MANAGEMENT OF CRITICALLY SICK CHILD
MANAGEMENT OF A CRITICALLY SICK CHILD

MANAGEMENT OF A CRITICALLY SICK CHILD

OXYGENATION

PERFUSION

WARMTH

MEDICATION

NUTRITION

DEPARTMENT OF PAEDIATRICS
CAMA & ALABESS HOSPITAL, MUMBAI - 1.
PUBLISHED BY: STATE HEALTH I.E.C. BUREAU, AUNDH CAMP, PUNE - 27,
FOR DIRECTORATE OF HEALTH SERVICES MAHARASHTRA STATE,
(1997-98)
Dear friends,

The health status indicators like infant mortality and under-five mortality speak of the achievements made by the health services. The infant mortality rate for 1996 which is 48 per thousand live births when compared to the rate in 1981 of 79 per thousand live births indicate that a good progress has been made. The situation in rural area is more critical as the IMR there is 58 per thousand live births. Problems associated with service delivery require improvement.

The death rate in the children under five years which is 70 per thousand births (1992-93 NFHS Survey) is also a serious concern.

The deaths under one year if further analysed, it become evident that 60% of these deaths occur within one month and 75% within first week of life. This helps us to know where to concentrate our attention. The causes responsible for deaths in this period are -

- Diarrhoea
- Pneumonia
- Measles
- Malnutrition
- Repeated infections
- Malaria

The care of the newborn, awareness of the mother regarding danger signals and referral and treatment at sub-center, P.H.C. level can dramatically improve this situation. It is necessary therefore that the simple, effective techniques of treatment reach the medical and paramedical staff.

Dr. S. R. Daga paediatrician, Grant Medical College Mumbai has taken efforts to develop these treatment techniques and has conducted training of medical staff. The public health department intends to train the staff using this booklet.

I congratulate Dr. Daga and his associates and also others who have helped in the publication of this booklet. I am sure their efforts will help in bringing about changes in the knowledge and skills of medical officers and paramedical staff and will result in achieving the final objective of reducing the infant and under-five mortality.

With best wishes

Dr. B. M. Dama
Director, Health Services
Maharashtra State, Mumbai
A mother always cares for her child. A newborn is likely to suffer from various illnesses. Success of universal immunisation programme has lead to reduction in morbidity and mortality due to the six killer diseases to a great extent.

There are still diseases or conditions like Diarrhea, measles, Pneumonia, Malaria and malnutrition which result in deaths of children under five years. Inadequate communication, ignorance are some of the causes for not availing medical help by the community. Awareness creation and involvement of primary health centre staff in treating the complications at their level can save many lives.

It is intended that the medical officers will be trained using the knowledge and skills explained in this booklet. Further it can be extended upto subcenter.

The techniques used to treat the severely ill children have been tested at CAMA and ALBLESS Hospital, Mumbai. Some of the medical officers have practiced it in the field and found it very effective.

The medical officers are getting an opportunity through practicing these techniques to serve the community and get their blessings.

Dr. S. R. Daga and associates have contributed towards the technical part of this booklet. The staff of the state Health Information Education and communication Bureau, Pune has also played a major role in publication of this booklet. I am thankful to all of them.

Dr. Prakash M Bhatlavande
Joint - Director (Health Services)
State I. E. C. Bureau
Aundh, Pune - 411 027.
In our country 70% of deaths in the children under five years of age are due to Diarrhoea, Pneumonia, measles, malaria and malnutrition. Dehydration, frequent vomiting, chest indrawing, swelling are common symptoms in the advanced stage of the disease. If not treated properly there are always chances of death. When such a referred case is successfully treated at P.H.C., it increases the credibility of the primary Health centre staff. This leads to better community participation.

At the primary Health Centre, children with severe illness as well as care of newborn with complication can be taken. It is a common misconception of health workers that newborn care always require expert medical help.

Keeping in mind the need of the medical officer and paramedical staff working at P.H.C., the skills have been simplified. The skills have been practiced at Cama and ALBLESS (CAMA) hospital mumbai to treat the severely ill children and were found to be extremely effective.

