hours

Status asthmaticus:		Oxygen PRN					
		Salbutamol per	Salbutamol per inhalation 1.5-2.5 mg/dose (add 1 ml NaCl), up to 4-6 times/day				
		(Salbutamol p.c	(Salbutamol p.o. 0.3-0.4 mg/kg/day; < 1 years: 1 mg x 3-4 times/day; < 5 years:				
		2 mg x 3-4 time	s/day)				
or		Fenoterol soluti	on (2 drops + 1 drop per each year	of age/dose) in 2 ml NaCl for			
		inhalation up to	4-6 times/day				
and lp N		Ipratropium bro	mide solution (2 drops + 1 drop per	each year of age/dose) in 2 ml			
		NaCl for inhalat	<u>ion</u> up to 4-6 times/day				
	and	Dexamethason	e i.v./i.m. 0.5-1 mg/kg/day in 2-3 do	ses			
		(or Pred	dnisolone i.v./p.o. 2-5 mg/kg/dose)				
	and	Aminophylline i	.v. 5-7 mg/kg as loading dose over	20 min,			
	-	then 15	-20 mg/kg/day in 3 doses i.v./p.o.				
	and	Adrenaline/Epir	hephrine (in the vial you get 1:1000	dilution: make 1:10000 dilution =			
		1 ml Adrenaline	1 ml Adrenaline and 9 ml NaCl): give 0.1-0.3 ml/kg/dose s.c.(i.v.) (= 0.01-0.03				
		mg/kg), you car	repeat after 15-30 min as needed				
		tiulds as usual o	or even increased by 10%				
Status opil	ontique	1 Diazonami v	(roctally 0.3 (0.5) mg/kg/doco ovo	r 1 5 min (max, 20 mg/doso), can			
<u>Status epir</u>	epticus.	he repeated aff	L Diazepam I.V./rectally 0.3 (-0.5) mg/kg/dose over 1-5 min (max. 20 mg/dose), can				
		If fits respond h	If fits respond but come frequently make Diazenam drip 100 mg/500 ml and give				
		0.1-0.4 ma/ka/h	n nis respond but come requerity make Diazepart drip 100 mg/500 ml and give				
		2 Phenoharhito	0. I-0.4 IIIy/Ky/II 2. Phenoharhitone i v. 10.15 mg/kg/dose over 1.5 min. can be repeated after 10.20				
		min	2. Frienobarbilone i.v. 10-15 mg/kg/uose over 1-5 min, can be repeated aller 10-20 min				
		3 Phenytoin i v	10-20 ma/ka/dose over 15-20 min	(max_1000 mg/dose) can be			
		repeated after 1	0-20 min (5-10 ma/ka/dose)	(
		Be prepared for	Be prepared for intubation!				
		Do not forget th	Do not forget the possibility of hypoglycaemia!				
		As a last option	As a last option you can give the patient general anaesthesia with thiopental				
		2-3 mg/kg/dose	stat and then 1 mg/kg/dose prn				
Thermal in	<u>juries:</u>						
Body-	Day 1		Day 2	Day 3			
weight	Volun	ne/Type	Volume/Type	Volume/Type			
	0						
< 10 kg:10	0 ml/kg/a +	5 ml x kg x % BS [*]	$100 \text{ ml/kg/d} + 3 \text{ ml x kg x % BS^{-}}$	100 ml/kg/d +1 ml x kg x % BS^			
0.9	9% NaCI : 5	5% GIUC = 1 : 1	0.9% NaCI : 5% Gluc = 1 : 2	0.9% NaCl : 5% Gluc = 1 : 4			
< 20 ka.80	$ml/ka/d \pm E$	5 ml v ka v % PS*	$80 \text{ m}/\text{kg/d} + 3 \text{ m}/\text{kg/d} \times \frac{9}{2} \text{ PS}^*$	$90 \text{ ml/kg/d} \pm 1 \text{ ml x kg x } \% \text{ PS}^*$			
< 20 kg.00		5 IIII X KY X 70 DS	0.0% NoCl : 5% Glue = 1 : 2	0.0% NoCL: 5% Glue = 1:4			
0.8	70 INACI . O		0.370 mach. 070 Gluc – 1.2	0.3 / 0 NaCi . $0 / 0$ Glue – 1.4			
< 40 ka [.] 60	ml/ka/d + f	5 ml x ka x % BS*	60 ml/ka/d + 3 ml x ka x % BS*	60 ml/ka/d + 1 ml x ka x % BS*			
0.9)% NaCl : 5	5% Gluc = 1 : 1	0.9% NaCl : 5% Gluc = 1 : 2	0.9% NaCl : 5% Gluc = 1 : 4			

*BS: injured body surface

from day 4 onwards normal fluid amounts

Wound care - remove all necroses and blisters early, then apply GV-paint, later Vaseline gauze Adaequate pain medication - Pethidine i.m. 1 mg/kg/dose every 4-6 hours Do not forget tetanus immunization! Prophylactic antibiotics are of no proven benefit!

II. Other diseases

<u>Abscess:</u> the main therapeutic intervention is I&D

AIDS/HIV: no specific treatment affordable for the majority, only symptomatic remedies (but observe the national policy changes concerning HAART and PMTCT) treat secondary infections like pneumonia, gastroenteritis, chronic diarrhoea etc. treat tuberculosis as in uninfected individuals, but longer ensure good, vitamin-enriched nutrition prophylaxis: Vitamin A 100 000 IU for 2 days every 6 months if < 2 years 200 000 IU for 2 days if > 2 years Cotrimoxazole "prophylaxis" may reduce mortality: p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 1 dose

