Many factories are to be considered when taking into account the development of these accidents. Those factors include, the physiology of the individual, the species of the animal used in vaccine production, the method of inactivating the vaccines, and the dosage schedule.

Minor reactions which were found in this report were: fever during the course of vaccination (12.8%), malaise (4.7%), myalgia (5%) pruritus only in 2 out of 234 victims or 1%, and paraesthesia (2%).

Pre-Exposure Vaccination

Pre exposure vaccination in Indonesia is not yet practised. It is not known yet exactly whether pre-exposure vaccination in Indonesia is more costly than post-exposure vaccination, but it seems evident that pre-exposure vaccination is a paramount necessity in highly endemic areas like North Sulawesi, especially among the age group of 5-15 years. Of the 3 age group less than 2 years, 2-5 years and 5-14 years, the prevalence rate of rabid or suspected-rabid-bite is the highest in the 5-14 years age group. By implementing pre-exposure procedure, it is hoped that the development of rabies can be prevented effectively even though the lapse of time between the bite and the start of vaccination is longer than the safety time for starting vaccination.

SMB vaccine which contains almost a complete lack of the encephalitogenic factor is preferred for human vaccination. Moreira et al (1973) found a positive response of antibody formations to 3 doses of 1cc SMB vaccine at one week intervals. These levels were still satisfactory after 6 months.

DEV is very popular, and is widely used for pre-exposure vaccinations, especially in U.S.A., since this vaccine causes less adverse reactions. Cohen et al. (1964) reported that the antibody response of the individuals who one year previously received 4 doses of DEV with one week intervals, significantly increased starting from one day after vaccination. However, Moreira et al. (1973), recommended that a booster shot will be reasonable if it is given after 6 months, since it produces a new increase in the rate of neutralizing antibodies.

Morga et al. (1978) found that pre-exposure prophylaxis by intradermal inoculation with 0.1 cc of DEV is comparably effective to 1 cc of DEV.

Conclusion

In conclusion, we can see then that one of the most important factors in eliminating or at least greatly reducing rabies, is the public dissemination of information concerning not only the danger of un.injected animals, but how rabies can be prevented or terminated if treated immediately.

Furthermore we can see that effective treatment of rabies has been carried out by using NTV on an across the broad administration of 2 cc at one day intervals for 14 consecutive days, regardless of the age, the site and the severity of the wounds.

Abstract

A pediatric intensive care unit is a matter of fact indispensable for a pediatric hospital. The Pediatric Department of the Dr. Cipto Mangunkusumo General Hospital, although not really a pediatric hospital, has a capacity of 300 beds for infants and young children; therefore, it is only natural that the Department should acquire its own intensive care unit. On July 1, 1976, we established the Intensive Care Unit, furnished at first with simple equipments, and eventually with more modern ones. In the first ten months of operation we were able to treat 154 cases with a mortality rate of 51.9%. This high rate is mainly due to the severity of the cases treated and the delay of hospitalization.

Received 10th October 1979.


**Introduction**

An intensive care unit is recognized today as an integral and essential component of any general hospital (Krishna, 1979). In 1971, in the Dr. Cipto Mangunkusumo Hospital Jakarta, a general ICU was established by the Department of Anesthesiology. At the beginning, the unit was designed for adult patients only, thus the facilities, equipments and staff were not available for children. At this time the unit is also meant for pediatric patients, both for medical and surgical cases.

A child is not a little adult. The child has different anatomy and physiology and different response to stress and treatment. A good environment for adult patients is not always good for children. Infants are very likely to sustain a severe physiological disturbance in the presence of respiratory illness because of the structural immaturity of their respiratory system and the narrowness of their airways (Stooks, 1973). Especially in the neonatal period, conditions are the result of immature or abnormal development, or of asphyxia or other injury sustained during birth.

The sternum is soft and it affords an unstable base for the ribs. These in turn are horizontally placed and the intercostal muscles are poorly developed, so the bucket handle motion upon which thoracic respiration depends is eliminated. Respiration is therefore almost entirely diaphragmatic and may readily be embarrassed by abdominal distention. Under physiological circumstances the tidal volume and vital capacity are comparable with older patients, but any disease process will cause disproportionate reduction, largely because of the markedly increased effort required to expand the chest. The airways are large in comparison with those of a small adult, the trachea of a newborn is one third and the bronchioles are half in diameter of those of an adult which are 20 times his size. However, a given degree of swelling will have a much greater effect in early life.