Dr. S. R. Degn
Paediatrician
Grant Medical College.
Mumbai.
In a critically sick child, respiratory, circulatory or neurological insufficiency may occur alone or in combination. Usually a critically sick child presents with inability to drink, altered consciousness, abnormal breathing. Examination reveals respiratory distress or respiratory slowing, cool peripheries with weak pulsations and changed sensorium. These findings are seen alone or in combination. In advanced stage, overlaps are common and do not allow clear definition of systems involved. For example, sensorium may be altered because of hypoxemia or poor perfusion and breathing may be abnormal in case of increased intracranial pressure.

A critically sick child can be categorised into, either compensated or decompensated form depending upon following clinical features:

<table>
<thead>
<tr>
<th>Compensated (Early) Stage</th>
<th>Decompensated (Advanced) Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Tachycardia, delayed capillary refill, weak pulsations, normal blood pressure.</td>
<td>Bradycardia, impalpable pulse, hypotension, cool and mottled skin.</td>
</tr>
</tbody>
</table>
DIARRHOEA
VOMITING
FEVER/ SICK LOOK (INFECTION)

ALTERED SENSORIUM
FEVER
CONVULSIONS

INABILITY TO FEED
ABNORMAL RESPIRATION
ALTERED SENSORIUM

NEUROLOGICAL FAILURE

CIRCULATORY FAILURE
RESPIRATORY FAILURE

CARDIO-RESPIRATORY FAILURE
A) RESPIRATORY INSUFFICIENCY: It is the inability of the respiratory system to deliver oxygen or to remove carbon dioxide from pulmonary circulation.

PNEUMONIA IS THE COMMONEST CAUSE OF RESPIRATORY INSUFFICIENCY IN CHILDREN.

Respiratory insufficiency can result in hypoxia and hypercapnia. Hypercapnia depresses the nervous system and resultant academia depresses myocardium. Thus, respiratory insufficiency may show significant change in neurological and cardiac functions as well.

B) CIRCULATORY INSUFFICIENCY (Impaired perfusion, shock): It is the inability to deliver adequate oxygen and metabolic substrates to the tissues. Circulatory insufficiency may be due to:

1) Hypovolemia (commonly seen with diarrhoeal dehydration)
2) Severe infection
3) Cardiac dysfunction (pump failure)

COMMON CAUSES OF CIRCULATORY INSUFFICIENCY ARE DIARRHEAL DEHYDRATION AND INFECTIONS CAUSED BY BACTERIA OR MALARIAL PARASITE

In early stages, blood pressure is well-maintained. Hypotension, bradycardia and irregular respiration are late and ominous signs.

c) NEURO-INSUFFICIENCY: Neuro-insufficiency is commonly secondary to hypoxia or ischemia caused by respiratory and circulatory insufficiency. Sometimes it is due to primary neurological diseases like cerebral malaria or bacterial meningitis.
CEREBRAL OEDEMA IS A MAJOR CAUSE OF NEURO-INSUFFICIENCY.

The oedema is most commonly cytotoxic in nature. Hypoxia, ischemia and acidosis cause depletion of cellular energy stores. The ionic pump of the cell ceases to function causing fluid accumulation in the cell.

A critically sick child with neuro-insufficiency may present with an altered level of consciousness, convulsions and abnormalities of tone, posture and power of limb. AVPU system is useful for evaluation of level of consciousness. It is as follows:

A = alert
V = responsive to voice
P = responsive to pain
U = unresponsive
I. ACUTE GASTROENTERITIS WITH SEVERE DEHYDRATION:

Points to remember:

1. Rapid rehydration is essential to save life in such a situation. Intraosseous route should be sought for rehydration in case of failure to establish an intravenous line.

2. Metabolic acidosis is manifested by deep and rapid breathing during the course of acute gastroenteritis. In most of the cases it tends to correct spontaneously with proper rehydration.

3. Inadequate replacement of potassium losses during diarrhea can lead to potassium depletion especially in malnourished children. However, potassium should be administered only when renal function is established, as evidenced by adequate urine output.

4. Associated bacteremia can cause death if not suspected and treated adequately. Inadequate response to rehydration and history of fever should make us suspect this condition.