<u>Allergies:</u>	Chlorpheniramine (Piriton; 4 mg tabs., 10 mg/ml) - p.o./s.c./i.m. 0.35 mg/kg/day ir Promethazine (Phenergan; 25 mg tabs., 25 mg/ml) - p.o./i.m. 0.1 mg/kg/dose x 3 or p.o. 0.5 mg/kg/dose at bedtime				
<u>Anaemia:</u>	Ferrous (elemer Folic acid p.o. 2	ntary) p.o. 2-3 mg/kg/day for 4 weeks .5-5 mg/day for 4 weeks			
<u>Animal bites:</u>	do not forget to surgical cleanin fasciotomy if ne scorpion bites v	consider T.T. and A.R.V. g if necessary cessary ery painful - give strong analgesic like Pethidine			
Asthma: Much fluid to d avoid dust and Salbutamol inh (Salbutamol ta or Salbut or Fenote inhalat and Ipratro NaCl f and Amino and Beclor or Predni zero!		ink in order to soften the mucus too much exercises aler 1-2 puffs x 3-4/day lets p.o. 0.3-0.4 mg/kg/day; <1 year: 1 mg x 3/day; <6 years: 2 mg x 3-4/day) mol per <u>inhalation</u> 1.5-2.5 mg/dose (add 1 ml NaCl), up to 4-6 times/day rol solution (2 drops + 1 drop per each year of age/dose) in 2 ml NaCl for on up to 4-6 times/day ium bromide solution (2 drops + 1 drop per each year of age/dose) in 2 ml r <u>inhalation</u> up to 4-6 times/day hylline p.o. 10-15 mg/kg/day in 3-4 doses ethasone inhaler 1 puff x 2/day olone p.o. 2 mg/kg/day initially, try to reduce then to less than 5 mg/day or to			
<u>Cellulitis:</u>	Benzylpenicillin (sometimes with then Penicillin V be aware of sta in 3 doses as lo	i.v. 100000-150000 IU/kg/day in 3-4 doses for 3-5 days n Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 5-7 days) / 75 mg/kg/d in 3 doses over 5-7 days phylococcal infection and if suspected give Cloxacillin i.v./p.o. 100 mg/kg/day ng as clinically indicated			
Chronic cardiac	<u>: failure (CCF):</u>	 Frusemide p.o. 1-3 (-5) mg/kg/day in 2 (-3) doses Captopril p.o. 0.5-1-2 mg/kg/day in 2-3 doses (start first with 0.25 mg/kg/day) Digoxin i.v. 0.02 mg/kg/dose at 0 and 6 hours (rapid digitalization) (digitalizing dose 0.04 mg/kg) Digoxin p.o. 0.015 mg/kg/dose at 0, 6, 12 and 18 hours (slow digitalization) (digitalizing dose 0.06 mg/kg) then as maintenance dose p.o. 0.015-0.02 mg/kg/day in 1-2 doses Hydrochlorothiazide p.o. 1-2 mg/kg/day in 1-2 doses Hydralazine p.o. 0.75-1 mg/kg/day in 3-4 doses in atrial fibrillation give ASA p.o. 150 mg/day in 1 dose for specialist use only: Nifedipine p.o. 0.5-1 mg/kg/day in 3-4 doses 			
Congenital hear	rt disease (CHD)	: we can only treat cardiac failure at HLH (see above) in cyanotic CHD keep Hb over 12 g/dl			
Dysentery: Amoebiasis - Shigellosis - Campylobacter		Metronidazole p.o./rect./i.v. 20-30 (-50) mg/kg/day in <u>1 or 3</u> doses for 7-10 days Tinidazole p.o. 50-60 mg/kg/day in 1 dose for 3 days (max. 2 g/day) Chloramphenicol p.o. 50 mg/kg/day in 3-4 doses for 5 days Cotrimoxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses for 5 days Ampicillin p.o. 100 mg/kg/day in 4 doses for 5 days Nalidixic acid p.o. 30-50 (-60) mg/kg/day in 3-4 doses for 5-7 days Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses for 5 days			
<u>Epilepsy:</u>	Generalised epi	lepsy - alternatives: Phenobarbitone p.o. 4-5 mg/kg/day in 2 doses Carbamazepine p.o. 15-20 mg/kg/day in 2(-3) doses Valproic acid p.o. 10-20 mg/kg/day in (2-) 3 doses			

or combinations of these Focal epilepsy - alternatives: Carbamazepine p.o. 15-20 mg/kg/day in 2(-3) doses Phenobarbitone p.o. 4-5 mg/kg/day in 2 doses Valproic acid p.o. 10-20 mg/kg/day in (2-) 3 doses or combinations of these Rule: start slowly with one-fourth of the final dose, then increase by one-fourth increments after 3-4 days Never change an antiepileptic drug which works well!!! Only consider to stop these drugs if the patient has not had any convulsion for the last 2 years!!! Stop gradually, taper off over a month's time, especially phenobarbitone Febrile convulsions: during convulsion: lower fever > 38.5° C immediately with Paracetamol + tepid sponging, give Diazepam rect./i.v. 0.3-0.5 mg/kg/dose (you can use i.v. solution for rectal application), can be repeated up to four times/day; if this fails use for example Phenobarbitone for prophylaxis: lower always fever > 38.5° C with Paracetamol; if the child had repeated episodes of febrile convulsions - consider also regular Diazepam administration (e.g. rect.) during febrile illnesses in order to prevent recurrences. In prolonged and frequently recurrent fits consider prophylactic phenobarbitone or valproate in above doses. Rule out meningitis. Paracetamol p.o. 60-80 mg/kg/d in 3-4 doses (15-20 mg/kg/dose) Fever: tepid sponging - only 30 min after Paracetamol effective, otherwise will cause only shivering Aspirin (= ASA) – only second choice (dosage as Paracetamol) Fever of unknown origin (FUO): essentially one has to treat like sepsis Gastroenteritis: mostly viral pathogens, therefore only symptomatic treatment necessary according to WHO/IMCI guidelines (pages 16-18) Giardiasis: Metronidazole p.o. 30 mg/kg/d in 1 or 3 doses over 3-5 days Tinidazole p.o. 50-60 mg/kg/day in 1 dose for 1 day (max. 2 g/day) Glomerulonephritis/Nephritic syndrome: look for hypertension, treat this according to the schedule below Penicillin V p.o. 75 mg/kg/day in 3-4 doses over 10 days diuretics if necessary Hepatitis B (chronic): no specific treatment; look for signs of liver failure (jaundice, bleeding, ascites) Hypertension: 1. Propranolol p.o. 0.5-1 (-3) mg/kg/day in 3 doses 2. Nifedipine p.o. 0.5-1 mg/kg/day in 3 doses 3. Hydrochlorothiazide p.o. 1-2 mg/kg/day in 1-2 doses 4. Captopril p.o. 0.5-1-2 (-4) mg/kg/day in 2-3 doses in more severe cases as additional therapy: 5. Frusemide p.o. 1-3 (-5) mg/kg/day in 2-3 doses 6. Hydralazine p.o. 0.75-1 mg/kg/day in 4 doses 7. Methyldopa p.o. 10-40 mg/kg/day in 3 doses 8. Spironolactone p.o. 2-3 (-5) mg/kg/day in 2-3 doses or combinations if single drug not effective: 1. + 3./2. + 3./1. + 4./2. + 4./3. + 4./5. + 6. etc. do not forget to consider T.T. Injuries: wound care Juvenile rheumatoid arthritis: Aspirin (ASA) p.o. 60-80(-100) mg/kg/day in 2-3 doses or Indomethacin p.o. 1-2 mg/kg/day in 3 doses or Prednisolone p.o. initially 1-2 mg/kg/day in 2-3 doses, then reduce to less than 5-7.5 mg/day as a single morning dose needs long-term medication! Lymphadenitis (if bacterial): Amoxicyllin p.o. 30-50 mg/kg/day in 3-4 doses over 7-10 days

Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 7-10 days Chloramphenicol p.o./i.v. 50 mg/kg/day in 3-4 doses over 7-10 days can be added - Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 5 days initially

