

SEA-Rabies-23
Distribution: General

Prevention and Control of Rabies in the South-East Asia Region



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1. CURRENT STATUS AND MAGNITUDE OF RABIES PROBLEM IN SEAR

Rabies is an acute zoonotic vaccine-preventable viral disease. It is endemic in seven countries of the South-East Asia Region (SEAR) with the exception of Bhutan, DPR Korea, Maldives and Timor-Leste. It is estimated that more than 60% of global deaths due to rabies take place in the SEA Region. In spite of considerable advances in development and availability of efficient tools to control this disease, there has not been any substantial decrease in the incidence of rabies in the countries of the SEA Region, except in Thailand. It continues to be a major public health problem throughout the Region with the exception of selected and small areas with lesser burden of disease.

1.1 Reservoir

Rabies is enzootic in the South-East Asia Region of WHO. Various animal species were found to be the reservoirs of this infection leading to the existence of both sylvatic and urban cycles of rabies. However, human deaths on account of rabies is primarily from canine rabies-dogs account for 93-96% of all animal bites in humans who report to the health facilities for their post-exposure management. Cats, mongoose, cattle and monkeys are among other animals who contribute to the burgeoning incidence of animal bites.

1.2 Mortality and Morbidity

Rabies is an invariably fatal illness. Diagnosis in the majority of cases, is based on the characteristic features of hydrophobia and most of the times do not warrant clinical acumen. Since the disease is endemic in all the countries of the Region, except Maldives and Timor-Leste, for the last many years, the common man is often aware of the dramatic pathognomonic features and hence many patients do not come in contact with the health authorities. Weak reporting and surveillance system do not result into creation of a reliable database and hence the figures being made available by countries are only estimates. Accordingly, it is believed that around 35 000 people die of

hydrophobia every year in the countries of the South-East Asia Region. In addition, about 1.5 million people undergo antirabies vaccination. The country-wise estimates are shown in Table 1.

Table 1. Deaths and postexposure treatments due to animal bites in the SEA Region*

No.	Country	Estimated deaths/year	Estimated postexposure treatments/year
1	Bangladesh	1 250-1 550	60 000
2	Bhutan	Sporadic	Sporadic
3	DPR Korea	Sporadic	Not available
4	India	18 000-20 000	1 100 000
5	Indonesia	100	8 000
6	Maldives	Nil	Nil
7	Myanmar	34	5 000
8	Nepal	200	25 000
9	Sri Lanka	133	80 000
10	Thailand	74	200 000
11	Timor-Leste	Nil	Nil

*Based upon reports presented at the Seminar on Rabies Control in Asia in 2001 and Country Reports of 2002.

Animal bites are commonly inflicted upon younger people who are in their productive years of their lives and spend more time in outdoor activities. Data from the countries of the SEA Region itself substantiate this belief. WHO estimates that between 40 to 60% of rabies victims are children under the age of 15 and recommends that this age group should be considered a top priority for preventive immunization (WHO/CDS/CSR/EPH/2002.08). In a study conducted in Thailand, 51% of victims of animal bites were children below the age of 12 years. Moreover, because of smaller size of growing children, the bites caused on them are usually categorized into severe bites which demand aggressive management and are associated with greater risks.

It is difficult to extrapolate the human mortality, morbidity and misery due to rabies in terms of economic loss. However, it certainly will be much more than the estimated cost of rabies surveillance, prevention and control in the countries of the Region which may range between US\$ 50 000–150 000 per million inhabitants per year. The cost of rabies vaccine alone for prevention of rabies only in human beings in India comes to US\$ 21 000 per million inhabitants per year.

1.3 Diagnostic Facilities

Reliable surveillance data and proper post exposure management require accurate laboratory diagnosis. The infrastructure and utilization of services are inadequate in the SEA Region. Countries like Bangladesh and Nepal have only one laboratory each at the central level. Even India has a very limited number of diagnostic centres - most of which are in the veterinary sector with very little coordination and collaboration with health services.