For example, a one millimeter increase in the thickness of the mucosa at the subglottic level, will cause a 75% reduction in the cross sectional area of the airway in a neonate, but only a 19% reduction in an adult. Laryngotracheobronchitis and bronchiolitis are therefore serious diseases in the very young, but are of little importance in adults (Stocks, 1973). The susceptibility to infection is manifested in the high incidence of septicemia, pneumonia and meningitis. Progress of the illness is frequently so rapid that the diagnosis is difficult and respiratory failure and death often supervene before effective therapy can be established. Immature development is particularly common in premature infants; it may be expressed by the inability to breathe regularly, a lack of development of certain important reflexes, or deficiency of surfactant production. Irregular respiration occurs in nearly half of prematurely born neonates and may lead to apneic spells. Pharyngeal incoordination is common in the first 48 hours of
life and may result in inhalational pneumonia (Avery, 1968), occasionally it may persist for several months.

Developmental anomalies such as cardiac lesions, diaphragmatic hernia, etc., may affect part of the respiratory system or associated organs. Assisted ventilation with mechanical ventilation increases the complexity of the management and the incidence of complication, and is therefore usually reserved for patients unlikely to survive without it (Stoks, 1973). There are other reasons that can be put forward so that most people agree that children need a separate ICU.

On July 1, 1976, a Pediatric Intensive Care Unit was established in the Dept. of Child Health, Dr. Cipto Mangunkusumo General Hospital Jakarta. It is housed in a room measuring $13 \times 13m^2$ and divided into several rooms such as nursing care, laboratory, toilet, etc. Air flow is given from the central air conditioner with a room temperature of about $22^\circ C$ and air humidity of about 55%. It is regulated in such a manner to enable the air to flow in one direction, so that the clean area does not mix with soiled area. Air borne bacterial contamination can be minimized by this method and it has been confirmed by bacterial examination. All methods and procedures in our unit enable us to isolate and to prevent cross infection. Gravely ill patients are especially vulnerable to this complication (Krishna, 1975).

The Dept. of Child Health, Dr. Cipto Mangunkusumo General Hospital Jakarta has 300 beds (including surgical and neonatal ward), and on the basis that 3% of the patients would require intensive care, 10 beds are considered adequate, 4 for newborns and 6 for infants and older children. Each bed is completely equipped with oxygen outlet, air outlet, suction unit, sphygmomanometer, electrical knob, examination lamp, etc. We started to work only with the most essential equipments. As time went on and we had some experiences on the type of cases to be managed, better equipments were gradually filled up. In children respiratory emergencies seem to predominante and everything needed must be available such as laryngoscopes, endotracheal tubes, selfinflating bag and mask, CPAP system, respirators such as Bird Mark VII, Mark VIII, Baby Bird Respirator, Loosco Amsterdam Infant Ventilator and RCF 4 Respirator. And also heartscope monitor, Apnoe monitor and the other alarm system.

Laboratory equipments for routine, electrolyte and blood gas examination, etc. are kept in our laboratory. The most important requirement for an ICU is an adequately trained nursing and medical staff (Krishna, 1975). On the base of nurse/patient ratio of about 1 : 2, our unit has 20 trained nurses.

### Discussion

During the first 10 months, 154 patients of various age and disease were admitted to our unit. The mortality rate was 51.9% or 80 out of 154 cases.

#### Side effects of Rabies Vaccination

Besides preventing the victims from contracting rabies, the vaccine also could give deleterious reactions. These deleterious effects can be divided into:

1. Minor reactions including erythema and pruritus.
   - Local reactions such as pain, erythema and pruritus.
   - Systemic reactions such as fever, malaise, myalgia and adenopathy.
2. Major reactions such as central nervous system reactions to vaccines, and anaphylactic reactions.

