Strategic Framework for Elimination of Human Rabies Transmitted by Dogs in the South-East Asia Region

World Health Organization
Regional Office for South-East Asia

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Acronyms

ABC	Animal birth control
ABC/AR	Animal birth control/anti-rabies
AIDS	Acquired immune deficiency syndrome
ASEAN	Association of Southeast Asian Nations
ASEAN Plus Three	ASEAN plus China, Japan and Republic of Korea
CCV	Cell-culture vaccine
CSF	Cerebrospinal fluid
dRIT	Direct rapid immunohistochemistry test
EDCD	Epidemiology and Disease Control Division
FAO	United Nations Food and Agriculture Organization
FAT	Fluorescence antibody test
GARC	Global Alliance for Rabies Control
HIV	Human immunodeficiency virus
IDRV	Intradermal rabies vaccination
IEC	Information, education and communication
IU	International Unit
MDG	Millennium Development Goal
MoH	Ministry of Health
MoH&FW	Ministry of Health and Family Welfare

MoHP	Ministry of Health and Population
MoPH	Ministry of Public Health
NGO	Nongovernmental organization
NTV	Nerve-tissue vaccine
OIE	World Organization for Animal Health
ORV	Oral rabies vaccine
PCECV	Purified chick embryo cell-culture vaccine
PEP	Post-exposure prophylaxis
PHC	Primary health care
PRP	Partners for Rabies Prevention
RIA Foundation	Rabies in Asia Foundation
RIG	Rabies immunoglobulin
SAARC	South Asian Association for Regional Cooperation
SEA	South-East Asia
TCV	Tissue-culture vaccine
WHO	World Health Organization
WSPA	World Society for the Protection of Animals

Executive summary

The World Health Organization (WHO) South-East Asia (SEA) Region consists of 11 countries, of which eight are endemic for rabies. More than 1.4 billion people in the Region are at risk of rabies infection and approximately 45% of worldwide rabies deaths occur in Asia. Dog bites are the primary source of human infection in all rabies-endemic countries and account for 96% of rabies cases in the SEA Region. Some countries have a comprehensive rabies control programme but it is a neglected disease in others due to competing public health priorities and the complex nature of rabies control activities.

Elimination of human rabies is dependent on the elimination of dog rabies. Progress in preventing human rabies through control of the disease in the animal reservoir has been slow. This has been due to technical, intersectoral, organizational and financial obstacles.

In the majority of countries, the number of patients receiving post-exposure prophylaxis (PEP) has steadily increased over time, particularly in urban areas. Countries are allocating increasing portions of health budgets to the procurement of modern rabies vaccines and immunoglobulin to meet the growing demand for PEP. It is a challenge to meet the growing demand of rabies vaccine and WHO is encouraging Member countries to introduce cost-effective intradermal rabies vaccination (IDRV).

New innovative tools and techniques have been developed and standardized in recent years which will help to improve dog vaccination coverage, dog population management and the accessibility of modern rabies vaccines. The successful introduction of cost-effective IDRV regimens in a number of Member countries has increased the availability and affordability of PEP. Oral rabies vaccine (ORV) delivery strategies for dogs and immunocontraception are new tools which will improve vaccination coverage and animal birth control.

The United Nations Food and Agriculture Organization (FAO), World Organization for Animal Health (OIE) and WHO are working together with Regional partners to control and subsequently eliminate rabies in dog and human populations through partnership with concerned authorities at the country level. There are a number of donors, regionally specialized organizations and international nongovernmental organizations (NGOs) who are willing to contribute in dog rabies control and dog population management in the SEA Region. Their input is important to launch and sustain regionally coordinated programmes for rabies elimination and for generous support to high-burden countries.

Considering the importance of consolidating achievements in rabies control in Member countries, the WHO Regional Office for South-East Asia has developed a Regional strategy for elimination of human rabies transmitted by dogs. WHO is committed to providing technical leadership, advocating with national health authorities in Member countries to develop major stakeholder consensus for a comprehensive rabies elimination programme, and implementing national strategies for the elimination of human rabies.