5. Cholera should be suspected whenever there is profuse, watery diarrhea of rice water consistency. Dramatic onset of severe dehydration with extreme prostration and history of contact or suggestion of an epidemic should alert us to this possibility.

6. Passage of blood and mucus in stool suggests an acute diarrhea due to enteroinvasive organisms, especially Shigella.

7. It is often difficult to judge the extent of dehydration in malnourished children. Signs that remain useful for assessing hydration status in malnourished children include moistness of mouth and tongue, eagerness to drink and lacrimation. Rapid intravenous rehydration of a malnourished child may cause heart failure. Hence, use of intravenous fluids should be avoided in malnourished children as far as possible.

II. SEVERE PNEUMONIA:

Points to remember:

1) Pneumonia in children is commonly caused by bacteria in our country. All children diagnosed to have pneumonia should receive antibiotics because it is not possible to differentiate between viral and bacterial pneumonia with certainty.

2) More than fifty percent of children with pneumonia are found to be hypoxemic. Mortality is four times higher in hypoxemic children with pneumonia as compared to non hypoxemic children. Oxygen
administration, therefore, assumes importance in presence of pneumonia.

3) Hypoxemia caused by severe pneumonia may lead to hypoxic myocardial dysfunction. This manifests as bradycardia or marked tachycardia, arrhythmias and hypotension. Inadequate response to this possibility.

4) Chloramphenicol is an effective, safe and cheap drug which is grossly underused due to fears regarding its adverse effect on bone marrow.

5) Despite respiratory distress, most babies tolerate intragastric feeds. This will ensure adequate hydration and prevent malnutrition that commonly occurs in any acute infection.

III. SEVERE MALNUTRITION:
Points to remember:
1. Deaths due to hypothermia in malnourished children have been documented in tropical regions too. The risk of death in cold and malnourished children is two times more as compared to warm malnourished children. Often silent death occurs during night hours. This should be considered as a sign of hypothermia. Hence, it is essential to keep malnourished children warm to prevent death.

2. Intake of high protein and calories in the first few days of treatment is inappropriate. A malnourished child is unable to deal with the metabolic stress involved with such a diet. Carefully calculated amounts of protein and energy given frequently throughout the day and night, are therefore needed to avoid overloading the kidney, heart and intestines.

3. Malnourished children should be fed at night also. Otherwise, there is a possibility of death secondary to hypoglycemia.

4. Malnourished children with pneumonia breathe at a slower rate as compared to well nourished children to conserve energy. Hence, clinical parameters may underestimate the gravity of pneumonia in malnourished children. Similarly, it is difficult to predict status of hydration in such children.

5. Fifty percent of children with pneumonia are found to be hypoxemic. Mortality is four times higher in hypoxemic children with pneumonia as compared to normoxemic children. Oxygen administration therefore assumes great importance in presence of pneumonia.

6. Infection and malnutrition are inter-related. Recurrent infections increase the severity of malnutrition and malnutrition predisposes to
infections thus it is a vicious cycle. Malnutrition Infection Give antibiotics and anti-malarials routinely to all malnourished children. Infections in malnourished children may not always be obvious.

7. Severity of measles, pneumonia and diarrhoea is milder in children who have received vitamin A. Therefore, give vitamin A to all malnourished children.

8. Iron generates highly reactive free radicals which can induce cellular injury within the body. Iron should, therefore, not be given to a sick malnourished child until recovery.

9. Intravenous rehydration of a malnourished child may cause heart failure. Use of intravenous fluids should be avoided in malnourished children as far as possible.

10. Diuretics like frusemide (Lasix) should be avoided in oedematous malnourished children. It may lead to potassium depletion.

IV. CEREBRAL MALARIA:
points to remember:

1) Cerebral malaria is defined as unarousable coma not attributable to any other cause in a patient of falciparum malaria. Clinically, it should be suspected in an endemic area when a child presents with fever, which may be continuous, and neurological dysfunction, with or without palpable spleen.

2) Cerebral oedema is often present in cases of cerebral malaria. Cerebral decongestants are, therefore, indicated.