In this report none of the victims vaccinated with NTV had either encephalitis post vaccination or anaphylactic reactions. It is interesting to note that the occurrence of neuparalytic accident due to NTV used in immunization, varies from one country to another.
Table 1  THE FIRST 154 CASES ADMITTED TO THE ICU

<table>
<thead>
<tr>
<th>Neonates</th>
<th>&lt;1 year</th>
<th>1-3 year</th>
<th>3-6 year</th>
<th>&gt;6 year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S D S D S D S D S D S D</td>
<td>9 21 24 21 20 13 14 12 7 13 74 80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S = Survived  
D = Dead

Table 2  DIAGNOSIS OF CRITICALLY ILL PATIENTS

<table>
<thead>
<tr>
<th>Neonates</th>
<th>&lt;1 Year</th>
<th>1-3 Year</th>
<th>3-6 Year</th>
<th>&gt;6 Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus</td>
<td>5 4 7 6 1 1 2 3 2 1 15 10</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>5 4 15 10 8 5 2 7 2 48 31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encephalitis</td>
<td>- 10 5 9 7 5 3 1 1 26 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastric perforation</td>
<td>7 6 7 4 2 1 1 - 1 1 18 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dengue fever</td>
<td>2 4 10 9 3 3 1 1 2 2 14 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacterial meningitis</td>
<td>- 6 2 4 1 1 - - 5 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laryngitis</td>
<td>- - - - - - - - - - 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRDS</td>
<td>5 - - 1 - - - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>1 - - 2 - - - - - - 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHD</td>
<td>3 3 5 3 1 1 - - 1 1 10 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningitis</td>
<td>1 2 1 1 - - - - - - 3 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal disease</td>
<td>- 3 9 2 3 1 1 5 3</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Postoperative</td>
<td>- 1 1 - - - - - - 1 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intubation</td>
<td>4 2 4 1 - - - - - - 10 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>- 2 1 1 - - 1 1 1 7 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S = Survived  
D = Dead

Table 3  CAUSE FOR ADMISSION TO ICU

<table>
<thead>
<tr>
<th>Neonates</th>
<th>&lt;1 Year</th>
<th>1-3 Year</th>
<th>3-6 Year</th>
<th>&gt;6 Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory distress</td>
<td>25 133 24 18 18 16 116</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>- - - - - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water/Electrolyte and acid base balance disturbances</td>
<td>20 2 9 18 13 18 98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe conditions</td>
<td>11 13 10 8 6 48</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>1 1 9 12 10 33</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>1 1 9 9 10 29</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tracheostomy</td>
<td>- 4 4 1 - 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>3 5 - - - 2 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post operative care</td>
<td>4 3 7 1 4 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypopryrexia</td>
<td>- - 2 1 1 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>- 1 - 4 5 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal failure</td>
<td>- 1 - - - 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenteral nutrition</td>
<td>1 1 - - - 2</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

RABIES VACCINATION

Day. The efficacy of post-exposure vaccination, most probably depends upon the time when the inoculation of vaccine is started, since the incubation period of human rabies ranges from 12 days to 6 or more months following exposure.

The average is between 30-60 days. The incubation depends upon the site and severity of the wounds, age of the victim, virulence of rabies virus, and the nervous system at the site of the wounds. Its is stated that the bitten wounds on the neck and head have the shortest incubation period.

None of the 17 out of 234 victims, bitten on their heads or necks contracted rabies, eventhough their inoculations were started even without ARS within 10 days after being bitten. Four of these were vaccinated without boosters. However, it is very risky not to give ARS to the victims bitten on their head or necks for whom inoculation was started later than 10 days. The reason is one of 2 victims, who commenced vaccination on the 14th day after being bitten contracted rabies, on the 13th day of daily consecutive inoculation (Figure 2).

It is easily seen in this report that the bite wounds on arms or legs, have a longer incubation period that the bite wounds on head or necks, since none of the 65 arm-bite-victims and none of the 112 leg-bite-victims contracted rabies eventhough the inoculation was started 21 days or more after being bitten, and without ARS of course, prospective studies of the efficacy of NTV regarding the age, the site of the wounds, the dosage schedule, and the time span between the bite and the start of vaccination can not be conducted for ethical reasons. However, post exposure vaccination should also be instituted even if the victims have been bitten by rabid or suspected-rabid-animals 3 or more montas before. One of the victims in this report, who was not vaccinated, contracted rabies 4 months after being bitten on his arm by a suspected-rabid-dog.

It is also easily seen that 2 booster doses 10 days apart are not necessary, since 89 out of 234 victims did not continue the vaccination to the booster stage. And none of those victims contracted rabies. But further studies, like the determination of antibody levels to support this finding are still necessary.

