Japanese Encephalitis Clinical Care Guidelines

Guidelines for management of children presenting with symptoms or signs of acute encephalitis syndrome

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Introduction

These guidelines were prepared by the Japanese Encephalitis Working Group, which is a collaboration of the World Health Organization (WHO), United National Children's Fund, PATH, universities and others who work with Japanese encephalitis. The guidelines are intended to guide the management of acutely ill children, especially those with fever, a change in consciousness, convulsions, or other symptoms suggesting meningitis or encephalitis.

Meningitis, caused by bacteria, must be treated as soon as possible with antibiotics. Encephalitis, usually caused by a virus, cannot be treated with antibiotics. However, good clinical management is important to reduce the risk of disability or death from either disease[1,2].

Many of these guidelines are adapted from WHO's *Integrated Management of Childhood Illness* (IMCI).[3] IMCI promotes evidence-based assessment and syndromic treatment to support rational and affordable therapy. A review of published literature was undertaken and expert consensus was also used.

It is essential that these guidelines are **adapted for use in individual countries**. The spectrum of common presenting illnesses, medications on the national essential drugs list, medical equipment commonly available, and other factors vary from country to country. The local adaptation of these guidelines should:

- Make them consistent with national and other treatment policies.
- Include the most serious or common childhood illnesses recognized locally.

In addition, expected staff capacities at individual levels of the health system vary. The adaptation process should also make the guidelines practical to implement at each level of the health system.

Charts 1-14 guide medical care, including contact at first-level health facilities (e.g., village clinics). Not all facilities have the resources to provide the suggested services; each facility must identify its capabilities and limitations. In facilities with limited capacity, ill children must be clinically stabilized to the best of a facility's ability. ***Urgent referral of the child to the next-level health facility must be made when an important procedure or treatment cannot be done***. Rapid identification of a seriously ill child, immediate clinical stabilization, and referral can greatly improve a child's outcome.

Charts 15-18 include treatment of potential complications of encephalitis—fluid or sodium imbalance and elevated intracranial pressure. These problems should be managed at facilities with laboratory services, life-support and monitoring equipment, and experienced medical care providers who provide critical care.

Charts 19-21 cover medications and **Appendices 1-4** include coma scales for assessing levels of consciousness, tables for cerebrospinal fluid analysis and fluid calculations, a list of differential diagnoses, and a suggested patient examination form.

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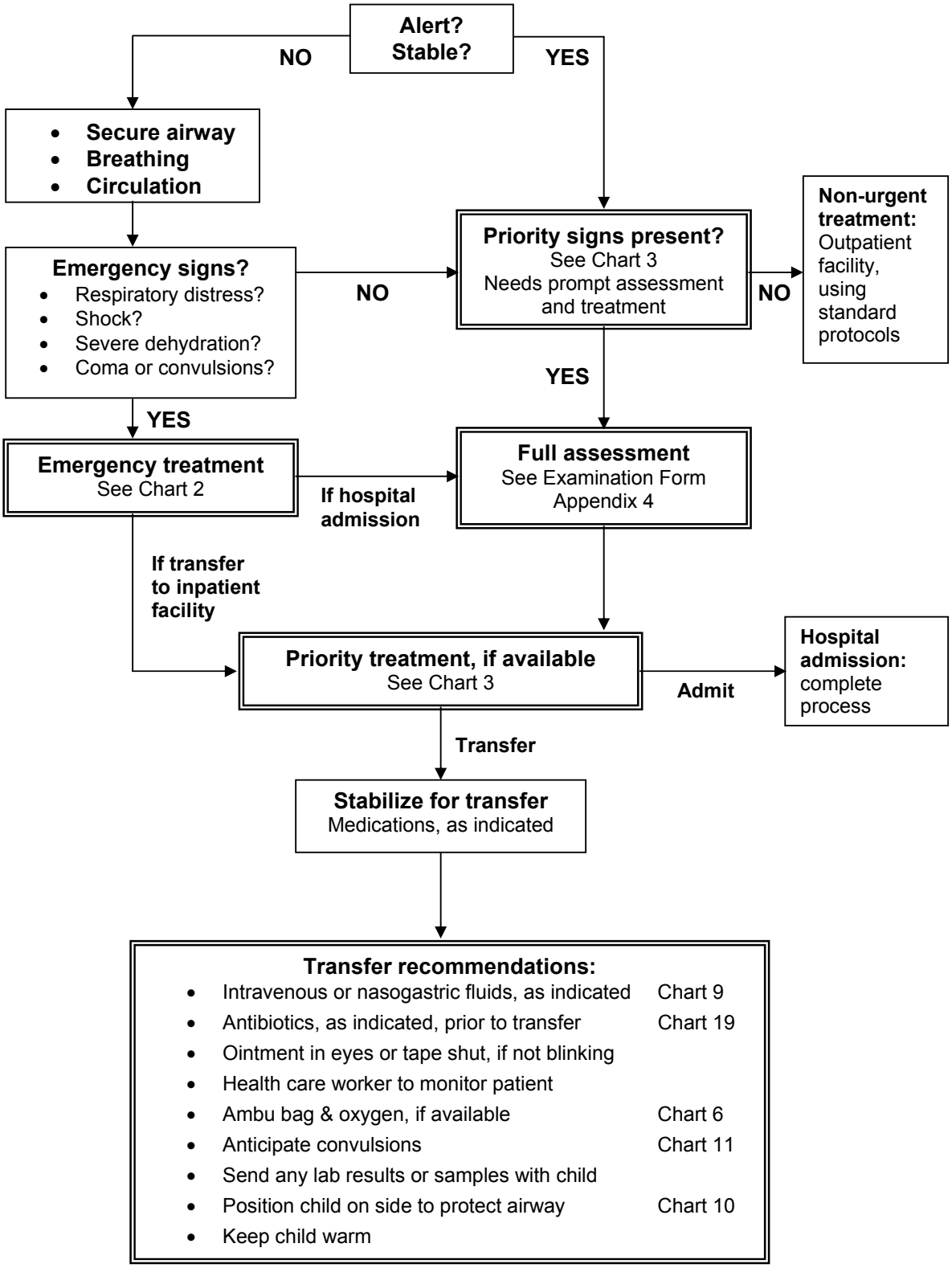
[1] Rao PN. Japanese encephalitis*. Indian Pediatrics.* 2001; 38: 1252-1264.

[2] Solomon T, Dung NM, Kneen R *et al*. Seizures and raised intracranial pressure in Vietnamese patients with Japanese encephalitis*. Brain.* 2002; 125: 1084-1093.

[3] World Health Organization, Department of Child and Adolescent Health and Development*. Management of the child with a serious infection or severe malnutrition: guidelines for care at the first-referral level in developing countries.* Integrated Management of Childhood Illness. WHO; Geneva, 2000.

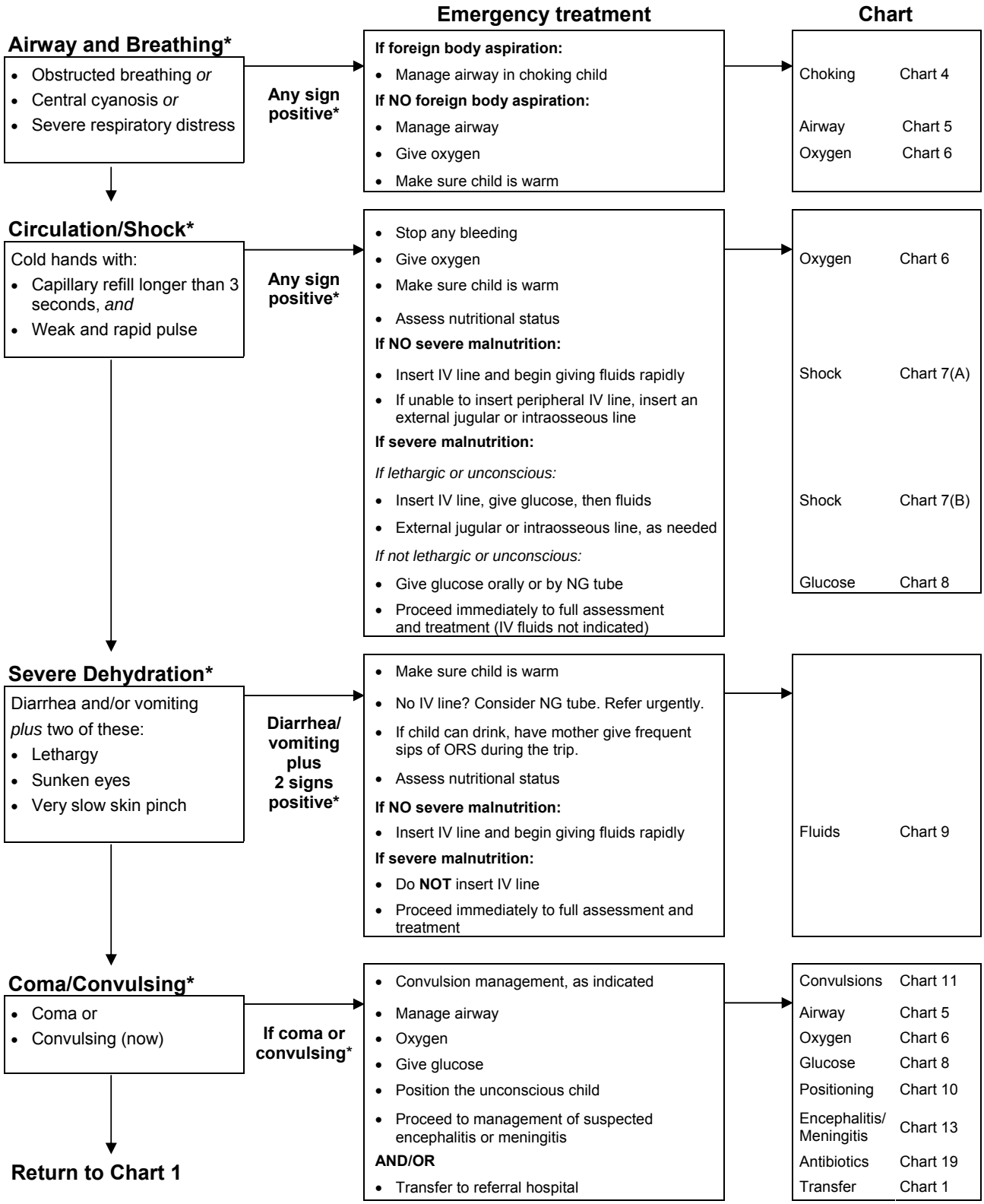
To use this manual:
Start with Chart 1, “Basic assessment of a sick child.” As you follow the steps through this flow chart, you will be directed to other charts, which should be utilized as indicated by the clinical status of the child.