Though an efficient laboratory system can support rabies control activities, the clinical and epidemiological features of this disease in humans are not dependent in their entirety upon laboratory support. The available tools for the control of human rabies, if applied effectively, can produce remarkably cost-effective results even in the absence of an extensive laboratory support. However, minimum laboratory services for rabies diagnosis in humans and animals need to be established, to strengthen control programmes.

1.4 Nationally Coordinated Control Activities

Four countries in the Region viz. Indonesia, Nepal, Sri Lanka and Thailand have rabies control activities that are being coordinated at the national level. Nepal and Sri Lanka have created a Veterinary Public Health Unit in its Ministry of Health; Thailand has integrated antirabies activities in its PHC system of health care delivery. The control efforts in Bangladesh and India are fragmented and need better coordination.

1.5 Immunization against Rabies

Immunization against rabies plays a very vital role in reducing mortality in human beings as well as animals. Vaccines are the cornerstones for the control of rabies in animals. None of the countries of SEA Region is self-

dependent on production of adequate quantities of antirabies vaccines. All countries are dependent upon import of these biologicals. The status of production and utilization of immunization agents in the countries of the SEA Region is shown in Table 2.

Table 2. Production and utilization of immunizing agents against rabies*

No.	Country	Use in humans			Use in animals		
		NTV	TCV	Self-reliance in production	NTV	TCV	Self-reliance in production
1	Bangladesh	+	+	-	+	+	-
2	Bhutan	-	+	-	-	+	-
3	DPR Korea	?	?	-	?	?	-
4	India	+	+	-	+	+	-
5	Indonesia	?	+	-	-	+	-
6	Maldives	Nil	Nil	Nil	Nil	Nil	Nil
7	Myanmar	+	+	-	?	?	?
8	Nepal	+	+	-	+	+	-
9	Sri Lanka	-	+	-	-	+	-
10	Thailand	-	+	-	-	+	-
11	Timor-Leste	Nil	Nil	Nil	Nil	Nil	Nil

NTV: Nervous Tissue Vaccine; TCV: Tissue Culture Vaccine; ?: Information not available

*Based upon reports collected from countries.

Antirabies serum (ARS) from horses, its purified version of equine rabies immunoglobulins (ERIG) as well as rabies immunoglobulins of human origin (HRIG) are available in the countries of the SEA Region. India and Thailand produce ARS and ERIG-HRIG, whereas all the countries import RIG. Lack of knowledge about the importance of passive immunization, their inadequate availability and high cost have resulted into progressively lesser utilization of this important life saving tool in postexposure management of rabies. This is quite contrary to utilization of antirabies vaccine where an annual growth rate of almost 10% has been seen in many countries in the recent past.

1.6 Production of Antirabies Immunization Agents in the SEA Region

Production of antirabies vaccines and antirabies serum/RIG is a very cost-intensive proposition. However, globalization has made it easier to import these products. Tissue culture vaccines of primary chick embryonic cell and purified Vero cells are currently being produced in India and also utilized in some of the neighbouring countries. Production of nervous tissue vaccine is being discouraged, but in the absence of other cost-effective alternatives, some countries are still continuing with it.

The production of nervous tissue vaccine takes place in **India** in nine units in the public sector and averages 35 million ml per year. This vaccine is utilized for providing postexposure prophylaxis to about half a million individuals. Annual production of tissue culture vaccines in India is estimated to exceed 3.5 million doses and an additional one million doses are imported every year to meet the burgeoning demand for immunization of around 0.7 million persons bitten by rabid or suspected rabid animals.

Around 150 litres of antirabies serum raised in horses is produced every year in India. Unspecified quantities of ERIG and RIG are imported.

For veterinary use, India is producing 9 million ml of 5% nervous tissue vaccine every year. More than half a million doses of tissue culture vaccine (BHK21 cell line derived) are also produced. Unspecified quantities of tissue culture derived antirabies vaccines are imported.