1

Introduction

Rabies is an acute zoonotic disease of public health and economic importance in South-East Asia. It is endemic in eight countries of the World Health Organization (WHO) South-East Asia (SEA) Region,* the exceptions being the Democratic People's Republic of Korea, Maldives and Timor-Leste. It is estimated that approximately 45% of global human deaths due to rabies occur in the SEA Region. There are two clinical forms of rabies in humans and animals: furious and paralytic rabies. Both forms are invariably fatal.

In spite of considerable advances in the development and availability of efficient tools to control this disease, there has not been any substantial decrease in rabies incidence in the Region, except in Thailand and Sri Lanka. It continues to be a major public health problem throughout the Region with the exception of certain small areas which have a lower burden of disease. Therefore, it is acknowledged that rabies has an impact on the meeting of the Millennium Development Goals (MDGs) by 2015.

Based on disease incidence, countries and areas can be categorized as high, medium or low rabies-endemic areas or a rabies-free area. In most countries rabies incidence has been stable but in some it has increased. The Lakshadweep, Andaman and Nicobar islands of India, Maldives and Timor-Leste are historically free of rabies.

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* The 11 Member countries of the WHO South-East Asia Region are Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste.

Rabies control activities vary across the Region. Only four countries (Bhutan, Indonesia, Sri Lanka and Thailand) have rabies control activities that are coordinated at the national level. Sri Lanka has created a Veterinary Public Health Unit responsible for rabies activities within the Ministry of Health (MoH). In the past the Ministry of Public Health (MoPH) of Thailand was carrying out a comprehensive rabies control programme, but responsibility for this was subsequently transferred to the Department of Livestock Development. The Thai MoPH has integrated anti-rabies activities in its primary health-care (PHC) system. The National Centre for Animal Health in Bhutan has been focusing on dog vaccination and dog population management activities in southern districts, and cross-border control of dog movement and dog rabies is a matter of serious concern. Indonesia has observed rabies as an emerging disease problem in the last 10 years and more islands have been infected every year due to the movement of infected dogs. Control efforts in Bangladesh, India and Nepal are fragmented and need better coordination. Rabies remains a neglected disease in most rabies-endemic countries due to competing public health priorities and the complex nature of control activities.

Although rabies is preventable, the high cost of modern rabies vaccines, compounded by the lack of education and awareness about rabies, limits use of post-exposure prophylaxis (PEP). Recent studies show that most rabies patients were victims due to negligence, ignorance and inadequate availability of primary health-care services, amongst other factors. As a result, human rabies incidence remains stable in most rabies-endemic countries.

Progress in preventing human rabies through control of the disease in the dog reservoir has been slow. This has been due to a number of barriers – technical, intersectoral, organizational and financial. In addition, there has been poor implementation of efficient dog rabies control campaigns and dog population control programmes. Lethal methods of dog population control have been used in some countries. This has been an expensive and sensitive issue. Attempts to control rabies by reduction of the dog population have not worked for any extended period.

Successful elimination of human rabies requires a multisectoral, collaborative approach. Prevention of animal rabies, better public awareness and improved access to cost-effective and high-quality human rabies vaccines are essential for the elimination of human rabies. The absence of any of these components will result in a failure to achieve rabies elimination.

1.1 Reservoir

Dogs are the main reservoir and transmitter species of rabies in human and animal populations. Human deaths are primarily from rabid dog bites, which account for 93%-96% of all animal bites in humans who report to health facilities for PEP. Therefore elimination of human rabies is dependent on rabies elimination in dogs.

Rabies circulates in two epidemiological cycles: an urban cycle involving maintenance of infection in dog populations and a sylvatic cycle involving wildlife. There is a possibility of spillover of rabies virus from dogs to wildlife and vice versa. Mongoose (*Herpestes spp.*), jackals (*Canis aureus*), foxes (*Vulpes bengalensis*) and wolves (*Canis lupus*) have been incriminated as wildlife reservoirs of rabies in Bangladesh, India and Nepal[1]. Cats have also been found to be transmitters, and domestic animals such as cattle, buffalo, pigs, sheep and goats are susceptible to rabies infection. However, human rabies cases from exposure to these species are a minority. The most important transmitter species is the dog. If rabies can be eliminated in the dog population, it can be eliminated in the human population.