Basic assessment of sick children — Chart 1



Emergency signs and treatment — Chart 2

■ **If any sign is positive:** give treatment, call for help, draw blood for emergency laboratory studies: glucose, malaria smears, hemoglobin



***Note:** If a child has trauma or other surgical problems, get surgical help or follow surgical guidelines. Check for head/neck trauma before treating child—do not move neck if cervical spine injury is a possibility. (See Chart 10.)

Priority signs and treatment — Chart 3

■ These children need prompt assessment and treatment, if readily available.

■ If not, proceed directly to stabilization prior to referral or admission. (See Chart 1.)

Assess the following 9 conditions:	Urgent treatment	Chart
1. Prevent low blood sugar for *all* children	Glucose, sugar water or breast milk	Glucose Chart 8
2. Danger symptoms • Convulsions • Lethargy, altered consciousness, unconsciousness • Inability to drink or breastfeed • Vomiting everything	Diazepam or paraldehyde If febrile, give antibiotic IV fluids	Convulsions Chart 11 Antibiotics Chart 19 Fluids Chart 9
3. Cough or difficulty breathing • Respiratory rate (fast breathing) suggests pneumonia 2 mo – 12 mo > 50 breaths per minute 12 mo – 5 yrs > 40 breaths per minute • Chest wall indrawing • Stridor (noise when breathes in) in a calm child	Oxygen Antibiotic	Oxygen Chart 6 Antibiotics Chart 19
4. Diarrhea/ dehydration (any two of the following) • Sunken eyes • Not able to drink or drinking poorly • Skin pinch recovers very slowly	IV or nasogastric fluids	Fluids Chart 9
5. Severe febrile disease • Any danger symptom (see above) • Malaria risk? • Stiff neck • Continually irritable or restless	Antibiotic Antimalarial, as indicated Paracetamol	Antibiotics Chart 19 Antimalarials Chart 20 Antipyretics Chart 21
6. Measles - With any danger symptom *or* • Clouding of cornea or • Deep or extensive mouth ulcers	Antibiotic Vitamin A Tetracycline eye ointment	Antibiotics Chart 19 Vitamin A Chart 20
7. Ear problems • Tender swelling behind ear = mastoiditis	Antibiotic Paracetamol	Antibiotics Chart 19 Antipyretics Chart 21
8. Severe malnutrition or severe anemia • Visible severe wasting or • Severe palmar pallor or • Edema of both feet	Vitamin A	Vitamin A Chart 20
9. Infants age 1 week to 2 months • Convulsions • Fast breathing (>60 breaths per minute) • Severe chest wall indrawing • Nasal flaring (when breathing in) • Grunting (when breathing out) • Bulging fontanelle • Pus drainage from ear • Umbilical redness extending to surrounding skin • Fever (rectal temp > 38°C) or hypothermia (rectal temp <36°C) • Many or severe skin pustules • Lethargy or unconsciousness • Less than normal movement • Not able to feed	Sugar water or breast milk IV or nasogastric fluids as needed Anticonvulsant if needed Antibiotic Keep warm	Glucose Chart 8 Fluids Chart 9 Convulsions Chart 11 Antibiotics Chart 19

How to manage a choking infant or child Chart 4

A. Infant

1. Lay the infant on your arm or thigh in a head down position. *(See Diagram 1.)*
2. With heel of hand, give 5 slaps to the infant's back.
3. If obstruction persists, turn infant over and give 5 chest thrusts with 2 fingers, one finger width below nipple level in midline. *(See Diagram 2.)*
4. If obstruction persists, check infant's mouth for any obstruction that can be removed.
5. If necessary, repeat sequence with back slaps again.

Diagram 1: Back slaps

Diagram 2: Chest thrusts

B. Child

1. With heel of hand, give 5 blows to the child's back. Child may be sitting, kneeling or lying. *(See Diagram 3.)*
2. If the obstruction persists:
   - Go behind the child and pass your arms around the child's body.
   - Form a fist with one hand immediately below the child's sternum.
   - Place the other hand over the fist and pull into the abdomen with a sudden upward jerk. (*See Diagram 4.*) This forces air from the lungs.
   - Repeat this "Heimlich maneuver" up to 5 times, as necessary, to remove obstruction.
3. If the obstruction persists, check the child's mouth for any obstruction that can be removed.
4. If necessary, repeat steps 1 and 2.

Diagram 3: Blow to the back in a choking child

Diagram 4: Heimlich maneuver in a choking child

How to manage the airway in an infant or child Chart 5

A. No neck trauma suspected

Infant or child who is conscious

1. Inspect mouth and remove foreign body, if present.
2. Clear secretions from throat/suction airway.
3. Let child assume position of maximal comfort.

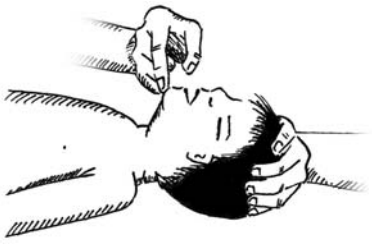


Diagram 1: Neutral position in an infant

Infant or child who is unconscious

1. Position the head as shown. *(See Diagram 1 or 2.)*
2. Inspect mouth and remove foreign body, if present.
3. Clear secretions from throat/suction airway.
4. Check the airway. *(See Diagram 3.)*
   - Look for chest movements.
   - Listen for breath sounds.
   - Feel for breathing.

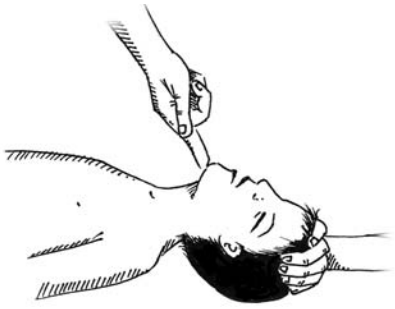


Diagram 2: Sniffing position in an older child

If the child is still not breathing after completing the above steps, ventilate with bag and mask.

Diagram 3: Look, listen, and feel for breathing

B. Neck trauma suspected (possible cervical spine injury)

1. Stabilize the neck. (See Chart 10.)
2. Use jaw thrust, without head tilt. *(See Diagram 4.)*
3. Inspect mouth and remove foreign body, if present.
4. Clear secretions from throat/suction airway.
5. Check the airway. *(See Diagram 3.)*
   - Look for chest movements.
   - Listening for breath sounds.
   - Feel for breathing.

Diagram 4: Jaw thrust without head tilt, if neck trauma is suspected.

If the child is still not breathing after completing the above steps, ventilate with bag and mask.

How to give oxygen Chart 6

Give oxygen through nasal prongs or a nasal catheter.

A. Nasal prongs

1. Place the prongs just inside the nostrils.
2. Secure with tape. *(See Diagram 1.)*
3. Start oxygen flow at 1-2 liters per minute.

Diagram 1: Nasal prongs

B. Nasal catheter

1. Use an 8 F size tube
2. Measure the distance from the side of the nostril to the inner eyebrow margin with the catheter.
3. Insert the catheter to this depth.
4. Secure with tape. *(See Diagram 2.)*
5. Start oxygen flow at 1-2 liters per minute.

Diagram 2: Nasal catheter

Emergency IV fluids for shock — Chart 7

Signs/symptoms of shock:
- Hands and extremities cold
- Capillary refill slow (longer than 3 seconds)
- Weak and rapid pulse, ↓ BP

A. If no severe malnutrition:

1. Start intravenous or intraosseous line with isotonic fluid (Ringer's lactate or 0.9% saline).
2. Infuse 20ml/kg as rapidly as possible. (*See table.*)

Age	Weight	Fluid volume
2 months	< 4 kg	75 ml
2 to < 4 months	4 to < 6 kg	100 ml
4 to < 12 months	6 to < 10 kg	150 ml
1 to < 3 years	10 to < 14 kg	250 ml
3 to < 5 years	14 to 19 kg	350 ml

3. Reassess*: Repeat 20 ml/kg, if no improvement in child's condition after 1st infusion.
4. Reassess*: Repeat 20 ml/kg, if no improvement in child's condition after 2nd infusion.†
5. Reassess*: Give <u>blood</u> 20 ml/kg over 30 minutes, if no improvement after 3rd infusion.

†Alternative recommendation to consider:
If suspected blood loss or if no response after 2 boluses of 20 ml/kg of isotonic fluid, give 10 mg/kg blood, plasma, or colloid (albumin).

B. If severely malnourished, has signs of shock and is lethargic or unconscious:

1. Obtain blood glucose.
2. If not available or if blood glucose is < 55 mg/dl, give 5 ml/kg 10% glucose. (See Chart 8.)
3. Infuse Ringer's lactate or 5% dextrose ½ Normal Saline (D_5½ NS) at a rate of 15 ml/kg over 1 hour. (*See table.*)

Weight	Fluid volume Infuse over 1 hour	Weight	Fluid volume Infuse over 1 hour
4 kg	60 ml	12 kg	180 ml
6 kg	90 ml	14 kg	210 ml
8 kg	120 ml	16 kg	240 ml
10 kg	150 ml	18 kg	270 ml

4. Reassess*: If child's condition improves (pulse rate falls), give repeat 15 ml/kg IV over 1 hour. If worsens, see below.

***Signs/symptoms of improvement:** pulse rate slows, ↑ BP, capillary refill quickens.

If child becomes worse during the infusion, STOP the procedure because IV fluid can worsen the child's condition, then

1. Evaluate for congestive heart failure:
   - Gallop rhythm
   - Basal rales
   - Hepatomegaly
   - Increased heart rate and respiratory rate
   - Abnormal chest x-ray (CXR)
2. Consider:
   - Dopamine: 5 micrograms/kg/min
     plus
   - Furosemide: 1 mg/kg IV every 12 hours PRN

1. Insert IV line, if available. If IV line is not an option or if child is conscious without convulsions, see instructions for rectal administration (A) or oral administration (B) of glucose below.
2. Obtain blood for emergency laboratory studies (glucose, malaria smears, hemoglobin).
3. Check blood glucose: dextrostix and/or lab test of blood glucose.
4. Administer glucose solution:
   - if blood glucose is less than 45 mg/dl in a well-nourished child, or
   - if blood glucose is less than 55 mg/dl in a severely malnourished child, or
   - if blood glucose test not available.