Malaria: Fansid Amodia Mefloq Quining over 7 Artesun Arteme Before vomitin		ar p.o. (1 tab = 500 mg sulfadoxine/ 25 mg pyrimethamine) - <u>single</u> dose 20 mg/kg Sulfadoxine and 1 mg/kg pyrimethamine (adults: 3 tablets x 1!) quine (1tab=150mg) day 1 – 10 mg/kg, day 2 – 10 mg/kg and day 3 - 5 mg/kg uine p.o. (250 mg tabs) 15-25 mg/kg/full course - day 1: 15 mg/kg in 1 dose; day 2: 10 mg/kg in 1 dose (only by doctor!) e p.o. (avoid i.m. as much as possible) 30 mg/kg/day in 3 doses (10 mg/kg/dose) days nate (only by doctor!) ther (only by doctor!) giving oral antimalarials reduce fever 30 min beforehand in order to reduce the risk of g!			
<u>Measles:</u> no sp	ecific tre Vitamin Vitamin	atment available, look for bacterial superinfection (pneumonia, otitis media) A 100 000 IU for 2 days if < 2 years A 200 000 IU for 2 days if > 2 years			
Nephrotic syndi	rome:	Prednisolone p.o. 2 mg/kg/day in 2-3 doses (50% - 25% - 25%) over 6-8 weeks, then slowly reduce over 6-8 weeks to zero if urine free of protein. Continue longer time only if there is a clear response in the initial 6-8 weeks of treatment. If Prednisolone fails Cyclophosphamide 2.5-3 mg/kg/day can be tried for 3 months if there is response. good, protein-rich nutrition			
Obstructive bro	<u>nchitis:</u>	Salbutamol inhaler 1-2 puffs x 3-4/day (Salbutamol tablets p.o. 0.3-0.4 mg/kg/day; < 1 year: 1 mg x 3/day; <6 years: 2 mg x 3-4/day)			
	or or	Salbutamol per <u>inhalation</u> 1.5-2.5 mg/dose (add 1 ml NaCl), up to 4-6 times/day Fenoterol solution (2 drops + 1 drop per each year of age/dose) in 2 ml NaCl for inhalation up to 4.6 times/day			
	and	Ipratropium bromide solution (2 drops + 1 drop per each year of age/dose) in 2 ml NaCl for <u>inhalation</u> up to 4-6 times/day			
	and and or	Humid steam inhalation Prednisolone p.o. 1-2 (-5) mg/kg/day in 2-3 doses over 3-5 days Dexamethasone i.v./i.m. 0.2-0.5 mg/kg/day in 2 doses over 2-3 days			
<u>Osteomyelitis:</u>	1. Cloxa 2. Eryth 3. Cotri weeks 4. Chloi can be consult	acillin p.o./i.v. 30-50 mg/kg/day in 3 doses over 3-4 weeks promycin p.o. 40-60 mg/kg/day in 3-4 doses over 3-4 weeks moxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses over 3-4 ramphenicol p.o./i.v. 50 (-75) mg/kg/day in 3-4 doses over 3-4 weeks added - Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 10-14 days initially with all drugs above surgeon early for possible operation			
Otitis media: 1. Amo 2. Chlo (and in Nose of Parace Ear dro it is a of		xycillin p.o. 30-50 mg/kg/day in 3-4 doses over 10 days ramphenicol p.o. 50 mg/kg/day in 3-4 doses over 10 days complications Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 7 days with 1. or 2.) rops 3-4 x/day for 5-7 days tamol p.o. 60-80 mg/kg/d in 3-4 doses (15-20 mg/kg/dose) (also see appendix) ps like Boric acid or Gentamicin or Chloramphenicol <u>only</u> if ear drum is <u>intact</u> and <u>hronic</u> otitis media (> 4 weeks duration)			
<u>Pain:</u>	Paracetamol p.o. 60-80 mg/kg/d in 3-4 doses (15-20 mg/kg/dose) Aspirin (= ASA) – only second choice				
(dosage as Par	acetamo Tramad Pethidir	l) lol p.o. 1-3 (-5) mg/kg/d in 2-3 doses (only by doctor!) ne i.m. 1 (-2) mg/kg/dose, can be repeated after 4-6 hours			
<u>Pneumonia:</u>	Amoxyo Chlorar Erythro Cotrimo	cillin p.o. 30-50 mg/kg/day in 3-4 doses over 7-10 days nphenicol p.o. 50 mg/kg/day in 3-4 doses over 7-10 days mycin p.o. 40-60 mg/kg/day in 3-4 doses over 7-10 days oxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses over 7-10			

days

can be added - Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 5 days initially with all drugs above

over 6 years also: Penicillin V 75-100 mg/kg/d in 3-4 doses over 7-10 days

- Pyelonephritis: Amoxycillin p.o. 30-50 mg/kg/day in 3-4 doses over 10-14 days or Cotrimoxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses over 10-14 days
 - (or Ampicillin i.v. 100-150 mg/kg/day in 3-4 doses over 10-14 days)
 - (and Gentamicin i.m. 5-7.5 mg/kg/day in 1-2 doses over 7 days)
- Pyomyositis: the main therapeutic intervention is I&D

<u>Relapsing fever:</u> PPF i.m. 50000 IU/kg/d in 1 dose for 7 days, start with 25% of final dose, increase by 25% each day up to final dose Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 7 days > 8 years: Doxycycline for 7 days (dose see below) (even a single dose of PPF may be sufficient, but this needs further research)

<u>Rheumatic fever (RF):</u> Penicillin V 75-100 mg/kg/d in 3-4 doses for 14 days ASA 80-100 mg/kg/d in 3-4 doses for 2-3 weeks, then gradually reduce according to clinical picture of activity (sometimes antiacids needed for stomach protection)

 Rheumatic heart disease (RHD):
 if a patient with RF presents in the late stage of RHD for the first time then treat also as if he/she has acute rheumatic fever (see there above)

 reinfection prophylaxis
 - < 25 kg: Benzathine-Penicillin i.m. 600000 IU monthly</td>

 - > 25 kg: Benzathine-Penicillin i.m. 1200000 IU monthly

- in case of heart failure see management of CCF as above
- <u>Rickets:</u> Calcium-enriched nutrition (like milk) Vitamin D p.o. 1000-2000 IU/day for 4 weeks
- <u>Sedation:</u> Diazepam p.o./rect./i.v. 0.2-0.4 mg/kg/dose up to 3-4 times/day Phenobarbitone p.o./i.m./i.v. 1-2 mg/kg/dose up to 3-4 times /day Promethazine i.m. 0.5-1 mg/kg/dose Chlorpromazine p.o./i.m./i.v. 0.5 mg/kg/dose 3-4 x/day (max. < 5 years: 40 mg/day; 5-12 years: 75 mg/day)

<u>Sickle cell anaemia:</u> you cannot avoid that these patients will die eventually but you can avoid early serious complications

prophylaxis: Folic acid p.o. 2.5-5 mg in 1 dose daily (lifelong) Chloroquine p.o. 5 mg/kg in 1 dose weekly Benzathine-Penicilline i.m. < 25 kg: 600000 IU/kg once monthly > 25 kg: 1200000 IU/kg once monthly do not use iron supplementation as a routine transfuse if Hb < 6 g/dl in order to increase oxygen capacity in pain crisis give enough intravenous fluids to prevent further sickling Sinusitis: Nose drops 3-4 x/day for 5-7 days Paracetamol p.o. 60 mg/kg/day in 3-4 doses (15-20 mg/kg/dose) Amoxycillin p.o. 40-50 mg/kg/day in 3-4 doses over 7-10 days Cotrimoxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses over 7-10davs Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 7-10 days Skin eczema: Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 5-7 days (when superinfected)