Bangladesh imports tissue culture antirabies vaccines for both human and veterinary use. Approximately 5 million ml of nervous tissue vaccine is produced annually for postexposure prophylaxis of human beings and animals.

Betapropiolactone inactivated nervous tissue vaccine is produced in **Nepal** in quantities adequate to meet the needs of 20 000 people who are bitten by rabid animals annually. Five Percent carbolized nervous tissue vaccine is produced in Nepal for veterinary use-primarily for postexposure prophylaxis.

Thailand discontinued the production of nervous tissue-derived antirabies vaccines during 1990s and shifted to the use of imported tissue culture vaccines for both veterinary and human use. Similarly, **Sri Lanka** and **Bhutan** depend upon import of rabies vaccines.

2. PROBLEMS AND CONSTRAINTS IN CONTROL OF RABIES IN SEAR

Persistence, and to some extent expansion, of the overall rabies situation in the countries of the Region indicate inadequacy of control activities. Various constraints and problems that are responsible for it are:

2.1 Lack of National Policy

Rabies is a typical example of a zoonotic infection which does not fit into the domain of a single agency that can be entrusted with the task of controlling it.

- Whereas the reservoir is in animals, mortality and morbidity mainly affect human beings. Canine rabies also brings into picture the social impact of man-dog interaction which is further influenced by lack of education, preponderance of religious beliefs and complicated by an array of myths. All these have huge impact on the ecology of the dog.
- In most countries two or three Ministries are dealing with rabies-Ministry of Health, Ministry of Agriculture and Ministry of Local Government (especially in urban areas).

Since rabies control is not the concern of an individual agency, partnership amongst various agencies is the key element. A nationally coordinated and supervised comprehensive programme is mandatory for achieving success. This programme can yield tangible results only if it is backed by commitment at the highest level in the country through a national policy on control of rabies.

The national policy is the statement of intention of the country revealing its commitment to control rabies and is accompanied by allocation of appropriate resources to achieve the desired objectives within stipulated period. Countries in the SEA Region with rabies as a major problem do not have this national policy, which is a prerequisite to mounting an efficient programme against rabies.

The national policy is accompanied by appropriate legislation which needs to be enforced vigorously. Most of the countries do have a legislation that requires mandatory registration, licensing and vaccination of dogs. The implementation of the legislation is practically non-existent.

2.2 Absence of Comprehensively Coordinated National Rabies Control Programme

Most of the countries in the Region do not have any nationally coordinated comprehensive and sustained rabies control activities with inter-sectoral collaboration and active participation of the communities. The success of such a programme was demonstrated in Sri Lanka a few years back. In the absence of such a programme, there is neither a well-defined plan nor effective strategies to control rabies. Most of the countries have been undertaking some rabies control activities without any well defined objectives, goals and indicators to measure success as well as to evaluate the output achieved with the human and financial resources used as input for rabies control activities.

2.3 Inadequate Partnership between Various Administrative Agencies, NGOs and Communities

The epidemiological dynamics of rabies with profound socio-economic and cultural parameters warrant active involvement of nongovernmental organizations (NGOs) and the communities. This relationship has generally not been forged nor explored to galvanize communities in actively participating in the rabies control campaigns. Initial management of animal bites, proper and complete post-exposure management of victims of animal bites and educating communities in regular immunization of dogs are some of the activities where NGOs and local community groups can play crucial role.

2.4 Non-implementation of a Technically Sound Strategy

Globally it has been shown that immunization of dogs shall result in break of the chain of transmission if at least 75% of the animals are covered with effective vaccines on a sustained basis. Most of the countries follow an *ad hoc* approach and immunize a limited number of animals with the available resources and are unable to sustain the level of immunization. Though this provides individual protection to the animal, it has no bearing upon the epizootology of the infection. From a programme point of view, these resources do not provide adequate returns. Similarly, measures of elimination of dogs in small numbers and at erratic intervals does not yield any benefits to the programme.