A. IV or rectal administration of glucose solution:

Give glucose solution by rapid IV injection or per rectum as follows:
(maximum volume per rectum is 150 ml for young children; 250 ml for older children)

Age	Weight	Volume of 10% glucose (bolus of 5 ml/kg)	Volume of 25% glucose (bolus of 2 ml/kg)
< 2 mo	< 4 kg	15 ml	6 ml
2 to 4 mo	4 to < 6 kg	25 ml	10 ml
4 to < 12 mo	6 to < 10 kg	40 ml	16 ml
1 to < 3 yr	10 to < 14 kg	60 ml	24 ml
3 to < 5 yr	14 to < 19 kg	80 ml	32 ml

5. Recheck blood glucose in 30 minutes.
6. If remains low—repeat dose of glucose solution IV or per rectum.
7. Recheck blood glucose in 30 minutes.
8. If remains low: if child is unconscious or having convulsions, needs IV containing 5-10% glucose (dextrose). *Do not feed orally*.

B. Oral or nasogastric (NG) tube administration of glucose solution:

If child is conscious *without convulsions*, feed milk or sugar solution by mouth or nasogastric tube.
(Sugar solution—dissolve 4 teaspoons sugar (20 gm) in 200 ml clean water)

Emergency management of severe dehydration Chart 9

1. Assess for signs/symptoms of shock:
   - Hands and extremities cold
   - Capillary refill slow (longer than 3 seconds)
   - Weak and rapid pulse, ↓ BP
2. If child has signs of shock, go to Chart 7.
3. Switch to Chart 9 (this chart) when the child's pulse slows or capillary refill improves.
4. Give **70 ml/kg** Ringer's lactate solution (preferred) or 0.9% NaCl.
   - **Over 5 hours in infants** (age <12 months)
   - **Over 2½ hours in children** (age 12 months – 5 years)

IV Fluid- total volume (vol/hr)

Weight	Age <12 months (Give over 5 hours)	Age 12 months-5 years (Give over 2½ hours)
< 4 kg	200 ml (40 ml/hr)	---
4 to < 6 kg	350 ml (70 ml/hr)	---
6 to < 10 kg	550 ml (110 ml/hr)	550 ml (220 ml/hr)
10 to < 14 kg	850 ml (170 ml/hr)	850 ml (340 ml/hr)
14 to < 19 kg	1200 ml (240 ml/hr)	1200 ml (480 ml/hr)

5. Reassess child every 1-2 hours.
6. Increase IV rate if hydration status not improving.
7. Give ORS (oral rehydration salts solution at ~5ml/kg/hour) as soon as the child can drink.

Weight	Volume ORS solution per hour
< 4 kg	15 ml
4 to < 6 kg	25 ml
6 to < 10 kg	40 ml
10 to < 14 kg	60 ml
14 to < 19 kg	85 ml

How to position an unconscious child Chart 10

A. If neck trauma is not suspected:

- Turn the child on the side to reduce risk of aspiration.
- Keep the neck slightly extended and stabilize by placing cheek on one hand.
- Bend one leg to stabilize the body position. *(See Diagram 1.)*

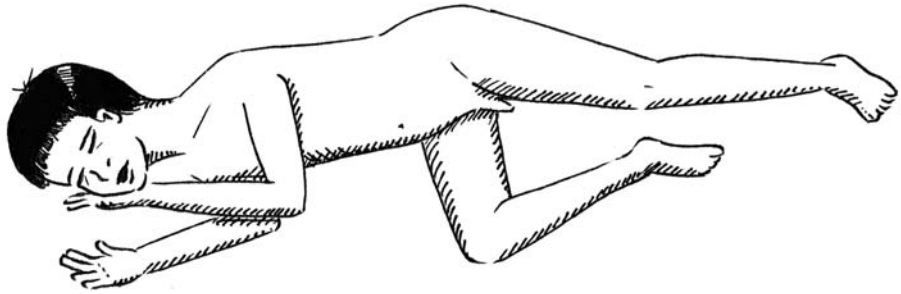


Diagram 1: Positioning child, if neck trauma is not suspected

B. If neck trauma is suspected:

- Stabilize the child's neck.
- Keep the child lying on the back.
- Tape the child's forehead to the sides of a firm board to secure this position.
- Prevent the neck from moving by supporting the child's head (e.g., using liter bags of IV fluid on each side). *(See Diagram 2.)*
- If vomiting, turn on the side, keeping the head in line with the body.

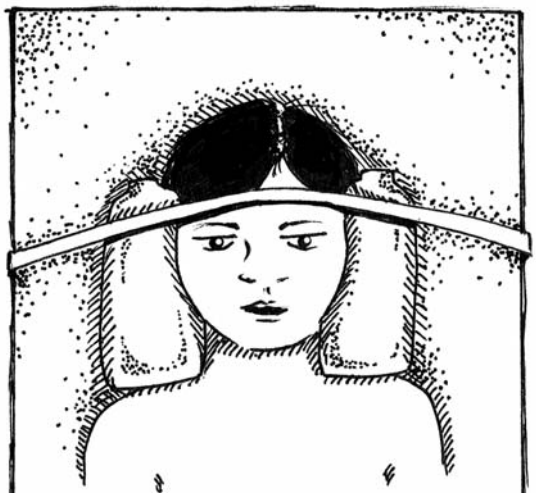
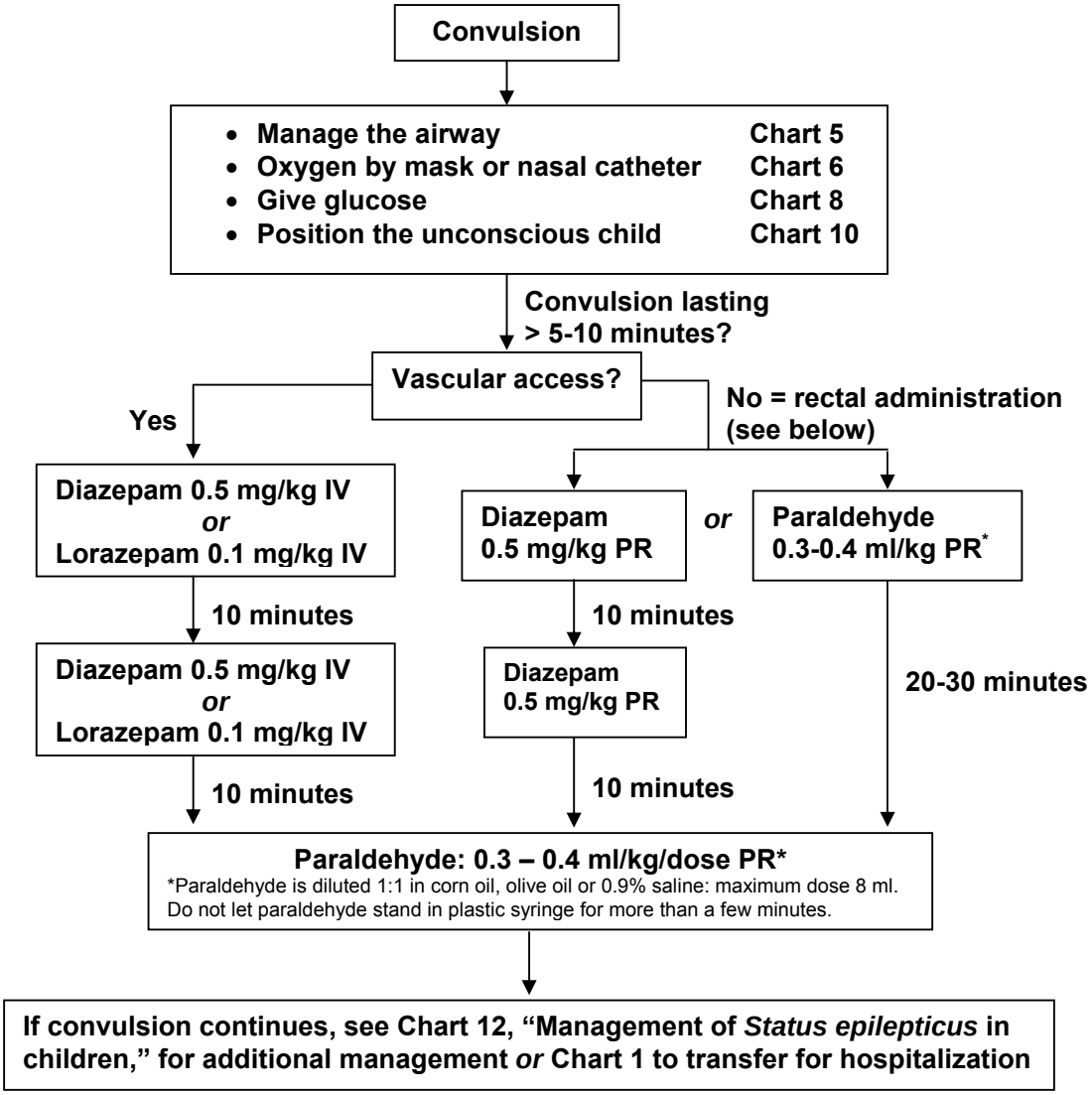