Skin eczema: Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 5-7 days (when superinfected) Salicylic acid 2% ointment - to remove crusts Urea 2% ointment - to soften the skin PVP-lodine solution - to kill microorganisms GV-paint/KMNO4-solution - to dry up wet eczemas and to kill microorganisms Streptococcal tonsillitis: Penicillin V p.o. 75 mg/kg/d in 3 doses over 10 days

Syphilis (mostly congenital): PPF i.m. 50000 IU/kg/day in 1 dose over 10 days

Tinea capitis: Griseofulvin p.o. 10 mg/kg/day (max. 500 mg/day) in 1 dose for at least 4-6 weeks

Tinea corporis: Clotrimazole ointment 2-3 times/day or Whitfield's ointment

Tuberculosis: PTB/TB-Pleuritis - 2RHZS/6EH Miliary TB - 2RHZS/6EH (+ Prednisolone?) TB-Meningitis - 2RHZS/1RHZ/7RH (+ Prednisolone?) TB-Pericarditis - 2RHZS/6EH (+ Prednisolone?) TB-Spine - 2RHZS/6EH TB-Abdomen - 2RHZS/6EH TB-Glands - 2RHZS/6EH Continuation phase for children below 8-10 years: INH 8-10 months (?) Continuation phase for children below 10 kg: RH 1/2 tab x 1 x 4 months (1/4 tab < 5 kg) TB-prophylaxis for children < 6 years: INH p.o. 5 mg/kg/d in 1 dose for 6-9 months Dosages for TB drugs: Rifampicin 10 mg/kg/d (max. 600 mg), INH 5 mg/kg/d (max. 300 mg), Pyrazinamide 25 mg/kg/d (max. 2.5 g), Streptomycin 15-20 mg/kg/d (max. 750 mg), Ethambutol 15 mg/kg/d Available tablets: RH 150/100 mg, INH 100 mg, Pyrazinamide 400 mg, Ethambutol/INH 400/150 mg, Ethambutol 400 mg, Streptomycine 1 or 5 g/vial Prednisolone p.o. 2 mg/kg/d (morning 75% - evening 25%)

Typhoid fever: Chloramphenicol i.v./p.o. 50-75-100 mg/kg/day in 3-4 doses for 14 days

Urinary tract infection:Cotrimoxazole p.o. 8-10 mg/kg/day TMP and 40-50 mg/kg/day SMZ in 2 doses over
5 days
Amoxycillin p.o. 30-50 mg/kg/day in 3-4 doses over 5 days
reinfection prophylaxis - give if there is an anatomical malformation of the
genitourinary tract or if there are more than 3 episodes of urinary tract infection in
half a year; duration 6 months
Cotrimoxazole p.o. 2 mg/kg/day TMP and 10 mg/kg/day SMZ in 1 dose in the
evening
Amoxycillin p.o. 10 mg/kg/day in 1 dose in the evening

<u>Vomiting:</u> in mild/moderate cases - no treatment necessary in severe cases - <u>be careful</u> with all these drugs especially in small children because they can cause heavy sedation, apnoea, involuntary extrapyramidal movements and death! (Antidote: Biperiden 0.04 mg/kg/dose; Benztropine (Cogentin) p.o./i.m. 0.5-1 mg/dose) Chlorpromazine (Largactile; 25 and 100 mg tabs., 25 mg/ml):

p.o. 0.25-1 (-6) mg/kg/day in 4-6 doses (max. 1-2 g/day)

i.m. 0.5 mg/kg/dose 3-4 x/day (max. < 5 years: 40 mg/day; 5-12 years: 75 mg/day) Promethazine (Phenergan; 25 mg tabs., 25 mg/ml): i.m./rect. 0.25-0.5 mg/kg/dose > 10 yrs: Metoclopramide (10 mg tabs.) p.o. 0.1 mg/kg/dose (max. 4 doses/day, < 0.5 mg/kg/day)

<u>Whooping cough (Pertussis):</u> Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses over 10-14 days sometimes sedation needed observe superinfection and apnoea in young infants

Worm infestation:Mebendazole p.o. 100 mg x 2/day for 3 days, repeat after 14 days if necessary
(under 2 years: half dose) (for threadworm, whipworm, roundworm, hookworm)
Niclosamide p.o. < 2 years: 500 mg/day; 2-6 years: 1 g/day; > 6 years: 2 g/day
in 2 divided doses 1 hour apart on 1 day only (for tapeworm) (or 30 mg/kg/day in 1 dose)
Praziquantel p.o. 10-20 mg/kg on 1 day only (for tapeworm)
Levamisole (Ketrax) p.o. 2.5 mg/kg/dose on 1 day only (for roundworm)
Piperazine p.o. 50 mg/kg/day in 1-2 doses for 7 days (for threadworm, roundworm)

III. Other rarer diseases

<u>Burkitt-Lymphoma</u>: This is the only treatable cancer here at HLH for the time being! for 2 days before Cyclophosphamide: at least 2 ltrs of intravenous fluid with Frusemide i.v. 2 mg/kg/day in 2-3 doses, Allopurinol p.o. 10-15 mg/kg/day in 3 doses on day of Cyclophosphamide: same as above Cyclophosphamide i.v. 40 mg/kg as single dose over 1 hour in 250 ml 0.9% NaCl solution

for 2 days after Cyclophosphamide: same as above

Rabies: no specific treatment possible, only heavy sedation

<u>Schistosomiasis:</u> Praziquantel p.o. 20 mg/kg/dose, repeat after 6 hours with same dose (or 40 mg/kg in 1 dose)

Tetanus:Benzylpenicillin i.v. 150000-200000 IU/kg/day in 4 doses for 10-14 daysorMetronidazole i.v. 30 mg/kg/day in 3 doses for 10-14 days
clean the possible source (wounds etc.)
Tetanus antitoxin i.m. 3000-6000 units once, may need to be repeated
Sedation - alternate Diazepam i.v./p.o. 0.5-1 mg/kg/dose with Phenobarbitone i.v./i.m./p.o.
1-2 mg/kg/dose each up to 4-6 times/day
try to avoid aspiration pneumonia and feed via NGT
Do not forget to booster with T.T. doses because the disease itself gives no lasting
protection!!!

N.B. 1: Chloramphenicol in newborns has a different dosage(should be avoided)

- < 1 week: 25 mg/kg/day in <u>1</u> dose
- > 1 week: 50 mg/kg/day in <u>2</u> doses

N.B. 2: **Tetracycline** and **Doxycycline** are contraindicated in children below 9 years of age! Above this age you can use it for some indications (brucellosis, cholera, relapsing fever, Mycoplasma, Chlamydia, Rickettsiae). Dosage: Tetracycline p.o. 25-50 mg/kg/day (max. 4 g/day) in 4 doses; Doxycycline p.o. 4-5 mg/kg/day (max. 100-200 mg/day) in 2 doses

N.B. 3: **Ciprofloxacine** is theoretically contraindicated in childhood. If a <u>doctor</u> decides to give it, the dose is 7.5-15 mg/kg/day in 2 doses.