3) Failure to extend basic care and manage associated infection / malnutrition may contribute to death. This is often misinterpreted as chloroquine resistance.

V. BACTEREMIA WITH SHOCK:
Point to remember:

An infant in shock with no history suggestive of respiratory illness and impalpable spleen should make us suspect bacteremic shock.
Khajaki, 8 months old baby girl, weighing 7 kg, was admitted for complaints of watery loose motions and vomiting since three to four days and convulsions since one hour. On admission, her general condition was poor with altered sensorium, weak peripheral pulsations, signs of severe dehydration, and irregular jerky respiration. Intravenous line could not be secured despite 2-3 attempts. Therefore, intraosseous route was obtained immediately and ringer-lactate boluses were given. Within half an hour, her pulses were well felt. Sensorium and respiration improved. She was discharged after five days.

**TIME IS PRECIOUS**

**IF INTRAVENOUS NOT POSSIBLE**

**OBTAIN INTRAOSSEOUS ROUTE.**
Rangaswamy, 3 months old child (wt. 4.5 kg) was brought with complaints of fever and cough since 3 days and not accepting feeds since one day. On admission, baby was febrile, had irregular, jerky respiration and weak peripheral pulsations. Systemic examination revealed tachycardia, bilateral crepitations, hepatosplenomegaly. Oxygen, boluses of ringer lactate, inotropes & antibiotics were administered. Within 24 hours, there was marked improvement and respiratory distress decreased. By day 5, showed clearing of the lung fields. The child was discharged after 10 days.
CASE NO. 3

CEREBRAL MALARIA

Jyoti, 4 year old girl with weight of 13 kg., had high grade fever with headache for 5 days, vomiting and altered sensorium since 2 days. On admission, she was febrile and semicomatose. There was severe pallor and splenomegaly.

She was treated with chloroquine, mannitol and steroids. There was prompt response, sensorium improved and she became afebrile. Blood examination showed a haemoglobin 4.8 gm % and pl. falciparum in peripheral smear. She went home after 7 days.

SUPPORTIVE CARE AND CEREBRAL DECONGESTANTS ARE IMPORTANT IN CEREBRAL MALARIA.
Abukatar, 2 year old boy had fever for 10 days, cough for 3 days and history of recurrent diarrhoea. On admission his weight was 7.2 kg. and PEM grade III. He was treated with cotrimoxazole, vitamin A, mebendazole, metronidazole, furazolidine, and chloroquine. He was given rice + legume gruel feeds to begin with, followed by full diet. His diarrhoea stopped, he gained weight rapidly and was discharged after a week. His weight on discharge was 8.3 kg.

RECURRENT DIARRHOEA NEEDS SPECIFIC TREATMENT
5. MANAGEMENT

MANAGEMENT OF A CRITICALLY SICK CHILD

CRITICALLY SICK CHILD

Oxygen
Inj. Chloramphenicol
Basic Care*

POOR PERFUSION
(FEEBLE OR ABSENT PULSES, COOL & CLAMMY EXTREMITIES)

Ringer's lactate bolus,
repeat if necessary

INADEQUATE RESPONSE

Adrenaline infusion
Inj. Dexamethasone

NEUROLOGICAL DYSFUNCTION

I. V. Mannitol
Inj. Chloroquine **
Inj. Phenobarbitone,
in case of convulsions

* Basic Care: 1) Provision of warmth,
2) Nutritional support/enteral feed.
** Any critically sick child with fever/palpable spleen/severe pallor neurological dysfunction should receive chloroquine
1. A critically sick child especially the malnourished one must be nursed in a warm room where an adult feels a little uncomfortable.


3. Oropharyngeal administration of oxygen is simply effective, and avoids wastage of oxygen. Bag and mask ventilation of mouth-to-mouth breathing may be required for a short period, in case of slow breathing or apnoea.

4. Intramuscular chloramphenicol is preferred in the beginning. After some improvement oral chloramphenicol can be given. It should be given for a total of 10 days.