Diagram 2: Stabilize neck, if head trauma is suspected

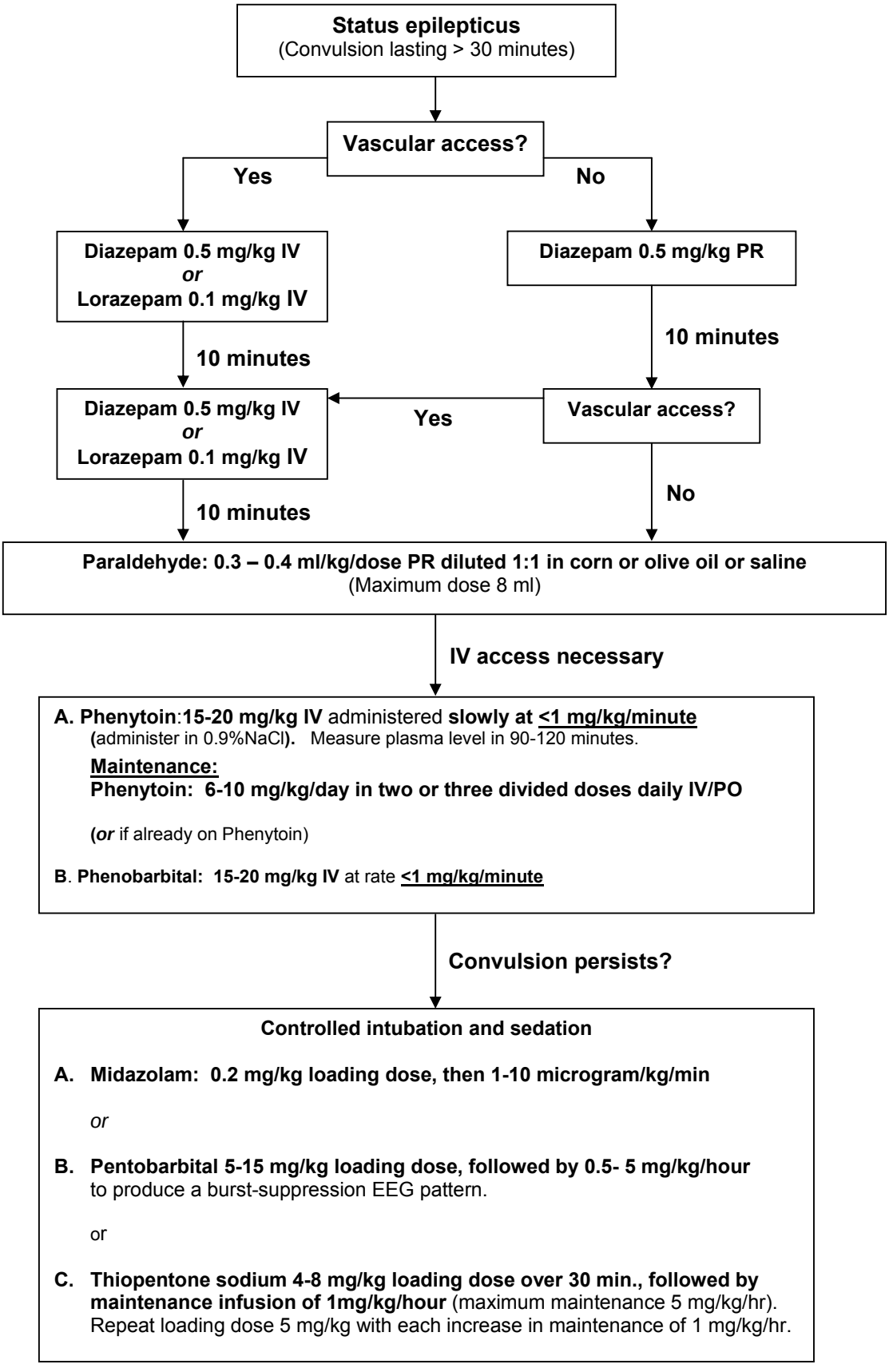
Management of uncomplicated convulsions in children Chart 11



Rectal administration of medications

1. Draw up dose of medication into a tuberculin (1 ml) syringe, then remove needle.
2. Insert the syringe into the rectum 4-5 cm and inject the solution.
3. Hold buttocks together for a few minutes to prevent expulsion.

		Diazepam (rectal) 10 mg/2 ml solution	Paraldehyde (rectal)
Age	**Weight**	**Dose 0.1 ml/kg**	**Dose 0.3-0.4 ml/kg**
2 wk to 2 mo	<4 kg	0.3 ml	1.0 ml
2 mo to < 4 mo	4 to 5.9 kg	0.5 ml	1.6 ml
4 mo to<12 mo	6 to 9.9 kg	1.0 ml	2.4 ml
1 yr to < 3 yr	10 to 13.9 kg	1.25 ml	4 ml
3 yr to < 5 yr	14 to 19 kg	1.5 ml	5 ml


Status epilepticus
(Convulsion lasting > 30 minutes)
Vascular access?
Yes
No
Diazepam 0.5 mg/kg IV
or
Lorazepam 0.1 mg/kg IV
Diazepam 0.5 mg/kg PR
10 minutes
10 minutes
Diazepam 0.5 mg/kg IV
or
Lorazepam 0.1 mg/kg IV
Yes
Vascular access?
No
10 minutes
Paraldehyde: 0.3 – 0.4 ml/kg/dose PR diluted 1:1 in corn or olive oil or saline
(Maximum dose 8 ml)
IV access necessary
A. Phenytoin:15-20 mg/kg IV administered slowly at <1 mg/kg/minute
(administer in 0.9%NaCl). Measure plasma level in 90-120 minutes.
Maintenance:
Phenytoin: 6-10 mg/kg/day in two or three divided doses daily IV/PO
(or if already on Phenytoin)
B. Phenobarbital: 15-20 mg/kg IV at rate <1 mg/kg/minute
Convulsion persists?
Controlled intubation and sedation
A. Midazolam: 0.2 mg/kg loading dose, then 1-10 microgram/kg/min
or
B. Pentobarbital 5-15 mg/kg loading dose, followed by 0.5- 5 mg/kg/hour
to produce a burst-suppression EEG pattern.
or
C. Thiopentone sodium 4-8 mg/kg loading dose over 30 min., followed by
maintenance infusion of 1mg/kg/hour (maximum maintenance 5 mg/kg/hr).
Repeat loading dose 5 mg/kg with each increase in maintenance of 1 mg/kg/hr.

Management of suspected encephalitis or meningitis Chart 13

Clinical presentation:
- Acute onset fever
- Change in consciousness *and/or*
- New onset convulsions (simple febrile convulsion ruled out*) *and/or*
- Stiff neck

1. Clinical assessment**

→ **Examination form** **Appendix 4**

2. Admission laboratory

→ **Recommended laboratory tests**

Blood:
- Blood count, differential
- Glucose
- Malaria smears†
- Electrolytes
- Ammonia
- Calcium
- Magnesium
- Liver enzymes
- Blood urea nitrogen
- Creatinine
- Serum anti-JEV IgM ELISA†
- Dengue serology
- Blood culture
- Blood gas, as indicated

Urine:
- Urinalysis
- Urine culture
- Toxicology screen

3. Lumbar puncture
(Relative contraindications‡—see below)

→ **Lumbar puncture** **Appendix 2**

CSF:
- Cell count, differential
- Glucose
- Protein
- Gram stain
- India ink preparation
- Viral & bacterial cultures
- Anti-JEV IgM ELISA†

4. Clinical management
Consider transfer—
See indications below (antibiotics before transfer)

→ **Clinical management** **Chart 14**

or

Indications for transfer to intensive care facility:
- Inability to stabilize
- Clinical deterioration
- Uncontrolled convulsions
- Hyponatremia (serum Na+ <125 mmol/L or symptoms)
- Depth of coma (GCS ≤ 8). (*See Appendix 1.)*
- Signs of increased intracranial pressure (ICP)§

→ **Transfer to intensive care facility with:**
- IV fluids (do not overload)
- Anticonvulsants Charts11& 12
- Health care worker to monitor patient
- Ambu bag/ O_2 by mask
- Antibiotics before transfer Chart 19

* Febrile convulsion defined as: Single convulsion lasting < 15 minutes
Child aged 6 months to 5 years with fever
Recovery of consciousness within 60 minutes

** For list of differential diagnoses, see Appendix 3

† If positive, notify MOH.

‡ Pupils unequal; prolonged or focal convulsions; posturing; one-sided weakness; signs of increased ICP; GCS ≤ 8. *(See Appendix 1.)*

§ Unequal pupils, ↑ blood pressure, bradycardia, irregular breathing, new onset vomiting, hemiplegia, posturing

Basic clinical management of acute encephalitis syndrome Chart 14

Note: Antibiotics started upon admission should be continued for presumptive meningitis for at least 10 days, if lumbar puncture was not performed, or until meningitis is ruled out by results of CSF examination.

Admission laboratory Chart 13

IV fluids:

- 5% dextrose ½ Normal Saline (D_5½NS) or Ringer's lactate.
- If plasma Na+ <135 mmol/L, change to 0.9% NaCl. Charts 15, 16, 17
- Total daily fluids = ¾ routine maintenance. Appendix 2
- Avoid fluid overload.
- Fluid and electrolyte management is critical to outcome.
- Monitor for signs of intracranial hypertension (↑ ICP). Chart 18

Medications:

- Oxygen as indicated.
- Anticonvulsants as indicated. Chart 11
- Antibiotics as indicated. Chart 19
- Antimalarial as indicated. Chart 20
- Antipyretics/ analgesics. Chart 21
- Antacids, as indicated. Chart 21
- Management of intracranial hypertension (↑ ICP). Chart 18

Lab:

- Daily electrolytes, hematocrit/hemoglobin or blood count, glucose.
- Plasma and urine osmolality, if plasma Na+ < 135 mmol/L. Charts 15, 16
- Repeat serum anti-JEV IgM ELISA* at 7-10 days of illness or prior to discharge or at death, whichever comes first.
- If CSF is repeated, send for anti-JEV IgM ELISA.*

Start flow (monitoring) chart: (maintain every 4 hours, if possible)

- Vital signs—temperature, blood pressure, heart rate, respiratory rate, pupils.
- Coma scale score. Appendix 1
- Intake (oral + IV).
- Urine output—maintain at least 0.5 ml/kg/hr.
  If urine output decreases, assess for dehydration versus SIADH. Chart 15
- Urine specific gravity.
- Convulsion log; other neurological signs.