N.B. 4: **Ceftriaxone** and **Cefotaxime** are very potent, but also <u>very expensive</u> drugs! Only a <u>doctor</u> can prescribe them for inpatients! Dosage of **Ceftriaxone** i.m./i.v.: first day 75-100 mg/kg/day in 1 dose, then 50 mg/kg/day in 1 dose. Dosage of **Cefotaxime** i.v.: 100-200 mg/kg/day in 3 doses. Use them at present only for meningitis (and sometimes sepsis and pneumonia)!

IV. Some rarer drugs in Paediatrics

Bisacodyl p.o.	0.3 mg/kg/dose; < 10 years: 5 mg/dose; > 10 years: 10 mg/dose
Buscopan i.m./p.o.	< 6 years: 5 mg/dose x 3/day; 6-12 years: 10 mg/dose x 3/day
Carbimazole p.o.	< 12 years: start with 5 mg/dose x 3/day; > 12 years: 10 mg x 3/day
Cimetidine p.o.	20-30 mg/kg/day in 4 doses
Heparin	s.c./i.v. bolus 75-100 IU/kg/dose every 4 hours; continuous i.v. 10-25 IU/kg/hour
Ibuprofen p.o.	40-60 mg/kg/day in 4 doses
Indomethacine p.o.	1-3 mg/kg/day in 3 doses
lodine p.o.	< 1 year: 25-50 ug/day; < 6 years: 50-75 ug/day; < 12 years: 100 ug/day;
	> 12 years: 100-200 ug/day; all in 1 dose
Ketamine	i.m.: 4-10 mg/kg/dose; i.v.: 1-2 mg/kg/dose; repeat according to effect
Ketoconazole p.o.	3 mg/kg/day in 1 dose for more than 2-4 weeks
Mg-Sulfate p.o.	250 mg/kg/dose (or 5 g/dose)
Mg-Trisilicate p.o.	5-10 ml/dose x 3-4
Neostigmine	p.o. 0.3 mg/kg/dose every 4-6 hours; i.m./s.c. 0.03 mg/kg/dose every 4-6 hours
Nitrofurantoin p.o.	3-5 mg/kg/day in 3 doses
Probenecid p.o.	25 mg/kg initially, then 10 mg/kg/dose every 6 hours
Proguanil p.o.	3-5 mg/kg/day in 1-2 doses
Propantheline p.o.	1-3 mg/kg/day in 3-4 doses (max. 15 mg x 3)
Thiopental i.v.	2-7 mg/kg/dose for induction of anaesthesia
Thyroxine p.o	< 1 year: 25-50 ug/day; < 6 years: 50-75 ug/day; < 12 years: 75-100 ug/day;
	> 12 years: 100-200 ug/day; all in 1 dose

Protein-Energy-Malnutrition (PEM)

If the mother is breastfeeding in any case continue!!!

Resuscitation phase

first 4-6 hours: 50-100 ml/kg ORS (prepare with <u>2</u> litres instead of 1 litre per sachet!!!) may have to be repeated the next 4-6 hours again

If the child is vomiting try first NGT! If the child does not tolerate oral intake then give intravenous fluids at the same amount, but cautiously! Do <u>not</u> give blood transfusions unless the child is in shock **and** has a Haemoglobin level less than 5 g/dl!

Nutritional rehabilitation of malnutrition (examples of possible recipes)

Early recovery

Day 1-3: 120 ml/kg/day of diluted milk in 8-12 meals

Diluted milk (Recipe for 1000 ml of diluted milk feed (80 kcal/100ml))

200 ml fresh cow's milk (maziwa ya ng'ombe)100 g sugar (sukari)30 g oil (mafuta)20 ml KCladd water up to 1000 ml volume

Day 4-5 (7): 120 ml/kg/day of transitional milk in 6-8 meals

Transitional milk (This is a 1:1 mixture of diluted milk and high-energy feeds)

Day 6 (8) onwards: 150-200 (250) ml/kg/day of high-energy feeds in 6 meals

High-energy feeds (Recipe for 1000 ml of fresh milk feed (135 kcal/100ml))

900 ml warm cow's milk (maziwa ya ng'ombe)70 g sugar (sukari)55 g oil (mafuta)20 ml KCladd water up to 1000 ml volume

After 2 weeks:

high-energy feeds and gradually normal family meals

Other essentials of treatment

Vitamin A: one dose on first and second day and one more after 4 weeks 100 000 IU if < 2 years 200 000 IU if > 2 years Folic acid: from day 1 Ferrous: start after 10-14 days (when oedema has subsided) and continue for the next 3 months Multivitamins/Minerals: from day 1 Potassium: 2-4 ml/kg/day (see above) Antibiotics: Penicillin, Ampicillin, Amoxicillin, Gentamicin, Chloramphenicol, Metronidazole Antihelminthics: Mebendazole TB-medicine: if needed Antimalarials: if needed

N.B.: There are commercially produced rehydration (ReSoMal), refeeding (F-75, F-100), and mineral/ multivitamin solutions available. Availability and price are still a problem!

Age-Weight-Height-Table

Age		Weigh	nt for ag	ge (kg)	Height for age (cm)		Weight (kg) for Height (cm)			
Yr	Мо	Stand	. 80%	60%	Stand	. 90%	85%	Heigh	it Stanc	d. 80%
						C1.	un kim m			(and in a
<u> </u>		r				510	I		v 1	Vasting
	0	34	27	20	50	45	42	50	34	27
	1	4.3	3.4	2.5	55	49	46	55	4.6	3.6
	2	5.0	4.0	2.9	58	52	49	58	5.2	4.2
	3	5.7	4.5	3.4	60	54	51	60	5.7	4.6
	4	6.3	5.0	3.8	62	56	53	62	6.3	5.0
	5	6.9	5.5	4.2	64	58	54	64	6.2	5.5
	6	7.4	5.9	4.5	66	59	56	66	7.5	6.0
	7	8.0	6.3	4.9	68	61	58	68	8.1	6.5
	8	8.4	6.4	5.1	69	62	59	69	8.4	6.7
	9	8.9	7.1	5.3	71	64	60	71	9.0	7.2
	10	9.3	7.4	5.5	72	65	61	72	9.2	7.4
	11	9.6	7.7	5.8	73	66	61	73	9.5	7.6
1	12	9.9	7.9	6.0	75	67	64	75	9.9	8.0
	15	10.6	8.5	6.4	78	70	66	78	10.6	8.5
	18	11.3	9.0	6.8	81	73	69	81	11.2	9.0
	21	11.9	9.6	7.2	84	76	71	84	11.8	9.4
2	24	12.4	9.9	7.5	87	78	74	87	12.4	9.9
	27	12.9	10.5	7.8	90	81	76	90	13.1	10.5
	30	13.5	10.8	8.1	92	83	78	92	13.6	10.9
	33	14.0	11.2	8.4	94	84	80	94	14.0	11.2
3	36	14.5	11.6	8.7	96	86	82	96	14.5	11.6
	39	15.0	12.0	9.0	98	88	83	98	15.0	12.0
	42	15.5	12.4	9.3	100	90	85	100	15.5	12.5
	45	16.0	12.8	9.6	101	92	86	101	15.8	12.6
4	48	16.5	13.2	9.9	103	93	88	103	16.4	13.2
	51	17.0	13.6	10.2	105	95	89	105	17.0	13.6
	54	17.4	14.0	10.5	10/	96	91	10/	17.6	14.0
	5/	17.9	14.4	10.7	108	9/	92	108	18.0	14.4
5	60	18.4	14./	10.0	109	78	73	109	18.4	14./
0		21.0	10.0	12.0	102	104	104	110	21.2	17.0
0		23.5	20.9	14.1	123	115	100	123	24.0	17.2
0		20.0	20.0	16.0	120	120	112	120	20.4	21.1
10		31.0	24.4	18.4	132	120	117	133	31.5	25.1
11		35.0	28.0	21.0	142	129	121	142	33.8	27.0
12		39.2	31.4	23.5	148	133	126	148	37.7	30.2
Refer	ence:	Stuart a	ind Stev	enson, Ha	rvard S	andard	is with s	ome a	daptatio	on.