2.5 Weak Epidemiological Surveillance

The success of any programme depends on accurate assessment of the ground realities, morbidity and mortality data as well as understanding of the epidemiological trends. These require a strong epidemiological surveillance mechanism. Currently passive reporting system is in vogue in almost all the countries of the SEA Region. In the absence of an efficient surveillance mechanism, it would be impossible to monitor the progress of the programme.

2.6 Inadequate Infrastructure and Capacity

In most countries of the SEA Region there are no specifically designated staff, infrastructure, or laboratory support to undertake rabies control activities. There is practically no training support and CME activities are few and far between. Standard Operating Procedures do not exist for any of the activities. Training material and course curriculum for various categories of professional and supportive staff have not been developed. No institutional support is available in most of the countries to any rabies control activity.

2.7 Absence of Dog Population Management

Control of canine rabies depends heavily on management of the dog population to sustain its acceptable levels. The efforts towards dog population management are limited and disjointed in most countries. The same applies to vaccination of dogs.

2.8 Lack of Availability of Adequate Quantities of Safe and Potent Immunizing Agents

None of the countries has the indigenous capability and infrastructure to meet its own demands of both veterinary and human antirabies vaccines and agents conferring passive immunity (ARS/ERIG/RIG). Some countries are still using nervous tissue vaccines which are less efficacious and are associated with serious adverse reactions. In spite of repeated recommendations by international agencies as well as national experts, the production of modern tissue culture vaccines has not replaced the obsolete plants producing sheep brain derived nervous tissue vaccine.

The countries are also lacking in their efforts to utilize some of the modern technology such as oral rabies vaccines for dogs. Similar vaccine when used in wild life rabies has brought about considerable reduction in rabies in foxes in countries of Europe including Switzerland and France.

Rabies is a disease of both rural and urban areas. However, the accessibility of the rural population to antirabies vaccines is poor. The storage conditions for nervous tissue liquid vaccine in such remote areas are also far from satisfactory. Occurrence of cases with hydrophobia in spite of administration of nervous tissue vaccine is not uncommon.

There is a lack of awareness amongst the medical health professionals about the importance of wound toilet, appropriate use of antirabies vaccines and utility of antirabies serum or ERIG/RIG in saving the life of the victim of rabid animal bite. The problem is acute in peripheral areas where marketing and associated awareness by the private sector is also inadequate because of limited market.

2.9 Absence of Health Education

Community participation is an essential element of any disease control programme. IEC activities are few and far between. No efforts are being made to educate the public about the epidemiological features of rabies and simple "Dos and Dents" that can protect them as well as help in bringing about a reduction in the incidence of rabies.

2.10 Inadequate R&D

Only limited attempts are being made to develop and promote local technology for the control of rabies. Some research institutions carry out sporadic research projects which do not have any bearing upon the control of rabies. This is in spite of a large base of research institutions and Universities as well as four WHO Collaborating Centres on Rabies Control in the countries of the SEA Region.

3. PROJECTIONS FOR REQUIREMENTS OF VACCINES AND COSTING

Rabies is a vaccine-preventable disease. A variety of vaccines, either indigenously produced or imported, are used in the countries of the SEA

Region. The vaccines are being procured at the national, provincial, institutional as well as individual levels. The cost per unit would obviously vary under such conditions. Ideally, every country should establish a mechanism to procure/produce these vaccines in a manner that allows it to procure the maximum number of doses within the available resources. Assistance of an international organization such as WHO may also be of help in bulk procurement of the vaccine. Such procurement shall also ensure the quality of the product.