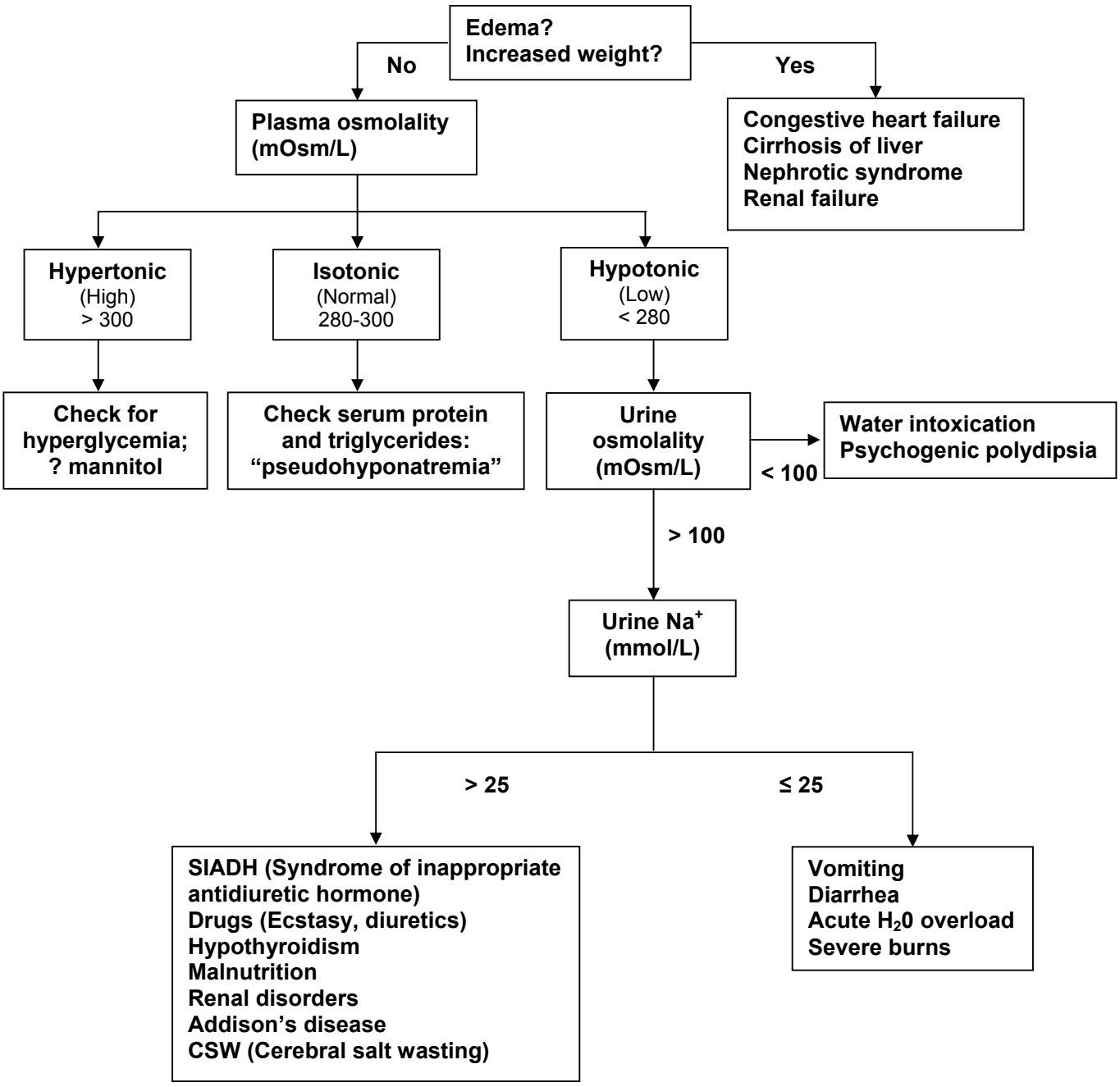
Routine management:

- Head of bed elevated 30° with head midline.
- Feed orally as soon as clinically appropriate.
- Nasogastric (NG) tube irrigation with normal saline every 4 hours.
- Monitor NG residuals before feeding (can refeed, but subtract amount from next feeding).
- Eye lubrication every 4 hours, if not blinking.
- Tape eyelids shut, if not blinking.
- Tepid sponge baths for fever.
- Foley catheter care every 8 hours (record urine output).
- Monitor for signs of secondary infection (urinary tract infection and/or pneumonia).
- Chest X-ray as clinically indicated.
- Quiet environment; avoid bright lights.
- Change position every 2 hours.
- Keep skin folds clean and dry.
- Change diapers frequently.
- Stool softener as needed.
- Start physical and rehabilitation therapy.

* If positive, notify MOH.

Differential diagnosis of hyponatremia Chart 15

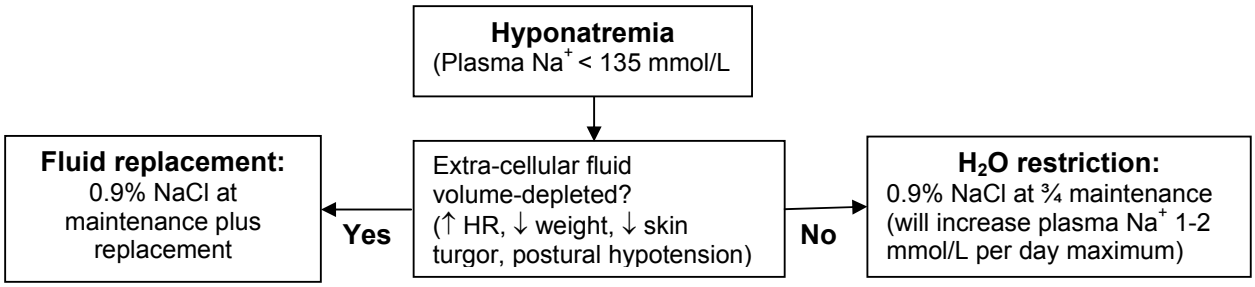
NOTE: Hyponatremia = Plasma Na < 135 mmol/L



	Plasma Na^+	Plasma volume	Urine output	Urine Na^+	Net Na^+ loss	Urine osmolality	Blood urea nitrogen	Management
SIADH	Decreased	Increased	Decreased	Increased	+/-	Increased	Decreased	H_2O restriction
CSW	Decreased	Decreased	Increased	Increased	Increased	Isotonic	Normal to increased	Isotonic NaCl

Clinical management of hyponatremia Chart 16

A. No symptoms, "mild-moderate"



B. Symptoms, "severe"

- Plasma Na^+ is usually < 125 mmol/L with symptoms.
- Symptoms: convulsions, other evidence of ↑ ICP and/or pulmonary edema.

THIS IS A MEDICAL EMERGENCY: requires careful correction of Na^+ deficit

Goal: a) Reverse symptoms
b) Increase plasma Na^+ to 120-125 mmol/L over 24 to 48 hours*

4. Secure airway—mechanical ventilation may be necessary.
5. Monitor arterial blood gases—avoid hypercapnia (pCO_2 > 45 mm Hg).
6. IV 3% NaCl (514 mmol/L)—give 5 ml/kg over 60 minutes.*
7. Check plasma Na^+ and calculate plasma Na^+ deficit: 125 minus actual plasma Na^+ (mmol/L).
8. Adjust infusion rate to allow gradual correction of remaining deficit over 24 to 48 hours*, using method "a" or "b" to determine volume of 3% NaCl:
   a. **Estimate method:**
      1 ml/kg 3% NaCl will increase plasma Na^+ approximately 1 mmol/L (administer over 24-48 hours)
   b. **Calculation method:** (total volume of 3% NaCl to reverse deficit over 24-48 hours*)

$$\text{3\% NaCl (ml)} = \frac{[(125 \text{ mmol/L} - \text{actual plasma } Na^+)] \times \text{Body wt (kg)} \times 0.6 \text{ L/kg}}{0.514 \text{ mmol } Na^+/\text{ml 3\% NaCl}}$$

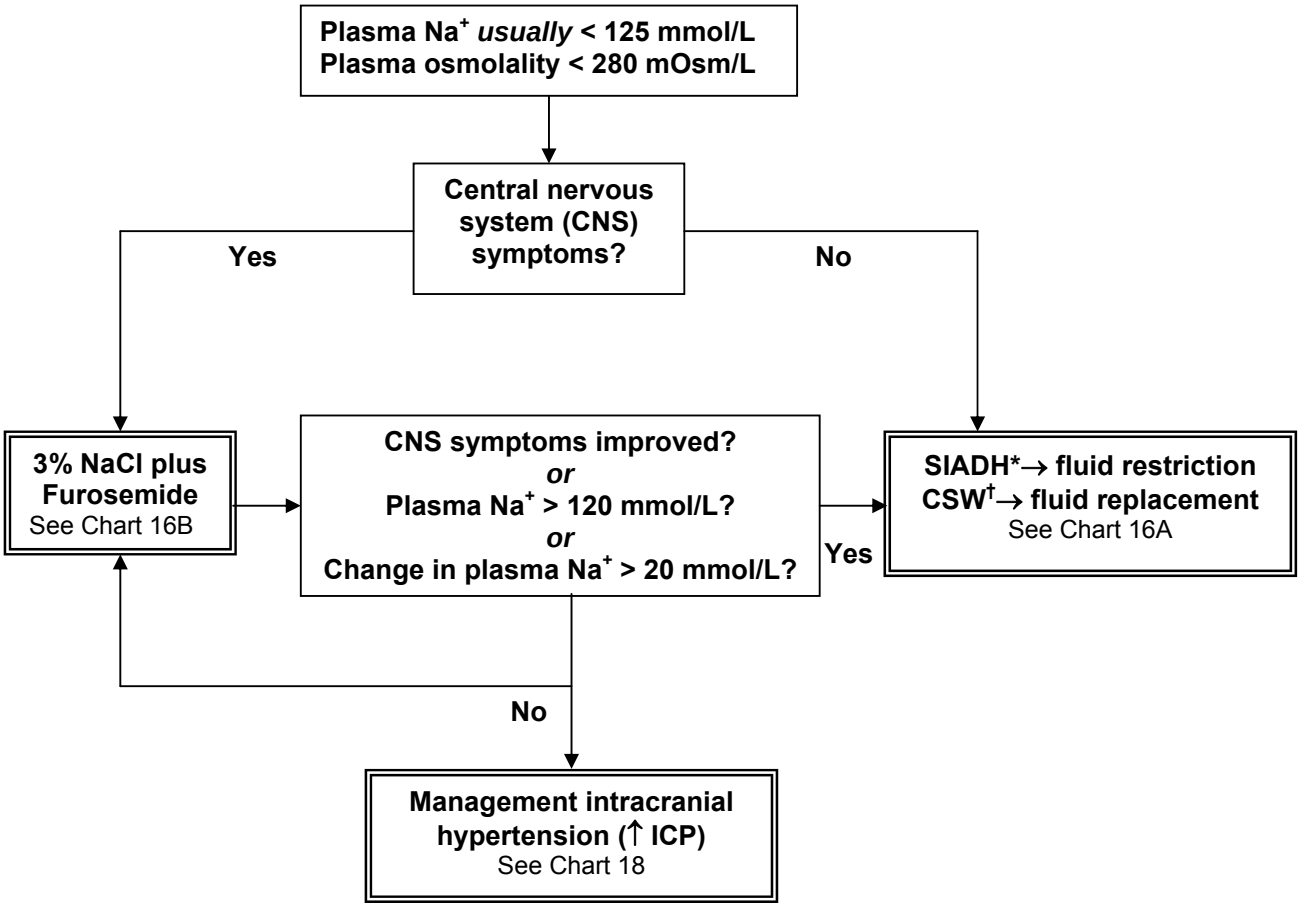
9. Discontinue therapy with 3% NaCl when:
   - patient becomes asymptomatic *or*
   - plasma Na^+ increases by 20-25 mmol/L *or*
   - plasma Na^+ reaches 120-125 mmol/L
10. Monitor plasma Na^+ every 2 hours until patient is neurologically stable.
11. Adjust infusion rate to reach therapeutic goal.
12. Furosemide 1 mg/kg/dose every 12 hours as needed (watch plasma K^+).
13. If diagnosis is SIADH (see Chart 15), resume fluid restriction therapy (¾ maintenance).
14. If diagnosis is CSW (see Chart 15), use 0.9% NaCl to replace urine output volume-for-volume.