5. In presence of signs of poor perfusion viz. delayed capillary refill, feeble or absent pulses, cold and clammy extremities, immediate intravenous access should be obtained. If unsuccessful, intraosseous access should be established. Ringer's lactate 20-30ml/kg should be given as a bolus, to correct hypovolemia.

6. If there is inadequate response, adrenaline infusion should be started. Dextrose 5% is used as a vehicle for adrenaline. Required amount of adrenaline can be delivered in 250 ml of dextrose 5% over 24 hours at the drop rate of 4 per minute.

7. Dexamethasone 2mg/kg is administered by intramuscular route to a critically sick child with poor perfusion.

8. Neurologic assessment is performed after some stabilization because cardio-respiratory inadequacy can change neurological status. Coma, semicoma, abnormal tone, abnormal posture, irregular breathing, bradycardia and convulsions are considered as indicators of neurological dysfunction. In such a case, 20% mannitol is administered intravenously in a dose of 5 ml/kg twice a day. In case of convulsion, phenobarbitone sodium should be administered intramuscularly with a stat dose of 20 mg/kg., and 2.5 mg/kg per every 12 hours, afterwards.

9. Any critically sick child with palpable spleen / fever /severe pallor / neurological dysfunction should be treated with antimalarial drugs. Chloroquine hydrochloride may be administered intramuscular in a dose of 5 mg/kg. of base once a day for 3 days.
Approximately one-third of all babies in India are born with low birth weight (less than 2,500 gm). Incidence of very low birth weight babies (less than 1500gm) is around 2-3 percent. This means that majority of low-birth weight babies are between 1,500 to 2,500 gm. in our country.

Newborn babies can be categorised into two groups for management purposes:

1. **Less than 1800 gm** (usually less than 34 weeks)
2. **1800 - 2500 gm** (usually 34 weeks and more)

   A vast majority of low birth weight babies fall under second category.

   By 34 -35 weeks of gestational age,

   i) babies develop ability to co-ordinate breathing, sucking and swallowing.

   ii) **Mature levels** of pulmonary surfactant are usually present and;

   iii) babies are able to maintain temperature with some assistance.

   Hence, enhancing survivals among babies with birth weight between 1800 - 2500 gms, is easy to achieve.

These babies can be managed, with some support, in Rural Hospital/Primary Health Centre setting also. The main interventions considered are adequate thermal support and proper feeding. Oxygen and antibiotics should be administered, as and when indicated. Even a good proportion of babies with birth weight less than 1800 gm can be saved on these lines.

This form of care can be delivered by the nurse-mother dai with the supervision of the medical officer. Free access to either grandmother or aunt of the baby makes the nursing care easier, besides giving emotional support to the mother during critical times.
I. THERMAL SUPPORT:

Thermoregulatory efforts are often insufficient in low birth weight babies. Exposure to cold or raising the baby in an environmental temperature which is lower than baby's requirement may lead to hypoxia and hypoglycemia. Both oxygen and glucose are consumed during metabolic thermogenesis. Metabolic acidosis occurs due to anaerobic tissue metabolism and hypoglycemia.

Keeping babies adequately warm has been shown to enhance newborn survival by 50 - 60%. Therefore, adequate thermal support becomes a key intervention in newborn care.

**Diagram:**
- Hypothermia
- Hypoglycemia
- Anaerobic Metabolism
- Metabolic acidosis
- Glucose and oxygen consumption
- Hypoxia
- R - L Shunt
Immediately after birth, the baby should be dried, wiped and covered adequately. A warm corner can be kept using an electrical warmer. This is the best option available at primary health centre/rural hospital. Thermocol box is a useful device for keeping babies warm in hospital setting, also.

A person without formal training can assess thermal adequacy of a newborn by just feeling the soles of the feet. Warm and pink soles indicate that the baby is enjoying thermal comfort. This is a simple method of judging thermal adequacy at home or at hospital.

II. FEEDING:

Low birth weight (LBW) babies are prone to hypoglycemia. Colostrum along with 10% dextrose prevents hypoglycemia that can occur especially during initial 1-2 days of life of an LBW baby.