Although further studies are needed especially whether or not a late instition of ARS is still effective enough, rather than early instition, from this analysis the following scheme can be recommended for post exposure vaccination of 2 cc NTV for 14 consecutive days:
vaccine should be discontinued. Until recent years, the sole source of virus for vaccine production, was infected brain tissue, and this NTV is still the most extensively used since it is highly effective, even though it occasionally gives side effects of neuropsychiatric reactions. However, these side effects are even less, in vaccines derived from newborn brain tissue, which do not contain myelin, considered to be a paralytic factor.

2. Non-nervous tissue vaccine such as, DEV, which is thought to contain little or no myelin, and HDCV which was developed by Wiktor et al. in the USA (1964) in the human diploid cell strain WI-38.

DEV in widely used in the USA, where it is estimated that more than 30,000 people are vaccinated with this vaccine each year. However, considerable doubts have been expressed about the efficacy of this vaccine (Crick and Brown, 1970). It is stated that DEV is effective enough in pre post exposure vaccination, and causes rare neurologically adverse reactions or minor reactions. (Cohen et al., 1964; Moreira et al., 1972; Morgan et al. 1978).

HDCV is highly immunogenic. The antibody response due to a 2 dose inoculation is comparable with that evoked by 14-24 injections of ordinary NTV, and it seemed to response faster (Shah et al., 1976). It is felt that further studies to evaluate the efficacy of this vaccine regarding the regimes used, are still needed.

The efficacy of human post exposure rabies prophylaxis with NTV rabies vaccine alone, can be seen in this analysis. Fourteen daily consecutive inoculations of 2 cc of NTV were administered without ARS regardless of the age of the victims, and the site and severity of the wounds. Contrary to the W.H.O. (1973) recommendation, where ARS should be given as early as possible to the victims who have been bitten on their neck or head, none of these victims in this report contracted rables as long as inoculation with NTV was started within less than 10 days after being bitten. It is also found that ARS and boosters are not at all necessary within the first 21 days to those bitten on the arms or legs (Figure 2).

It is very important to note that addition of ARS reduces the active "humoral antibody" response to most rabies vaccines. Corey et al. (1976) showed that 23% of the victims who were vaccinated with SMB vaccines together with the addition of ARS, failed to developed adequate antibody. By giving more than 1U/kg bw of ARS, and corticosteroid, the antibody response is suppressed. It has been shown that this immunologic suppression could be overcome by additional "booster doses" of vaccine. ARS might be necessary among the victims bitten on their neck or head 10 days or beyond, prior to the vaccination. One of the victims who started the NTV regime on the 14th day after being bitten, contracted rables on the 13th day of the course of vaccination, and died the next day. This high mortality rate was due to the severity of the patient’s condition on admission to the ICU and usually it had been given all kinds of treatment. For example, a child who suffers from bronchial asthma, will be first seen by a general practitioner and the doctor will try to give a treatment. When no good result is observed, the patient will be referred to the hospital in status asthmaticus, and then oxygen inhalation as well as other various treatment are given. If the patient becomes worse then he will be referred to the Pediatric ICU.

In such a manner, the shock patient will be referred to the ICU after prolonged or recurrent shock and various treatments have been given. Table 1 shows that the mortality of neonatal patients is higher than of infants and older children. This is due to difficulty to manage the neonatal problems. The mortality rate is also higher in children more than 6 years of age. May be the critically ill child at this age is not so worrying than in infant. In infants and young children a common disease sometimes seems to be critical. Intensive care could be required for other conditions in the pediatric age group. These include status epilepticus (Carter and Gold, 1969), endotoxin shock (Hodes, 1969), respiratory arrest (Smith, 1970), and others.

Table 2 shows the diagnosis of critically ill patients admitted to our unit. The major problems in neonates and infants are pneumonia, tetanus, gastroenteritis, encephalitis, IRDS, CHD, and pneumothorax. Whereas in older children the main problem is dengue hemorrhagic fever. Usually pneumonia cases are referred to if they are associated with impaired ventilation. When the impairment of ventilation is sufficient to pose an immediate threat to life, acute respiratory failure exists (Downes and Raphael, 1975).