See Chart 17 for "Overview of management of severe hyponatremia."

*Recent data indicates that the *rate* of correction has little relationship to the development of cerebral demyelinating lesions, broadly referred to as "central pontine myelinolysis (CPM)". The *absolute magnitude of the correction and underlying illness* are **the major risk factors**:

- Hypernatremic state created inadvertently
- Na^+ levels corrected greater than 25 mmol/L in 48 hours
- Hypoxia (pO_2< 55 mmHg), associated with neurogenic pulmonary edema or hypercapnic respiratory failure
- Severe liver disease

Overview of management of severe hyponatraemia Chart 17



*Syndrome of inappropriate antidiuretic hormone
†Cerebral salt wasting

Management of intracranial hypertension (↑ ICP) Chart 18

Note: Optimal use of Mannitol and Furosemide requires the capacity to monitor serum electrolytes (Na^+, K^+), glucose and blood urea nitrogen (BUN). Without this capacity, their use should be strictly limited to emergency management of signs or symptoms of brain compression (↑ICP).

Signs suggestive of ↑ ICP: Unequal pupils, increased blood pressure, bradycardia, irregular breathing, new onset vomiting, hemiplegia, posturing

Management

- Elevate head of bed 30°
- Cardiac monitor
- Monitor blood pressure (continuously or hourly)
- Maintain mean arterial pressure (MAP):* > 75 mm Hg in children
  > 85 mm Hg in adolescents/adults
- Central venous pressure (CVP) monitoring, especially when GCS ≤ 8
- Fluids IV: 5% dextrose ½ Normal Saline (D_5½NS) at ¾ maintenance. No hypotonic fluids.
  Avoid fluid overload.
  Avoid hypotension or hypovolemia (CVP may be used to manage fluids)
  Urine output, at minimum 0.5 ml/kg/hour (monitor every 4 hours)
- Medications: Antipyretics
  Anticonvulsants, therapeutic or prophylactic
  Barbiturate sedation may be indicated (See Chart 12)
  Mannitol 0.25 g IV (1.25 ml of 20% solution) - ↓ ICP in 15 min, lasts 3-6 hrs.
  and
  Furosemide 1 mg/kg IV every 12 hours (enhances action of mannitol)
- Mannitol dose may be gradually increased as needed to 1g IV (5.0 ml of 20% solution). *Should be used only when evidence of ↑ICP and no more than every 4-6 hours.*
- Calculate plasma osmolality every 12 – 24 hours. (See Appendix 2.) Maintain plasma osmolality < 310 mOsm/L.
- Controlled intubation (Avoid ketamine and succinylcholine; both can increase ICP)
  A. 100% oxygen

B. Sedation:	Normal BP	Lidocaine	1-2 mg/kg	*plus*
		Thiopental	4-7 mg/kg	
	Low BP	Lidocaine	1 mg/kg	*plus*
		Fentanyl	2-5 mcg/kg	*or*
		Thiopental	1-2 mg/kg	
C. Paralysis:	(as needed)	Pancuronium	0.1-0.2 mg/kg	

- Avoid hypoxia: O_2 saturation monitoring (continuous or hourly, at minimum)
- Avoid pCO_2 < 25: hyperventilation should be used only for acute management to lower pCO_2 to 30-35 mmHg and should be withdrawn gradually to avoid rebound ↑ ICP.

*MAP calculation = Diastolic pressure + (Systolic pressure - Diastolic pressure) ÷ 3

A. Antibiotics prior to transfer to referral facility

- Any child with danger symptoms, difficulty breathing or severe febrile disease. (For suspected meningitis, proceed to Category B.)
- Any infant age 1 week to 2 months with priority signs. (See Chart 3.)

Ceftriaxone: 50 mg/kg IV/IM

or

Ampicillin: 50 mg/kg IV/IM
plus
Chloramphenicol: 25 mg/kg IV/IM

B. Antibiotic treatment for presumptive bacterial meningitis*

Chloramphenicol: 25 mg/kg IV/IM every 6 hours
plus
Ampicillin: 50 mg/kg IV/IM every 6 hours

or

Chloramphenicol: 25 mg/kg IV/IM every 6 hours
plus
Benzylpenicillin: 60 mg/kg (100,000 units/kg) IV/IM every 6 hours

Where there is known resistance of common organisms to the above antibiotics, as found with *Haemophilus influenzae* or *Pneumococcus*, follow national guidelines.

Consider a third-generation cephalosporin such as:

Ceftriaxone: 50 mg/kg IV/IM every 12 hours

or

Cefotaxime: 50 mg/kg IV/IM every 6 hours

If CSF confirms the diagnosis of bacterial meningitis results:

- Give treatment parenterally for at least 3 days.
- Chloramphenicol may be given orally, when the child's condition has improved.
- Complete a full 10-day course of antibiotic treatment, based on culture results and clinical recovery.

***Suspected *Herpes simplex*:**

Acyclovir: 20 mg/kg IV every 8 hours for 14-21 days

A. Antimalarial treatment

Parenteral quinine or artemisinin derivatives are recommended in areas of chloroquine resistance, which is widespread in South East Asia. Follow national or regional guidelines.

	Form	Loading dose	3 - <6kg	6 - <10kg	10 - <15kg	15 - <20kg	20 - 29kg
Artesunate (IV)*	60 mg artesumic acid (in saline/bicarbonate) Dissolve in 3.4 ml 5% glucose or saline	2.4 mg/kg which is twice the maintenance dose (1.2 mg/kg) shown here	0.4 ml	0.7 ml	1.2 ml	1.5 ml	2.5 ml
Artemether (IM)†	80 mg/1ml ampoule	3.2 mg/kg which is twice the maintenance dose (1.6 mg/kg) shown here	0.1 ml	0.2 ml	0.3 ml	0.4 ml	0.6 ml
	40 mg/1 ml ampoule		0.2 ml	0.4 ml	0.6 ml	0.8 ml	1.2 ml
Quinine (IV)‡	Quinine dihydrochloride 150 mg/ml injection (2 ml ampoules)	20 mg salt/kg which is twice the maintenance dose (10 mg salt/kg) shown here	0.3 ml	0.6 ml	1 ml	1.2 ml	2 ml
	Quinine dihydrochloride 300 mg/ml injection (2 ml ampoules)		0.2 ml	0.3 ml	0.5 ml	0.6 ml	1 ml
Quinine sulfate tablet	200 mg tablet	Not applicable	1/4	1/2	3/4	1	1 1/2
	300 mg tablet		-	-	1/2	1/2	1

* Solution should be prepared just before use. Dilute as instructed in glucose or saline. Give maintenance dose at 12 and 24 hours, then daily for 6 days. Give the dose orally when the patient is able to swallow.

† Give the maintenance dose IM until the patient can swallow and take the dose orally.

‡ Loading dose should be given slowly over 4 hours. After 12 hours, give maintenance dose over 2 hours and repeat every 12 hours to complete 7 days' treatment. Can switch to tablet (10mg/kg) given every 8 hours when child is able.

B. Vitamin A treatment

		Dose according to body weight.				
	Form	3 - < 6 kg	6 - < 10 kg	10 - < 15 kg	15 - < 20 kg	20-29 kg
Once per Day for 2 days§	200 000 IU capsule	-	1/2	1	1	1
	100 000 IU capsule	1/2	1	2	2	2
	50 000 IU capsule	1	2	4	4	4

§Give 1st dose immediately on diagnosis; give 2nd dose the next day. If the child has clouding of cornea or is severely malnourished, give a 3rd dose 2-4 weeks later at follow-up visit.

A. Analgesics/Antipyretics

	Dosage	Form	3 - < 6 kg	6 - < 10 kg	10 - < 15 kg	15 - < 20 kg	20 - 29 kg
Paracetamol	10-15 mg/kg PO every 4-6 hr	100 mg tablet	-	1	1	2	3
		500 mg tablet	-	¼	¼	½	½
Acetaminophen	10-15 mg/kg PO every 4-6 hr	325 mg tablet	-	¼	½	½	1
		500 mg tablet	-	¼	¼	½	½
Ibuprofen*	5-10 mg/kg PO every 6-8 hr	200 mg tablet	-	¼	¼	½	¾
		400 mg tablet	-	-	-	¼	½
Aspirin * †	10-20 mg/kg PO every 4-6 hr	300 mg tablet	-	¼	½	¾	1

*Do not use ibuprofen or aspirin if suspected dengue hemorrhagic fever (DHF).
†Avoid aspirin use in young children, if possible, because of the risk of Reye's syndrome.