The projections of vaccine requirements and its tentative costing at estimated prices when procured in bulk would require availability of reliable data about the following:

Vaccination of animals

- Number of animals requiring vaccination per year
- Duration of immunity of vaccine
- Cost of single dose of vaccine when purchased in bulk
- Cost of administration and transport of vaccine

Post-exposure active immunization of human beings

- Number of animal bite cases per year
- Number of doses for each exposure
- Cost of single dose of vaccine when purchased in bulk
- Cost of administration and transport of vaccine

Post-exposure passive immunization of human beings

- Number of animal bite cases requiring passive immunization
- Quantity of agent required on an average per case
- Cost per ml of the agent when purchased in bulk
- Cost of administration and transport of agent

However, reliable data for the following are not available:

- Population of dogs in the countries of the SEA Region
- Number of animal bite cases per year

- Number of animal bite cases requiring passive immunization
- Mechanism adopted by the country to procure the vaccines

Estimates would also depend upon the targets that need to be achieved during various periods of the programme and the changes in the epidemiology of disease subsequent to successful control activities. The requirements and the costing which are being presented here would thus be influenced by a variety of such factors. Sustenance of the programme, which is one of the major problem in our Region would also have a major role. In the absence of a prolonged sustained programme, the gains of initial activities as well as the investment made may be negated quickly as the dog population and the component of unimmunized (and thus rabies susceptible) population again rapidly attain their plateau.

Estimates for cost of vaccines for animal and human use are provided below:

Vaccines for animal use

Activity	
Estimated number of dogs in the SEA Region	37.5 million
Annual increase in population @ 10%	3.75 million
Duration of immunity by a tissue culture vaccine	Two years
Immunity conferred by	Single dose
Number of doses required in first year (80% coverage)	30 million
No. of doses required in second year (10%)	3 million
No. of doses required in third year	30 million
No. of doses required in fourth year	3 million
No. of doses required in fifth year	30 million
Cost per dose of tissue culture vaccine + syringe + diluent	US\$ 0.35
Cost of vaccine for five years	US\$ 33.6 million
Cost of wastage of vaccine @ 25%	US\$ 8.4 million
Cost of transportation, storage etc.	US\$ 8 million
Total for 5 years	US\$ 50 million

Vaccine for use in humans

Activity	
No of animal bite cases in SEAR countries	2.5 million
No of doses of TCV for Post Exposure Treatment (PET) through intramuscular route	Five
No of doses required to achieve 100% coverage	12.5 million
Cost per dose of TCV (Incl syringe + diluent)	US\$ 3.5
Cost of vaccine per year	US\$ 43.75 million
Cost of vaccine for five years	US\$ 220 million
Cost of transportation etc.	US\$ 5 million
Total for 5 years	US\$ 225 million

Passive immunization for use in humans

Activity	
No of animal bite cases in the SEA Region	2.5 million
No of animal bite cases requiring passive immunization	0.8 million
Quantity of agent required on average for passive immunization	5 ml
Quantity required per year	4 million ml
Cost of agent per ml	US\$ 2
Cost of agent for five years	US\$ 8 million
Cost of transportation etc.	US\$ 2 million
Total for 5 years	US\$ 10 million

3.1 Factors Influencing Cost of Vaccination

Various other factors that will influence the costing of the vaccines for animal and human use are:

- Availability of multiple dose vials of vaccines
- Indigenous production of vaccine
- Utilization of existing vaccine production units in production of tissue culture vaccines instead of currently produced nervous tissue vaccines (Semple type)
- Use of intradermal route or 2-1-1 schedule of vaccination
- Removal of taxes and duties
- Utilization of available infrastructure and manpower (such as the one used for implementation of EPI) for the storage, distribution and administration of antirabies vaccines

3.2 Cost Reduction by Use of Intradermal Route

Intradermal inoculation of antirabies vaccines has been conclusively shown to be as effective as intramuscular or subcutaneous administration. When administered in a setting where large number of patients are available, the cost of vaccine can be reduced to almost >60% of that when the intramuscular or subcutaneous route is followed. Accordingly, the expenditure estimated for five years with subcutaneous or intramuscular administered tissue culture vaccines (US\$ 225 million) can easily be reduced to around <US\$ 40 million over the same period of time. This will make it much easier for the developing countries to embark upon effective control programmes with the limited resources at their disposal. This will also help them in diverting enormous resources that are at present devoted to sustain the infrastructure and meet the operational cost of the production of nervous tissue vaccines.