A baby born before 34 weeks may require tube feeding in initial stages. Orogastric feeding is advantageous. If one is not familiar with it, nasogastric feeding may be given. Expressed breast milk should be given through the tube. 5-10 ml per kg. body weight of a baby can be given every 2 hourly to a baby on first day. Afterwards, quantity is increased according to weight and age of baby (vide feeding chart). Depending upon maturity, age and condition of the baby, spoon feeds and feeding at breast should be instituted.

III. RESPIRATORY DISTRESS AND OXYGEN ADMINISTRATION:

Respiratory distress is defined as tachypnoea (respiratory rate more than 60 per minute) with or without chest indrawing/grunting. Majority of babies with respiratory distress are hypoxaemic. Cyanosis is a late sign of hypoxaemia. Often, a baby is hypoxaemic in absence of cyanosis.

Oxygen can be administered by head box, nasal prongs, nasopharyngeal or oropharyngeal catheters. Head box requires a lot of oxygen. Nasal prongs are not universally available. A nasopharyngeal catheter increases work of breathing and tends to get blocked frequently. Therefore, oropharyngeal oxygen administration is preferred since it is safe, effective and economical. If a person is not conversant with this method, nasopharyngeal catheter may be used.

Oxygen flow rate should be around 1/2 - 1 litre per minute for oropharyngeal or nasopharyngeal administration. Oxygen may have to be given for 2-3 days in most of the cases.
IV. ANTIBIOTIC ADMINISTRATION:

Confirmation of infection is often not possible. Therefore, antibiotics should be administered whenever risk of sepsis exists.

Indications:
1. Respiratory distress: This may be due to pneumonia, hence antibiotics are indicated.
2. Birth asphyxia: A baby with infection may be depressed at birth. Therefore, asphyxiated babies should get antibiotics.
3. Sick looking child

Choice: A combination of ampicillin and gentamycin for a period of 5-7 days is advocated for neonatal infections

Dosage:
- Ampicillin: 50 mg per kg per dose 12 hourly.
- Gentamycin: 2.5 mg per kg per dose 12 hourly.

Route of administration: intramuscular

V. PREVENTION OF INFECTION:

Newborn babies are prone for infections. Strict discipline to prevent neonatal infections deserves high priority.

1. It begins with clean conducton of a delivery.
2. Hands should be washed with soap and water before and after touching the baby.
3. A person with respiratory infection should be prohibited from coming in contact with a newborn baby.
4. Oxygen catheters, feeding tubes, containers of expressed breast milk etc. should be sterile.

VI. RESUSCITATION OF AN ASPHYXIATED BABY:

Birth asphyxia is recognised by insufficient respiration and abnormal colour. Most babies can be resuscitated successfully with adequate ventilation and without drugs. Infants with asphyxia can not produce enough heat. Therefore, extra efforts need to be made to keep them warm. Excessive physical stimulation is harmful. Bag - mask ventilation is effective method for resuscitation in most asphyxiated babies.
For successful bag-mask ventilation, the neck of the baby should be slightly extended by placing a thin roll of towel under shoulders. After slightly shifting the jaw, a proper sized mask is applied to enclose nose and mouth of the baby. The face mask must establish an air-tight seal with the face. The bag with reservoir attached, is compressed after connecting it to an oxygen source, at the rate of 40 per minute with the help of tips of fingers and thumb. There should be a noticeable rise and fall of chest with each inflation. It should be associated with improvement in colour. Mouth to-mouth ventilation is alternative procedure if bag and mask are not available.
Newborn babies with birth weight more than 1800 gm may be managed at home. These babies should be covered adequately to keep them warm. Culturally accepted practice of giving oil massage to the babies is useful as it reduces both heat and insensible water loss. Thermocol box can be used as a "home incubator".

Rewarming a hypothermic baby:

If the peripheries feel cold, rewarming can be done by applying a cloth held over a hot plate (Tawa) kept on cooking fire (chullah) as follows:

- Two pieces of multi-layered saree are held alternatively about 5 cm over a hot plate.

- Confirm that the cloth is not too hot by testing on the back of the hand. Then place the cloth over the chest, abdomen, heat alternatively, repeatedly rewarming them, until the feet become pink and warm.