Intravenous Fluid Therapy in Paediatrics

1.) Maintenance fluid volume

Day of life	ml/kg/day	drops/min/kg	Type of fluid
1	70	1	10% Glucose
2	90	1	"
3	110	1.5	10% Glucose/0.18% NS
			(add 1 ml KCl/kg/day)
4	130	2	"
5	150	2	n
Week of life			
1-4	150-200	2	ч
Month of life			
1-6	130-150	2	"
7-12	110-140	1.5-2	half strength Darrow's
13-24	90-120	1.5	n
Year of life			
3-5	80-100	1-1.5	n
6-10	60-80	1	II
11-14	50-70	1	as in adults
adult	40-60	0.5	"

Electrolyte requirements in children (mmol/kg/day): Na+ 2-4; K+ 2; Cl- 2-4

2.) Extra fluid

a) In dehydration add the amount of additional fluid on top of the maintenance fluid volume!

b) In high fever (>39.0° C) give 10ml/kg/day more!

c) In meningitis, cerebral malaria and severe pneumonia, only give 80-100% of calculated volume!

d) In intestinal obstruction, add 50 ml/kg/day!

Change as early as possible to oral rehydration solution and oral drugs! You can kill a patient with intravenous fluids!

Diarrhoea WHO/IMCI Treatment Schedules (Plan A, B, C)



Plan B: Treat Some Dehydration with ORS

Give in clinic recommended amount of ORS over 4-hour period

DETERMINE AMOUNT OF ORS TO GIVE DURING FIRST 4 HOURS.

AGE*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to 5 years
WEIGHT	< 6 kg	6 - < 10 kg	10 - < 12 kg	12 - 19 kg
In mi	200 - 400	400 - 700	700 - 900	900 - 1400

Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) times 75.

- · If the child wants more ORS than shown, give more.
- For infants under 6 months who are not breastfed, also give 100-200 ml clean water during this period.

SHOW THE MOTHER HOW TO GIVE ORS SOLUTION.

- · Give frequent small sips from a cup.
- · If the child vomits, wait 10 minutes. Then continue, but more slowly.
- · Continue breastfeeding whenever the child wants.

AFTER 4 HOURS:

- · Reassess the child and classify the child for dehydration.
- · Select the appropriate plan to continue treatment.
- · Begin feeding the child in clinic.

▶ IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT:

- · Show her how to prepare ORS solution at home.
- Show her how much ORS to give to finish the 4-hour treatment at home.
- Give her enough ORS packets to complete rehydration. Also give her 2 packets as recommended in Plan A.
- Explain the 3 Rules of Home Treatment:
 - 1. GIVE EXTRA FLUID
 - 2. CONTINUE FEEDING
 - 3. WHEN TO RETURN

See Plan A for recommended fluids and See COUNSEL THE MOTHER chart



<u>Neonatology</u>

Neonatal Resuscitation - Basics

Principle

Try to anticipate the problems instead of reacting only to them! Take a good history before delivery in order to be prepared well!

Equipment

resuscitation table (flat) good light heat source (if available) dry, clean (prewarmed) clothes, cap for premature newborns suction device with different sizes of suction tubes (Ch 5, 6, 10) ambu-bag with masks (size 0, 1) laryngoscope with blades 0, 1 Magill forceps endotracheal tubes (size 2.5, 3.0, 3.5, 4.0 ID) strapping small cannulas (24G, 26G) small butterflies (19G, 23G, 25G) umbilical vein catheter (you can use a normal feeding tube Ch 3.5 or Ch 5!) medicine (see below)

Medication (Dosage)

If you need drugs for resuscitation of a newborn (especially adrenaline/epinephrine) then the prognosis for survival is very poor!

Adrenaline/Epinephrine (in the vial you get 1:1000 dilution: make 1:10000 dilution): give 0.1-0.5 ml/kg/dose i.v. (=0.01-0.05 mg/kg), you can increase up to 1.0 ml/kg/dose (0.1 mg/kg) (high dose, esp. for endotracheal application)

Volume expanders: NaCl 0.9% 10-20 ml/kg i.v., repeat as needed; blood transfusion 10-15 ml/kg i.v. in haemorrhagic shock

Sodium bicarbonate (8.4% - dilute to 4.2%): 2 ml/kg 4.2% slowly i.v.

Naloxone: 0.1 mg/kg/dose (=0.25 ml/kg)

Atropine: 0.01-0.03 mg/kg/dose

Glucose 10%: 5 ml/kg i.v, then continuous infusion of Glucose 10%

Calcium gluconate 10%: 1-2 ml/kg/dose slowly i.v.

Phenobarbitone: 10 mg/kg/dose, can be repeated after 10-15 min

Route of administration of drugs

Oral administration does not work, intramuscular injections take too long a time to work.

<u>peripheral i.v.</u>: adrenaline, atropine, glucose/other fluids, naloxone, calcium, diazepam, frusemide, phenobarbitone, sodium bicarbonate

umbilical vein: as above

intratracheal: adrenaline, atropine, naloxone

intraosseous: adrenaline, atropine, glucose/other fluids, calcium, diazepam, sodium bicarbonate

Average birth weights according to gestational age

1000 g
1200 g
1600 g
2000 g
2600 g
3000-3500 g

Sizes of laryngoscope blades, endotracheal tubes and depths of intubation (according to body weight)

Body weight (kg)	Tube size (ID)	Depth of oral	f intubation(cm) nasal	Laryngoscope blade No.	
1	2.5	7	8	0 (-1)	
2	(2.5-) 3.0	8	10	1	
3	(3.0-) 3.5	9	11-12	1	

Size of suction tube according to size of endotracheal tube

Endotracheal tube (ID)	Suction tube
2.5	Ch 6
3.0	Ch 6
3.5 and bigger	Ch 10

Length of insertion of umbilical vein catheter (tip towards diaphragm)

Body weight (kg)	Length of insertion (cm)
1	6
2	7
3	8.5

Assessment of the Newborn Infant

APGAR at 1 min (and earlier) - Continue to assess at 1, 5, and 10 minutes

7-10:

no special action except drying and gentle stimulation (if at all necessary)

4-6 (blue asphyxia):

proceed as follows: probably only drying, stimulation, suctioning and ventilation (with or without oxygen) necessary

0-3 (pale/white asphyxia): proceed as below

There is a simplified score system proposed for assessment of asphyxia in newborns. This system only assesses breathing and heart beat.