3.3 Cost Benefits of Dog Rabies Elimination

The demand for and utilization of safe and effective modern tissue culture vaccines in proportion to their availability has increased. In some countries, the increase has been up to 10% every year. These vaccines are expensive, and providing post exposure prophylaxis to human beings does not have any

bearing upon the epidemiology of the disease. On the other hand, control measures in dogs, especially regular vaccination campaigns reaching a sufficiently high proportion of dog population, should reduce the number of cases in reservoir (dogs) and eventually lead to rabies elimination in dogs and human beings. Dog rabies control activities cost less than that for prevention in human beings. It is well known that a full human post-exposure treatment with tissue culture vaccines costs the equivalent of vaccinating 100 dogs. As this programme for prevention of rabies in dogs succeeds, the need for postexposure treatment in humans will also be reduced and may even be eliminated. Dog rabies elimination can help the health sector to make substantial savings.

4. REGIONAL STRATEGY FOR CONTROL OF RABIES

Control of rabies in the Region requires a dynamic strategy and flexible mechanism of implementation commensurate with the epidemiology of the disease at the local level by strengthening the local capabilities and providing appropriate institutional, infrastructural, legislative and logistic support on a sustained basis.

4.1 Objectives

The objectives of the regional strategy are as follows:

- (1) To prevent and reduce human mortality and morbidity due to animal bites by promoting early and appropriate post exposure treatment with quality biologicals;
- (2) To eliminate rabies in the canine population through mass immunization and dog population management using scientifically proven methods;
- (3) To institute an efficient surveillance mechanism, and
- (4) To develop and utilize appropriate technology in a cost-effective manner.

4.2 Key Elements for Implementation of the Strategy

Effective implementation of this strategy would require the following actions:

- Advocacy at the highest level by WHO could be achieved by discussing rabies in the meeting of the Regional Committee. This will act as a powerful tool to obtain the commitment of decision makers at the highest

level. The Resolution adopted in the Regional Committee meeting is also considered an advocacy tool for various levels of health professionals and administrators.

- Formulation of a national policy and plan for elimination/control of rabies within a stipulated period with allocation of suitable resources to sustain the programme on a long term basis is essential.
- Establishment of a national committee on control of rabies to provide technical guidance to the Government on development, implementation and monitoring of a comprehensive nationally coordinated Rabies Control Programme should be considered a top priority. This committee shall have senior representatives and national experts from all those agencies that are intended to play a part in control activities. It must be headed by the top technical or administrative official of the country and meet very frequently.
- Formulation of a National Rabies Control Programme with appropriate legislative, infrastructural and logistic support on a sustained basis and providing detailed guidelines for implementation of the objectives.
- Ensuring a strong partnership between various national and international players from administrative units, private sector, NGOs and general communities is crucial for generating new resources, pooling existing resources and working in collaboration to generate synergistic results. Intersectoral coordination has to become functional at all echelons and must extend to the peripheral functional units such as district or PHC.
- Development of realistic targets and indicators is necessary to assess the progress made in achieving the targets.
- Strengthening local capabilities and integrating rabies control activities in existing health and veterinary systems of federal, provincial as well as local civic bodies and coordinating with other developmental works would increase intersectoral cooperation.
- Development of appropriate technical material including those to be used for advocacy, training and undertaking specific operations (SOP) should be undertaken for training of staff at all levels.
- Enhancing national capacity in production, distribution and storage of biologicals (vaccines and antirabies serum) and/or ensuring purchase of these from international market in bulk at most competitive price would ensure their availability for anti-rabies treatment.