Rewarming can also be done by holding the baby in skin-to-skin contact (kangaroo method) by the mother or any relative. One layer of cotton blouses in between does not significantly lower effectiveness of skin-to-skin contact.

Feeding:

For first 2 - 3 days, a baby should get a cup (100ml) of sweetened water over 24 hours. This can be prepared by adding 2 teaspoonful of sugar/jaggery to a cupful of water. This should be boiled, cooled and fed by spoon every 2 - 3 hours. In addition, these babies must receive expressed breast milk by spoon. Some of these babies are quite active and can feed directly at breast.
TRANSPORTATION OF A NEWBORN BABY:

This is a weak link in the newborn care. It can be strengthened by transporting the baby in a thermaocol box. The parents should be reassured that there are two holes on each side of the box and that the baby can breathe normally in the box. The baby should be rewarmed before the transport, if the feet feel cold. The baby can be held close to the chest in the kangaroo position if the thermaocol box is not available for transportation. Oxygen should be supplemented through the holes of the thermaocol box while transporting newborns with respiratory distress or asphyxia.

NEWBORN CARE CAN BE EASY, INEXPENSIVE, YET EFFECTIVE.
### FEEDING CHART

Amount of EBM (ml.) to be given two hourly.

<table>
<thead>
<tr>
<th>Age (days)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>1.6</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>1.7</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>17</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>1.8</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>1.9</td>
<td>10</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>2.0</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>2.1</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>2.2</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>19</td>
<td>22</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>2.3</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>23</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>2.4</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>2.5</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>21</td>
<td>25</td>
<td>29</td>
<td>31</td>
</tr>
</tbody>
</table>

...
1. Chloramphenicol
   - **Dose**: 50mg /kg per day in three divided doses.
   - **Route of administration**: Oral, Intramuscular, Intravenous.
   - **Available as**:
     1. Syrup - 125 mg per 5 ml.
     2. Capsules - 250 mg and 500mg.
     3. Injection - 250 mg per ml.

2. Chloroquine
   - **Dose**: It is a drug of choice for the treatment of attacks of malaria.
   - **Route of administration**: Oral, Intramuscular, Intravenous infusion
   - **Available as**:
     1. Syrup - 50 mg base per 5 ml.
     2. Tablet - 150 mg base
     3. Injection - 40 mg base per ml.

3. Adrenaline
   - **Dose**: Adrenaline is a potent catecholamine that acts directly on the adrenergic receptors. Adrenaline infusion indicated in a patient with signs of poor systemic perfusion.
4. Dexamethasone
- Dose: 0.4 ug/kg per minute
- Route of administration: Intravenous
- Available as: Injection - mg/ml (1:1000)

It is a potent long acting, glucocorticoid indicated in patients with shock and cerebral edema.

2mg/kg per dose 12 hourly for 3 doses.

5. Mannitol
- Dose: 2mg/kg per dose 12 hourly for 3 doses.
- Route of administration: Intramuscular
- Available as: Injection 4 mg/ml.

It is an osmotic diuretic indicated in patients with cerebral edema.

5ml/kg per dose 8 hourly for 2 days.

6. Phenobarbitone Sodium
- Dose: 20 mg/kg stat followed by 2.5 mg/kg dose 12 hourly.
- Route of administration: Intramuscular, Intravenous, Oral.
- Available as: i) Injection - 200 mg per ml.
  ii) Tablet - 30 and 60 mgs.

It is a long acting barbiturate which is used as an anticonvulsant.

2.5 mg/kg per dose 12 hourly orally.
DOSE OF ADRENALINE
(0.4 ug/kg/minute)

Vehicle : 5% dextrose

Amount : 250 ml over 24 hours

rate of infusion : 4 drops per minute

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Amount of adrenaline to be added (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>1.25</td>
</tr>
<tr>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>12.5</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>
Fifty percent of children with pneumonia are hypoxemic and mortality is four times higher in them as compared to normoxemic children. Therefore, oxygen supplementation is essential in children with severe pneumonia.

Usually oxygen needs to be given for 1-2 days.

Passage of tube through the nose increases respiratory work. Hence, oropharyngeal administration of oxygen is preferred. It is also simpler to perform.