		<u>Score</u>	
	0	1	2
Breathing:	Absent	Gasping	Regular
Heart beat:	Absent	< 100/min	> 100/min

Score 4 is equivalent to APGAR 7-10. Score 2-3 is equivalent to APGAR 4-6. Score 1 is equivalent to APGAR 0-3.

Resuscitation Flow Chart

drying with (prewarmed) dry, clean towels thereby tactile stimulation cover especially premature infants well in order to prevent loss of body temperature (cap for head!)

suctioning of mouth (first!) and then nostrils not to vigorous in order to avoid vagal stimulation

bag-mask ventilation: 40-60 times/min, if available with oxygen if no response

intubation (preferably nasotracheal intubation) and continuation of ventilation if no response

cardiac massage (2-finger-technique) 120 times/min

<u>if no response</u>

resuscitation with drugs: adrenaline, volume (NaCl 0.9%), sodium bicarbonate, naloxone, atropine, glucose etc.

Stop resuscitation after 20-30 min if no response!

Special conditions

In meconium aspiration use prewarmed normal saline for irrigation and biggest suction tube which fits into trachea or endotracheal tube!

After prolonged resuscitation give glucose i.v. to all infants! They tend to have hypoglycaemia and metabolic acidosis!

Physiological Background Information for the Resuscitation of Newborns

<u>Heart rate:</u>	120-160/min
Respiration rate:	> 40/min
Respiration pattern:	through the nose using mostly the diaphragm
Blood pressure:	according to body weight but in general systolic BP 30-40 mmHg
Body surface:	The head is about 20% of total body surface. In relation to body weight, body surface is 3 times greater than in adults!

Temperature control:

Brown fat tissue (less in premature infants), insulating subcutaneous fat layer (thin in premature infants).

Loss of temperature due to convection, conduction (minimal), radiation and evaporation (high with wet infant). 4 times as rapid as in adults because of extensive surface area in relation to body weight.

Metabolic response to exposure to cold is limited, especially in starving or hypoxic infants.

Under normal environmental temperature in a delivery room ($20-25^{\circ}$ C), an infant's skin temperature falls approx. 0.3° C/min, the deep body temperature approx. 0.1° C/min immediately after delivery, meaning after 10 min of life the infant has lost 1° C of deep body temperature! The more immature the infant the more rapid the heat loss! Mortality of prematures is up to 80% if temperature is below 36° C, but only 20% if it is above 36° C!

Kangaroo Care

<u>Principle:</u> This type of care especially applies to premature newborns and small-for-date newborns. The mother is the primary care-taker of the newborn infant with regard to all aspects, regardless of birth weight and gestational age. The nurses and doctors "only" support the mother.

The aims are to lower morbidity and mortality from infection, hypothermia, hypoglycaemia, and from bradycardia and apnoea syndrome.

- After the initial adaptation phase (possibly including resuscitation procedures), within the first hour of life give the newborn to the mother in warm and clean clothes, and encourage breast feeding (if possible).
- The newborn is positioned between the mother's breasts all the time.
- Teach the mother how to control temperature (warmth of hands and feet).
- Teach the mother how to keep the baby clean and dry (frequent checks, provide enough clean clothing all time).
- Teach the mother how to feed the newborn frequently even if he/she cannot suck or attach to the breast (NGT, spoon or cup feeding, expression of breast milk).
- Teach the mother to recognise signs of infection, bradycardia, cyanosis and apnoea (poor feeding, temperature, heart beat, respiration pattern, sole colour).
- Try to avoid as many invasive procedures as possible.
- Treat any complications (especially infections) early.
- Support and re-assure the mother under all circumstances.

Enteral Nutrition in Term and Preterm Newborns

Breast milk is <u>always</u> the best nutrition for newborns. Only in exceptional circumstances cow's milk (or breast milk substitutes = formula feeding) may be added or substituted (sick mother, orphan).

<u>Day of life</u>	<u>Amount of milk (ml/kg/d)</u>
1	30-60
2	60-80
3	80-120
4	120-150
5	140-160
6	160-180
10	170-190
14	180-200
afterwards	200-250

<u>Feeding frequency</u>: fullterm newborns: ad libitum; fullterm sick newborns and newborns 2000-2500g: 5-6 meals/day; premature newborns 1500-2000g: 8 meals/day; premature newborns < 1500g: (8-) 12 meals/day

Premature newborns <u>below 33/34 weeks</u> of gestation usually need nasogastric or orogastric tube feeding (or similar measures as spoon feeding).

Fresh cow's milk as a substitute for breast milk in newborns and infants under 6 months of age

boil 2 parts of fresh cow's milk with 1 part of water to each 100 ml of this mixture add 2.5 g sugar (half a teaspoon) and half a teaspoon of oil

start with full strength of this mixture if the baby has difficulties with tolerating it then give 2/3 strength 3-5 days afterwards return to full strength of this mixture

daily requirement: 150 ml/kg/day (in premature infants even more up to 250 ml/kg/day)

Treatment of Term and Preterm Newborns

The 4 Basic Principles in Neonatology under Simple Conditions

- 1. Keep the baby warm!
- 2. Keep the baby clean!
- 3. Keep the baby dry!
- 4. Feed the baby appropriately!

Medication for certain conditions

<u>Anaemia:</u> in the first 5 days of life if Hb < 10 g/dl - transfuse blood 10 ml/kg later if Hb is < 6-7 g/dl - transfuse blood 10 ml/kg oral substitution - see under routine drugs

<u>Apnoea/Bradycardia:</u> Aminophylline 1% (10 mg/ml) solution p.o. 0.3-0.6 ml/kg/day (3-6 mg/kg/day) in 3 doses for 3-4 weeks

<u>Birth asphyxia:</u> diuretics and steroids have <u>no proven effect</u> at all on the outcome of birth asphyxia! in convulsions:

Diazepam p.o./i.v./rectal - 0.2-0.4 mg/kg/dose 3-4 times/day (i.m. works too slowly!) Phenobarbitone p.o./i.m./i.v. - loading dose 10 mg/kg up to 2 times the first day, then continuation with 5 mg/kg/day in 3 doses You can use these drugs in an alternating way!

Convulsions (rule first out meningitis, sepsis and malaria!):

Diazepam p.o./i.v./rectal - 0.2-0.4 mg/kg/dose 3-4 times/day (i.m. works too slowly!) Phenobarbitone p.o./i.m./i.v. - loading dose 10 mg/kg up to 2 times the first day, then continuation with 5 mg/kg/day in 3 doses You can use these drugs in an alternating way! Glucose 10% (or 5%) i.v. - 5 ml/kg/dose Calcium gluconate 10% i.v. - 1-2 ml/kg/dose

Feeding: see guidelines page 24

Infusion: see guidelines page 15

Malaria: Quinine p.o./i.v. 30 mg/kg/day in 3 doses (10 mg/kg/dose); preferably oral route, i.v. high risk of hypoglycaemia (if i.v. you can also use regimen with loading dose as on page 4)

Meningitis/Sepsis: Ampicillin i.v./i.m. 200-250 mg/kg/day in 3-4 doses for at least 7 days, then

Amoxicillin p.o. 50-75 mg/kg/day in 3-4 doses up to 21 days

plus Gentamicin i.m. 5-7.5 mg/kg/day in 1 dose for 10-14 days

optional during the <u>first 4 days:</u> Dexamethasone i.v. 0.6 mg/kg/day in 4 doses 15-20 min *before* antibiotic!