- Promoting R & D in the research institutions and WHO Collaborating Centres in the Region for safer and more effective vaccines with allocation of appropriate resources should be given consideration.
- An effective monitoring and evaluation mechanism should be instituted with quantitative indicators such as:
 - Reduction in number of human cases due to hydrophobia;
 - Reduction in animals dying of rabies as confirmed by the laboratory;
 - Number of dogs vaccinated (and revaccinated after recommended intervals);
 - Number of dogs in a defined population;
 - KAP of communities;
 - Availability of PET in district and peripheral hospitals;
 - Number of drop outs in PETs;
 - Quantity of vaccine utilized for human and animal use;
 - Quantity of antirabies serum/ERIG/RIG consumed, and
 - Number of training courses organized and persons trained.

4.3 Long-term Strategy – Canine Rabies Control

The epidemiology of rabies clearly indicates that control of rabies in dogs remains the only long-term, cost-effective means of elimination or preventing most human cases in the Member Countries of the SEA Region. Human public health preventive measures should be undertaken along side programmes for dog rabies control.

There are various practical strategies. These include selective capture and euthanasia of dogs through humane methods, effective control of their reproduction, systematic immunization by parenteral route and supplemental immunization through oral vaccination of dogs. Strategies for dog population management and control would need to be tailored to suit the social, cultural and religious environment of the country. The programme manager or strategy-makers have to be conscious of the fact that dog population reduction policies in the countries of South-East Asia may not always be popular measures and would require considerable IEC inputs and strong advocacy to elicit the active participation of the communities.

Any comprehensive programme for canine rabies control must have an effective combination of various activities that are targeted towards achievement of a break in the chain of transmission of rabies. This multipronged strategy should have the following:

- (1) Immunization of at least 75% of the dogs with a potent and quality vaccine;
- (2) Effective legislation and active community participation to control the trade and movement of dogs and to hold dog owners responsible and accountable for their animals;
- (3) Actions to limit the availability of food, water and shelter to stray dogs and initiation of programmes to restrict the population growth of the dogs.

4.4 Plan of Action

Placed below is a suggested model plan of action with a possible time frame. The time frame commences with month 0 and continues linearly. Some activities will overlap and/or run concurrently with other activities.

Activity	Time frame
Development of national policy and its approval	0-6 months
Constitution of a national committee on control of rabies and development of broad national rabies control programme	4-10 months
Designation of institutional support and development of operational manual for various training activities under the programme, training curriculum, material and logistics for training including identification of core trainers	10-15 months
Training of various categories of staff from all participating agencies	15-20 months
Estimation of needs of biologicals at the local level, their proper storage, transportation and procurement	15-20 months
Implementation of programme	20 months onwards
Monitoring and evaluation	Every six months
Comprehensive review of programme with possible mid-course corrections, if required	Annually

The model plan of action would require detailed description of activities which can be developed in consultation with national and international experts once the country has decided to launch rabies control activities.

Annex 1

DOs AND DON'Ts IN MANAGEMENT OF ANIMAL BITES

Dos

- Wash the wound with plenty of water and soap.
- If soap is not available, flush the wound with copious amounts of water.
- Remove soap and apply any
 - quaternary ammonium compound
 - 1 to 4% benzalkonium chloride
 - 1% cetrimonium bromide
 - alcohol (70%)
 - tincture of iodine or its aqueous solution
- Administer complete antirabies immunization as per flow chart in Annex 2