**PROCEDURE:** Feeding tube no. 8 is adequate for this purpose. The distance between the ala of nose to the tragus of the ear is the required length of the tube to be inserted through the mouth towards the pharynx. The outer end of the tube is attached to the oxygen source. The tube should be secured firmly on the dry cheek by an adhesive tape. The flow rate of oxygen should be half a litre per minute for babies less than 2 months and 1 litre per minute in babies over 2 months of age. The tube should be changed every night to avoid blockage of tube by mucus.
critically, sick malnourished children cannot take adequate oral feeds. They should be given intragastric feeds for the initial 2 - 3 days. Many of them may have co-existing respiratory effort and add to the breathing difficulty. Hence, orogastric tube is preferred in such children.

PROCEDURE: The distance of the feeding tube to be introduced through the mouth is measured from the tip of the nose to the glabella, to the tragus of the ear and from there downwards till the xiphisternum. The position of the tube in the stomach should confirmed before each feed. For this, Push 1 ml. of air with a syringe and auscultate over the epigastrium for the gushing sound.
A sick child may require orogastric tube for feeding, oropharyngeal oxygen and sometimes an intravenous line too. If he is excessively irritable, he may pull out these tubes. Often, the relatives are seen restraining him from removing the tubes.

A boxer bandage over his hands will prevent a child from doing such a thing, at the same time given some time for parents to relax.

**PROCEDURE:** A rectangular piece of gauze / gamjee / bandage is placed under the hand and folded around till the wrist and then rolled over sideways and secured in place by an adhesive tape.
Prompt and timely medication in critically sick children can be life saving. On several occasions, precious time is lost in securing vascular access. Immediate and successful intraosseous medications have been successfully administered by paramedical staff, even before hospitalisation of patients (5).

**PROCEDURE**: Scalp vein (butterfly needle) no. 18 is ideal for the intraosseous route. The preferred site is medial upper aspect of the tibia, 1 cms below and medial to the tibial tuberosity. The area is cleaned thoroughly with spirit and iodine after wearing gloves. The scalp vein is placed at 90° to the skin surface and introduced using corkscrew motion, till a lack of resistance is felt. Placement can be confirmed by aspirating blood with a syringe. Fluids and all medications can be rapidly administered through this route. It takes less than one minute to establish vascular access by this method.
INFORMATION ABOUT THERMOCOL BOX:

Thermocol box works like a thermos flask. It prevents heat loss. Hence, it can be used to keep the newborn baby warm.

Tips regarding use of thermocol box:

1) The holes made in the thermocol box should be shown to the relatives. They will not be anxious that the baby will be suffocated inside the box.
2) Do not keep hot water bottle or bag in the box.
3) Do not overwrap the baby in box and do not cover the head.
4) Keep the box away from fire.

Baby's behaviour according to the body temperature:

1) When the baby is cold, her hand and feet are cold, she is lethargic and does not feed well.
2) When the baby is overheated, baby cries excessively and looks red.
3) A normothermic baby sleeps and feeds well.
4) The mother generally makes the correct assessment and tries to keep the baby normothermic.
HIGHLIGHTS

1. OXYGEN

2. VOLUME EXPANDERS / INOTROPES ± STEROIDS

3. NUTRITION

4. ANTIBIOTICS ± ANTIMALARIALS

5. WARMTH

6. CEREBRAL DECONGESTANTS ± ANTICONVULSANTS


6. P D Borulkar, S D Borulkar, R K Dhole, S R Daga Special care of newborns at a community hospital: A 5 years experience, Tropical Doctor (in press)
CRITICALLY SICK CHILD

- Oxygen
- Inj. Chloramphenicol
- Basic Care*

POOR PERFUSIONS
Febrile or absent pulses, cool, clammy extremities

- Ringer lactate bolus
- Repeat if necessary

INADEQUATE RESPONSE
Adrenaline infusion
+ Inj. Dexamethasone

NEUROLOGICAL DYSFUNCTION
- I.V. Mannitol
- Inj. Chloroquin**
- Inj. Phenobarbitone

Management of a Critically Sick Child