B. Antacids

1. **Cimetidine:** 5-10 mg/kg PO, IV, IM every 6 hours
2. **Ranitidine:** PO: 4-6 mg/kg/24 hours divided every 8 or 12 hours
   IM or IV: 2-4 mg/kg/24 hours divided every 6-8 hours

A. AVPU scale for rapid assessment of level of consciousness:

A – Alert: is alert and awake
V – Voice: responds to voice, even though not alert
P – Pain: reacts to a painful stimulus (pinching or pulling frontal hair)
U – Unconscious: does not react to pain

B. Blantyre coma scale for preverbal young children

		Score
Watches or follows face or object	1	
Fails to watch or follow	0	
Eye movement		_____ (max 1)
Localizes painful stimulus	2	
Withdraws limb from painful stimulus*	1	
No response or inappropriate response	0	
Best motor response		_____ (max 2)
Cries appropriately with painful stimulus or speaks	2	
Moan or abnormal cry with painful stimulus	1	
No vocal response to painful stimulation	0	
Best verbal response		_____ (max 2)

*Pressure with horizontal pencil on nailbed of finger or toe

Total _____ (max 5, min 0)

C. Glasgow coma scale (GCS)

Observation	Response		Score
Eye opening (E)	Spontaneous	4	
	To speech	3	
	To pain	2	
	Nil	1	
			_____ (max 4)
Best motor response (M)	Obeys	6	
	Localizes	5	
	Withdraws	4	
	Abnormal flexion	3	
	Extensor response	2	
	Nil	1	
			_____ (max 6)
Best verbal response (V)	Oriented	5	
	Confused conversation	4	
	Inappropriate words	3	
	Incomprehensible sounds	2	
	Nil	1	_____ (max 5)
Coma scale (E+M+V) = 3-15	Score of < 8 indicates coma Score of 8 means possible coma Score of > 8 means noncomatose	**Total**	_____ (max 15, min 3)

Cerebrospinal fluid /Fluids and electrolytes/Osmolality Appendix 2

A. Cerebrospinal fluid (CSF) analysis

	Normal	Bacterial	Viral	TB
Cells	0-5 WBC/mm^3	> 1000/mm^3	< 1000/mm^3	25-500/mm^3
Polymorphonuclear leukocytes (PMN)	0	predominate	early	+/- increased
Lymphocytes	5	late	predominate	increased
Glucose	40-80 mg/dl	decreased	normal	decreased
CSF: plasma glucose ratio	66%	< 40%	normal	< 30%
Protein	5-40 mg/dl	increased	+/-increased	increased
Culture	negative	positive	negative	+TB
Gram stain	negative	positive	negative	positive

B. Fluids and electrolytes: routine maintenance requirements

1. Daily fluid volume calculation (Holliday-Segar Method)

Body weight	ml/kg/day	ml/kg/hour
First 10 kg	100	Approx. 4
Next 10 kg	50	Approx. 2
Each additional kg	20	Approx. 1

Example calculation for child weighing 25 kg:
(10 kg x 100 ml) + (10 kg x 50 ml) + (5 kg x 20 ml) = 1,600 ml/day

2. Electrolyte composition: (mEq/100 ml H_20): Na^+ 3.0, Cl^- 2.0, K^+ 2.2

Composition of frequently used parenteral fluids

Parenteral fluid	Na^+ (mEq/100 ml)	Cl^- (mEq/100 ml)	K^+ (mEq/100 ml)	HCO_3^- (mEq/100 ml)
D_5 0.225% NaCl	3.4	3.4	-	-
D_5 0.45% NaCl	7.7	7.7	-	-
NS (0.9% NaCl)	15.4	15.4	-	-
Ringer's solution	14.7	15.5	0.4*	-
Lactated Ringer's	13.0	10.9	0.4*	2.8

* With the exception of Ringer's and Lactated Ringer's, K^+ must be added to fluids.

C. Calculated serum/plasma osmolality (normal range = 285-295 mOsm/L)

$$2\,[Na^+] + \frac{\text{Glucose (mg/dl)}}{18} + \frac{\text{BUN (mg/dl)}}{2.8}$$

Differential diagnosis of child with fever and neck stiffness or convulsions, coma, or altered mental state in areas where Japanese encephalitis is endemic

NOTE: Conditions with specific treatment are in **bold print**.

Infectious
- **Meningitis (bacterial, cryptococcal or tuberculosis*)**
- **Cerebral malaria***
- **Brain abscess**
- **Herpes simplex encephalitis**
- **Leptospirosis**
- **Rickettsioses**
- **Infections associated with immunosuppression such as toxoplasmosis**
- Japanese encephalitis*
- Measles encephalitis*
- Murray Valley encephalitis*
- Rabies*
- West Nile encephalitis*
- Varicella-zoster encephalitis
- Dengue encephalopathy*
- Enteroviral meningoencephalitis (Coxsackie virus, echovirus, polio*)

Noninfectious
- Febrile convulsions
- **Hypoglycemia**
- **Shock**
- **Head injury**
- **Poisoning**
- **Diabetic ketoacidosis**
- **Cerebral vasculitis**
- **Acute glomerulonephritis with encephalopathy**
- **Tumor**
- Reye's syndrome

Parainfectious encephalomyelitis (rubella, mumps, Epstein-Barr, influenza, infectious mononucleosis, parainfluenza, ***Mycoplasma***)

Post-vaccinal encephalomyelitis* (Semple rabies and measles vaccines)

*If positive, notify MOH.

Clinical assessment of suspected encephalitis or meningitis

Name_____ **Age**_____ **Gender M / F** **I.D.#**_____

Assess: (Circle all signs present and fill in missing information.)

History: When did the child become sick? _____

What are the problems?

Fever this week? **Y / N** For how long? ____days Chills? **Y / N** Rash? **Y / N**

Vomiting? **Y / N** All food and drink? **Y / N**

Diarrhea? **Y / N** More than 3 times per day? **Y / N** For how long? ____days

Eating? **Y / N** Most recent food? _____

Fluid intake? **Normal / Poor** Types of fluids? _____

Passing urine at least 2 times per day? **Y / N** Time of last urination? _____

Preexisting health problems?

History of abnormal chest Xray? **Y / N**

Family members recently ill? **Y / N** **Symptoms:** _____

Travel outside this area within the preceding two weeks? **Y / N** Where? _____

Neurological: Headache? **Y / N** How long? _____

Convulsions? **Y / N** Date of onset_____ # per day? _____

When was the last convulsion?_____

Shaking of entire body? **Y / N** If no, then what part(s)? _____

Unable to arouse? **Y / N** Restless or irritable? **Y / N**

Abnormal facial or eye movements? **Y / N**

Tremors or abnormal body movements? **Y / N**

Unable to walk? **Y / N** Unable to talk? **Y / N**

Immunization status (check immunizations received as of this date):

BCG ☐ **DPT1** ☐ **DPT2** ☐ **DPT3** ☐ **HB1** ☐ **HB2** ☐ **HB3** ☐

OPV0 ☐ **OPV1** ☐ **OPV2** ☐ **OPV3**☐ **Measles** ☐ **No immunizations needed** ☐

Japanese encephalitis vaccination? **Y / N** Most recent? _____

Name_____ **I.D.#**_____

Physical exam

NOTE: Questions indicate specific concerns and should not limit complete examination.

Weight_____**kg** **Temperature**_____**°C** **HR** _____**/min.** **RR**_____**/min.** **BP**____**/**_____

General appearance: **Fair / Poor** Severe wasting visible? **Y / N** Edema? **Y / N**

Skin: Good turgor? **Y / N** Capillary refill > 3 seconds? **Y / N** Palmar pallor? **Y / N**
Rash? **Y / N** Petechiae? **Y / N** Vesicles? **Y / N** Bruising? **Y / N**
Tourniquet test positive? **Y / N**

Head, eyes, ears, nose, throat (HEENT):
Are pupils equal and reactive? **Y / N**
Is there corneal clouding? **Y / N**
Is neck stiff? **Y / N**

Cardiac: Is there a gallop rhythm? **Y / N**

Respiratory: Are there breathing problems? **Y / N**

Abdominal: Enlargement of liver? **Y / N** Enlargement of spleen? **Y / N**

Genitourinary:

Neurological: AVPU Scale for rapid assessment of level of consciousness (See Appendix 1.)
Alert? **Y / N** Responds to Voice? **Y / N** Reacts to Pain? **Y / N** Unconscious? **Y / N**
One-sided weakness or inability to move? **Y / N**
Abnormal movements of eyes or limbs? **Y / N**
Irritable or restless? **Y / N**
Persistent convulsion? **Y / N**
Abnormal posturing? **Y / N**

Initial assessment: **Lab:**

Plan:

Tips for Translating and Formatting the Guidelines Appendix 5

Recommendations for translation[4]

Choose one translator, preferably one with a health background and familiar with medical terminology, whose mother tongue is the local language. The translator should

- Aim for a conceptual equivalent of a word or phrase, not just a word for word translation.
- Avoid the use of jargon, but be familiar with standard translations of words in the field.
- Review the document with a bilingual native English speaker and with a speaker of the local language to make sure that there is no confusion on word usage or questions on meaning.

It may be appropriate to keep some English terms for clarity. If the translator does not have a medical background, sections that are not clear can be left in English and the appropriate translation done with medical staff during the adaptation process.

Some parts of the document may need to be back-translated by an independent translator, especially parts that convey difficult subjects or concepts where it is essential to get the exact meaning.

Pre-test to make sure the translation is well understood. Go back and revise any areas that may need strengthening or retranslating.

Be sure to check that new page numbers coincide with the table of contents.

Information for formatting

The JE guide is a complicated document, and therefore the Word files incorporate a lot of different formatting. The following tips will help you understand how the formatting was constructed and make the translation process a little easier.

1. There are four types of charts in the guide:
    - Flow chart—Charts 1, 11, 12, 15, 17
    - Decision table—Charts 2, 3, 13
    - Job aid with pictures—Charts 4, 5, 6, 10
    - Job aid with tables or text only—Charts 7, 8, 9, 14, 16, 18, 19, 20, 21

2. Styles were used as much as possible, but consistency was not always possible due to the requirements of each chart, especially regarding font size. The major styles used are:
    - Chart Title
    - Heading 1
    - Heading 2
    - Heading 3
    - Normal
    - Job aid steps
    - Job aid bullets

Flow charts

3. The flow charts are done with text boxes and arrows from the drawing toolbar.

4. Boxes with double lines around them indicate a referral to another chart on another page. The text boxes will need to be enlarged to fit expanding text, and the size and alignment of the arrows adjusted.