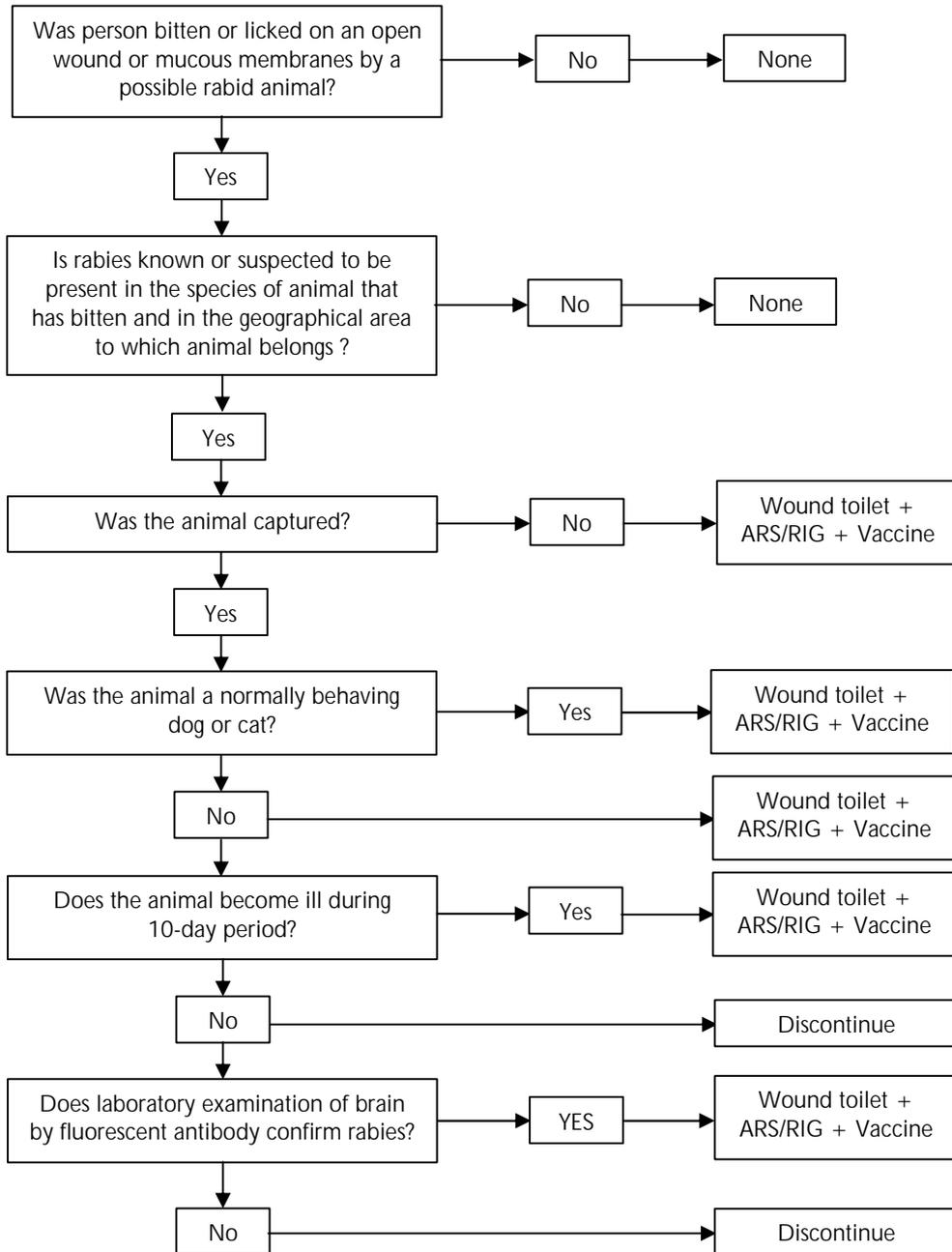
Don'ts

- Do not cauterize the animal bite wound, as it leaves a very bad scar, and does not confer any additional advantage over washing the wound with water and soap.
- If possible, primary suturing of the animal bite wounds should be postponed.
- However, if suturing is unavoidable, antirabies serum should be first infiltrated around the wound and subsequently minimum possible stitches should be applied.
- Do not provide incomplete immunization.

Annex 2

FLOWCHART FOR MANAGEMENT OF ANIMAL BITES

Rabies Prophylaxis



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