(If available, give Cefotaxime i.v. 100-150 mg/kg/day in 3 doses instead of Ampicillin; in staphyloccocal sepsis add Cloxacillin i.v. 100-150 mg/kg/day in 3 doses)

Pemphigus neonatorum: Erythromycin p.o. 40-60 mg/kg/day in 3-4 doses for 3-5 days or Cloxacillin p.o. 30-50 mg/kg/day in 3-4 doses for 3-5 days

<u>Pneumonia (e.g. aspiration):</u> Ampicillin i.v./i.m. 100-150 (-200) mg/kg/day in 3-4 doses for at least 5 days, <u>then</u> Amoxicillin p.o. 50-75 mg/kg/day in 3-4 doses up to 14 days **plus** Gentamicin i.m. 5 mg/kg/day in <u>1</u> dose for 5-7 days

<u>Routine drugs for all premature babies (< 37 weeks) - assess prematurity by using the Finnström score!</u> Vitamin K i.m. 0.5 mg if <1500 g, and 1 mg if >1500 g, after delivery. Repeat on day 3.

Aminophylline 1% (10 mg/ml) solution p.o. 0.3-0.6 ml/kg/day (3-6 mg/kg/day) in 3 doses for 4-6 weeks (to all prematures < <u>35</u> weeks)

Folic acid solution (1 mg/2 ml) p.o. 0.1 ml/kg/day (50 microgram/kg/day) in 1 dose for 4-6 weeks from the 3rd week of life

Ferrous acid solution p.o. 1 drop/kg/day (2-3 mg/kg/day elementary iron) in 1 dose for 4-6 weeks from the 3rd week of life

Multivitamin p.o. 1/2 tablet/day in 1 dose for 4-6 weeks from the 3rd week of life Vitamin D 500 units/day over 6 weeks from the 3rd week of life

All newborns: after delivery Povidone Iodine 2.5% eye drops x 1

N.B: Chloramphenicol in newborns has a different dosage (avoid if possible)

< 1 week: 25 mg/kg/day in <u>1</u> dose / > 1 week: 50 mg/kg/day in <u>2</u> doses

Finnström Maturity Score in Newborn Infants

Ref.: Finnström, Acta Paediatrica Scandinav	vica 1977, 60: 601 ff.
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Score	1	2	3	4
Breast size	< 5 mm	5 – 10 mm	> 10 mm	
Nipple formation	No areola nipple visible	Areola present, nipple well formed	Areola raised, nipple well formed	
Skin opacity	Numerous veins and venules present	Veins and tributaries seen	Large blood vessels seen	Few blood vessels seen or none at all
Scalp hair	Fine hair	Coarse and silky individual strands		
Ear cartilage	No cartilage in antitragus	Cartilage in antitragus	Cartilage present in antihelix	Cartilage in helix
Fingernails	Do not reach finger tips	Reach finger tips	Nails pass finger tips	
Plantar skin creases	No skin creases	Anterior transverse crease only	Two-thirds anterior sole creases	Whole sole covered

Total 7	l poin 8	ts sco 9	ored: 10	11	12	13	14	15	16	17	18	19	20	21	22	23
Days 191	s of ge 198	estatio 204	on: 211	217	224	230	237	243	250	256	263	269	276	282	289	295
Wee 27+	ks of 28+	gesta 29	tion: 30	31	32	33	34	35-	36-	36½	37½	38½	39½	40+	41+	42+

Notes:

Test fingernails by scratching them along your hand. Skin creases are the deep creases not the fine lines.

Intra-uterine Growth Chart



Reference: Lubchenco. University of Colorado Medical Centre.

<u>Appendix</u>

Reference Values

Respiration Rate

Age	Upper Limits
< 2 months	< 60/min
2 months - < 1 year	< 50/min
1 - < 5 years	< 40/min
5 - < 12 years	< 30/min
> 12 years	< 25/min

Pulse Rate

Age	Lower Limits	Average Rates /min	Upper Limits
Newborn	70	120	170
1-11 months	80	120	160
2 yr	80	110	130
4 yr	80	100	120
6 yr	75	100	115
8 yr	70	90	110
10 yr	70	90	110
12 yr	65	90	110
14 yr	60	85	105

Blood Pressure

Age	Mean Systolic ± 2 SD	Mean Diastolic ± 2 SD
1 month	80 ± 16	46 ± 16
6 months to 1 yr	89 ± 29	60 ± 10
2 yr	99 ± 25	64 ± 25
4 yr	99 ± 20	65 ± 20
5 yr	94 ± 14	55 ± 9
7 yr	102 ± 15	56 ± 8
9 yr	107 ± 16	57 ± 9
10 yr	111 ± 17	58 ± 10
12 yr	115 ± 19	59 ± 10
13 yr	118 ± 19	60 ± 10

The width of the cuff should cover about 2/3 of the length of the upper arm. The appropriate cuff for children is about 9 cm wide.

Red Blood Cell Values

Age	Hb (g/l)	PCV (1/I)	RBC (x 10 ¹² /l)
Birth (cord blood)	165 ± 30	0.54 ± 0.10	6.0 ± 1.0
3 months	115 ± 20	0.38 ± 0.04	4.0 ± 0.8
1yr	120 ± 15	-	4.4 ± 0.1
3-6 yr	130 ± 10	0.40 ± 0.04	4.8 ± 0.7
10-12 yr	130 ± 15	0.41 ± 0.04	4.7 ± 0.7

Values are mean ± 2 SD (95% range). Hb: haemoglobin; PCV: haematocrit; RBC: red blood cell count

Haemoglobin (g/l) in Iron-sufficient Preterm Infants

Age	Birthweight 1000-1500 g	Birthweight 1501-2000 g
2 weeks	163 (117-184)	148 (128-196)
1 month	109 (87-152)	115 (82-150)
2 months	88 (71-115)	94 (80-114)
3 months	98 (89-112)	102 (93-118)
4 months	113 (91-131)	113 (91-131)
5 months	116 (102-143)	118 (104-130)
6 months	120 (94-138)	118 (107-126)

Values are mean (range).

Normal Total Leucocyte Counts

Age	Mean Total Leucocytes	Range of Total Leucocytes
Birth	18.1	9.0-30.0
12 hrs	22.8	13.0-38.0
24 hrs	18.9	9.4-34.0
1 week	12.2	5.0-21.0
2 weeks	11.4	5.0-20.0
1 month	10.8	5.0-19.5
6 months	11.9	6.0-17.5
1 yr	11.4	6.0-17.5
2 yr	10.6	6.0-17.0
4 yr	9.1	5.5-15.5
6 yr	8.5	5.0-14.5
8 yr	8.3	4.5-13.5
10 yr	8.1	4.5-13.5
16 yr	7.8	4.5-13.0
21 yr	7.4	4.5-11.0

Values are mean (95% confidence limits) x 10⁹/l.