5. Text boxes, arrows, and pictures are formatted so they can be moved around easily. In order to release the object from the background:
    - Go to the “Format” menu.
    - Select “Object” or “Picture” depending on what you are trying to format.
    - Click on the “Layout” tab.
    - Select the "in front of text" wrapping style. This will enable the object to be moved around the page regardless of where the cursor is on the page.

[4]World Health Organization. Process of translation and adaptation of instruments. Available at: http://www.who.int/substance_abuse/research_tools/translation/en/. Accessed 22 March 2005.

6. You can "nudge" the text boxes, arrows, and pictures to move them by small amounts as you work to align them. To do this:
    - Select the object on the page.
    - Hold down the CTRL key while using the arrow keys on the keyboard at the same time to move the object.
    - If a text box does not move when you've selected it, click on the edge of it again so the grey shaded border changes from diagonal lines to lots of little dots.

7. Some objects are "grouped" together to keep them from moving apart. If you try to click on one object, but it selects several objects, you will need to "ungroup" them in order to make a change. To do this:
    - Right click on the grouped objects to select them and activate a pop-up menu.
    - Select “Grouping” from the menu.
    - Select “Ungroup.”

Decision tables

8. The decision tables are created as tables, even though they may not look like it. Many of the cells are merged and borders are only placed around the necessary cells. They are done as tables so that the text can expand without affecting how the formatting lines up.

9. Arrows are drawn in cells, and they can sometimes move or disappear. This is an unfortunate problem with Word. You may have to insert another arrow or copy and paste an arrow from another cell on the page back into the desired cell. "Nudge" the arrows into position if needed (see tip #6).

Job aids with pictures

10. The pictures (referred to as "diagrams" in the guide) are black and white jpg or tif files. They are formatted to be “in front of text” so they can be moved around by clicking on them and dragging with the mouse. (See tip #5).

Job aids with tables or text only

11. These charts should be the easiest to work with and use basic tables and formatting. Please refer to tips #8 and #9 if needed for some of the advanced table formatting.

Adapting the Japanese Encephalitis Clinical Care Guidelines for health facilities in your country Appendix 6

Introduction

In each country, and at different levels of the health system within each country, there are differences in access to and use of medical equipment and treatments. In addition there are variations in expected knowledge, skills and capacity of health staff to manage patients at different facility levels such as tertiary care centres, district hospitals or local health centres. It is therefore essential the Japanese Encephalitis Clinical Care guidelines are adapted to:

- Make them consistent with national and other treatment policies.
- Include the most serious or common childhood illnesses recognized locally.
- Make them practical to implement, and appropriate, to the various levels of the health system.

Adapting these guidelines can help build a consensus for an official policy or national guideline on JE. It can also build awareness of the disease and vaccine issues.

The following steps will help you to adapt the guidelines in line with your national policies and standard practices so that they are accurate for health workers in your country. The Guidelines for JE were developed based on Integrated Management of Childhood Illness (IMCI) principles. They can be easily incorporated into an already existing IMCI framework, if one exists in your country. These adaptation notes are also based on the IMCI Adaptation Guide produced by the World Health Organization and UNICEF[5].

Recommendations for Adaptation

"Adaptation is the process of deciding on and producing the changes needed to make these guidelines fit a country's circumstances"[5]

Step 1 – Collect information and develop a plan

First, collect all the information you will need to help you develop your adaptation. This could include existing national policies on JE, IMCI, and other childhood illnesses and conditions; clinical guidelines on management of other conditions (including meningitis, pneumonia, malaria); essential drugs list; policies on laboratory testing resources at different health care levels; and training manuals from different care levels within the health system.

It's always a good idea to develop an adaptation plan and timeline. Keep in mind that adaptation can take time because you are depending on input from several people with varying schedules.

Another important first step is to ensure that you have enough funding to develop these guidelines. Some costs you may need to consider are secretarial support, translation, printing costs and dissemination.

Step 2 – Identify an Adaptation Working Group

The support of the Ministry of Health (MOH) and the direct participation of relevant persons is necessary for the adaptation and implementation process. Adaptation works best when coordinated with a group of people that may include staff from the MOH, clinical experts from national hospitals and from hospitals at other levels of the health care system, representatives from university medical schools, the Paediatric Association and WHO, and other partners familiar with the topic or who will be involved in implementation. When the Working Group convenes, you may want to assign specific roles to members.

A senior member of the MOH should be the group coordinator. The coordinator must spend time before the initial adaptation meeting becoming familiar with the guidelines so he/she can facilitate the adaptation process.

Some strategies for developing consensus are:

- Report regularly to the Working Group or other partners involved in adaptation
- Meet individually with persons from other programs or institutions or with other key individuals who are not included in the Working Group but are relevant to guideline decisions.
- Make sure key programs or specialists are not excluded

[5] World Health Organization & Unicef. *Integrated Management of Childhood Illness - IMCI Adaptation Guide.* Department of Child and Adolescent Health and Development World Health Organization, Geneva, Switzerland. June 2002.

- Circulate memos with meeting results, lists of information needed and unresolved issues
- Lobby for enough time for the process of resolving specific issues.
- Circulate drafts of clinical guidelines, decisions on recommendations and use of local terms.
- Hold a special meeting for all people relevant to a particular technical issue to endorse guidelines in that area and/or to settle a final issue.
- Involve experts outside the adaptation subgroup on specific issues, when necessary.

Step 3 – Adaptation process

You are now ready to start your adaptation. Depending on the situation, a series of meetings may be convened to adapt the guidelines, or an initial meeting may be conducted with subsequent communication conducted by email or other means.

It is advisable not to make adaptations unless they are truly necessary and feasible to implement. If consensus cannot be reached on an issue, agree on work to be done to resolve it. Do not spend too much time discussing one or two controversial issues. Identify where extra information can be gathered and who is the person to do it. Feedback should be provided to the whole group when available.

Distribute notes of the meeting containing a record of all decisions to all members of the Adaptation Working Group. Once you've developed a draft, circulate it with the Working Group/experts for comments. Based on these comments revise the guidelines and send them out again for review.

Adaptation may be needed in two different areas:

A. Adapt the technical components of the guideline

Review your collected documents and decide which adaptations are essential and recommended. If your country's guidelines and policies, or the common presenting diseases in your country, differ significantly from the generic guidelines, then you may want to make substantial adaptations – for example, add a treatment that is consistent with national policy, remove information on malaria, or add in a diagnostic test. However keep in mind that if your country's documents have not been recently updated, these JE guidelines may provide more up to date and accurate information.

Based on policies, disease burden, and the health systems in your country, some examples of what may to be considered in your adaptation are:

- Existing national guidelines on treating meningitis
- Referral systems
- The essential drugs policy and drugs available
- Diagnostic capacity and laboratory procedures

Take care to only include drugs from the official list of essential drugs. Adaptations should take care not to increase the number of drugs required or substitute more costly drugs unnecessarily.

If IMCI guidelines exist in your country, make sure that these guidelines have consistent messages.

Above all, make sure that guidelines are safe and effective.

B. Adapt your guidelines according to level of care.

Expected staff capacities at individual levels of the health system vary. The adaptation process should also make the guidelines practical to implement at each level of the health system. Different documents made need to be developed for each level, or coding used in the document to indicate which sections are relevant at each level. For example, the guidelines for primary care facilities may just focus on referral, and a different document may be prepared for a referral hospital where treatment occurs. Consider who will be using these guidelines and ensure the recommendations are appropriate for that level of care.

As a reminder, the guidelines have two main sections:

- **Charts 1-14** provide the essentials of medical care
- **Charts 15-18** include treatment of potential complications of encephalitis which should be managed at facilities with laboratory services, appropriate equipment and staff with skills to provide critical care. You will need to determine if these charts are appropriate to include for the level of health facility for which you are adapting the guidelines.

Adjust the level of technical detail and language so that it is appropriate for the staff who will be using the guidelines. Make sure that you adapt the guidelines to include local terms.

Oftentimes, it is tempting to include a lot of information in guidelines, however avoid making guidelines too difficult. Keep in mind what services the health worker can actually deliver with the resources available.

Step 4 – Pre-test

Once the final draft has been prepared by the Working Group, and necessary revisions made based on comments received from the initial expert review, you should pre-test the guidelines. Pre-testing the guidelines is important to make sure that they are understandable and clear to your target audience. Be sure to take time to pre-test the guidelines with health workers at each level within the health system where the guidelines will be used.

Step 5 – Review and revise

Once you've completed your pretest, make appropriate modifications to the guidelines and circulate them once again for review by the Working Group/experts.

It is important to have agreement on all the changes to the generic guidelines so that they meet national guidelines, policy requirements and special circumstances in country.

Make sure that you have consensus on the clinical guidelines before you adapt training materials or implement use of the guidelines.

Step Six – Final steps and production

Add or change pictures to reflect the ethnic or cultural preferences of your audience. Keep in mind that color copying can be expensive and that certain colors do not photocopy well.

Step Seven – Introduce the Guidelines

Train key staff on how to use the JE guidelines.

Abbreviations

BP	Blood pressure
BUN	Blood urea nitrogen
CNS	Central nervous system
CSF	Cerebrospinal fluid
CSW	Cerebral salt wasting
CVP	Central venous pressure
GCS	Glasgow Coma Scale
hr	Hour
HR	Heart rate
IM	Intramuscular
IMCI	Integrated Management of Childhood Illness
ICP	Intracranial pressure
IV	Intravenous
JE	Japanese encephalitis
MAP	Mean arterial pressure
MOH	Ministry of Health
NG	Nasogastric
NS	Normal saline
ORS	Oral Rehydration Salts
PO	Per oral (“by mouth” or oral administration of a medication)
PR	Per rectum (rectal administration of a medication)
PRN	As required (pro re nata)
RR	Respiratory rate
SIADH	Syndrome of inappropriate antidiuretic hormone
WHO	World Health Organization

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