Gastroenteritis is still one of the major causes of morbidity and mortality in children in Indonesia. If it is complicated with shock or severe acid base/electrolyte disturbances, intensive care will be clearly needed. Infants with idiopathic respiratory distress syndrome (IRDS), the leading cause of respiratory failure in the newborn period, frequently require ventilatory assistance. By using continuous positive airway pressure (CPAP), only 5 out of 9 cases survived. Whereas Gregory et al. (1976) reported that the mortality rate was 8%. Dengue hemorrhagic fever, one of the serious problems in our department is usually referred to due to prolonged shock with or without bleeding tendency.

Congenital cardiovascular lesion such as tetralogy of Fallot cause severe tissue hypoxemia and eventual myocardial and central nervous system failure. Many of these children require intensive care (Downes and Raphael, 1975). Post operative cases such as craniotomy and other major surgical cases have minimal mortality. The other cases admitted to our unit are epilepsy, tracheomalacia,
empyema thoracis, atelectasis, paralytic ileus, hydrocephalus and carditis, one case each.

Table 3 shows the cause for admission to the ICU. The leading reason for admission are respiratory distress/failure, water/electrolyte and acid base balance disturbance. According to Levin (1976), over 75% of patients admitted to the pediatric ICU have respiratory distress to some degree. Subha Rao et al. (1973) reported that respiratory involvement comprised 66.6% of the indication for admission to his pediatric ICU.

Severe convulsion is also a leading factor for admission in our unit. Usually it is correlated with respiratory problems. Acute nervous system failure poses an immediate threat to life to:

1. coma, with upper airway obstruction or pulmonary aspiration of gastric contents.
2. disturbed respiratory control secondary to medullary depression.
3. increased intracranial pressure, causing brainstem and cortical compression (Downes and Raphaely, 1975).

Hyperpyrexia (body temperature more than 41°C) will become a problem if it cannot be lowered by common hibernation procedures because it may develope to malignant hyperpyrexia. It seems that there is no different problem in our unit in connection with patient’s age.

ICU has never been an economical object, because the costs of equipments and maintenance are extremely expensive. In spite of all these expenditures there is an outstanding benefit that is to give immediate and effective help at all time to those who need it.

REFERENCES


Twenty six out of 234 victims were bitten by different dogs which could not be identified, because all 26 dogs escaped after biting their victims. Apparently, the remaining 172 dogs, that bite 208 victims, could have been confirmed as to whether or not they were rabid, but only 58 dogs which bit 68 victims were confirmed as to having rabies by investigation of negri bodies. The rest of the 114 biting dogs were either killed or dead, without any awareness that rabies confirmation is very important. The dead bodies of the dogs in question were even thrown away into rivers or in beaches which are frequently used by swimmers. This situation might be very risky in the transmission of rabies, since oral infection has been demonstrated in experimental animals.

Age and sex prevalence of victims, bitten by rabid animals or rabid-suspected-animals in this report was most common among children of 5-14 years of age, and among males of all ages, since these children were frequently outside the house. One hundred and fifty four out of 234 victims or 65.8% were children of 5-14 years of age, and none of the victims was under 1 year of age.

Rabies Vaccination

Vaccination is the only effective way to prevent the development of rabies in man, regardless whether it is given before or after exposure to rabies virus.

Vaccination, given before exposure to rabies virus is called pre exposure vaccination, which is commonly given to the high risk people, such as nurses, doctors, veterinary students and laboratory workers who prepare rabies vaccine. While vaccination, given after exposure, is called post exposure vaccination. This is widely used in practice and highly effective in preventing the victims from rabies, which is almost always lethal.

Although there has been very little change in the regime of vaccination since it was introduced for the first time by Pasteur, many different types have been developed and continue to be developed in the production of vaccines for the immunization of man. Two types of vaccines have been developed:

1. Nervous tissue vaccine, derived from the nervous tissue of adult or newborn animals.

One of the most common types of NTV in use today is the Semple type, another is the SMB vaccine which is prepared from suckling mice brain before myelinization occurs. These vaccination completely inactivated virus which has some superiority such as: they keep better under field conditions; they provide increased assurance of safety, and they lend themselves to an easier centralized production.

Ferni type vaccine, is another vaccine which contains residual infectious virus. Since this vaccine still contains residual live virus which has risk effects, the WHO Expert Committee (1973) has recommended that the production of this