1.2 Burden of disease

The magnitude and epidemiological pattern of rabies differs from country to country. It is a disease of poverty, affecting vulnerable populations and children. According to data available, children in the 5-15-year age group represent about 40% of people exposed to dog bites in rabies-endemic areas[2]. The majority of bites that occur in children go unrecognized and unreported and, consequently, timely and complete courses of PEP are not received. Thus there is the likelihood of a disproportionately high number of young children contracting and dying of undiagnosed rabies.

Each year, an estimated 12 million people throughout Asia receive treatment after being exposed to animals that are suspected of rabies. Asia's annual expenditure due to rabies has been estimated to be more than US$ 563 million[3]. This is based on the direct and indirect costs of PEP in humans and costs incurred through dog rabies control efforts. Livestock losses due to dog-mediated rabies may be significant but estimation of the burden of disease in animals is difficult due to weak or non-existent animal disease surveillance systems in endemic countries.

More than 1.4 billion people are at potential risk of rabies infection in the SEA Region. It is estimated that 55 000 people die annually due to rabies worldwide. Approximately 21 000 to 24 000 of these deaths occur in the SEA Region[4]. However, it is difficult to present accurate data for the distribution of human rabies across the Region since not all cases of rabies are notified or reported. Table 1 shows the country-wise distribution of estimated human rabies cases.

It is estimated that 4 million patients receive at least one dose of rabies PEP vaccine each year after being exposed to animals that are suspected of rabies in countries of the SEA Region. In the majority of countries in the Region, the quantity of PEP provided has steadily increased over time. Endemic countries are spending increasing portions of their health budget on procurement of modern rabies vaccines and rabies immunoglobulin (RIG) to meet the increasing demand for PEP.

Table 1: Distribution per year of human rabies cases in countries of the SEA Region

Country	Estimated no. of human rabies cases per annum	Estimated no. of human rabies cases per million population	Source of information
Bangladesh	2000–2500	13	MoH&FW Bangladesh
Bhutan	<10	3	MoH Bhutan
Democratic People's Republic of Korea	Not available	Not available	N/A
India	18 000–20 000	18	APCRI, 2003 (5)
Indonesia	150–300	1.3	MoH, Indonesia
Maldives	0	0	Ministry of Health and Family, Maldives
Myanmar	1000	22	MoH, Myanmar
Nepal	<100	4	EDCD, MoHP Nepal
Sri Lanka	<60	3	PVS, Sri Lanka
Thailand	<25	0	MoPH, Thailand
Timor-Leste	0	0	MoH, Timor-Leste
SE Asia Total	**21 345–23 995**		

2

Situation analysis

Rabies has been a disease of economic and public health importance in countries of the SEA Region for centuries. However, it is a neglected disease in most endemic countries due to various constraints in implementing comprehensive rabies control programmes. These are elaborated below:

2.1 National policy

Rabies is a typical example of a zoonotic infection which does not fit into the domain of one single agency with the responsibility of control. Although there is an animal reservoir, mortality and morbidity mainly affect human beings. Therefore, the input of various agencies is necessary for prevention and control efforts.

Additionally, there is no surveillance system for animal rabies and, as a result, the impact of rabies on animal production is unknown. Ministries dealing with animal health are focused on economically important animal diseases which affect livestock productivity. Since dogs are not livestock, canine rabies control and dog population management are often neglected. In most countries two or three agencies deal with rabies, such as the ministries of health, agriculture/livestock and local governments (civic bodies). There is often a lack of consensus on which institution should take responsibility for dog rabies control and dog population management. There is growing recognition that the ministry dealing with animal health has a social responsibility for the control of rabies in animals.

2.2 Strategy

Globally it has been shown that control of canine rabies can be achieved with sustained dog vaccination coverage of 70%[4]. Most SEA Region countries follow an ad hoc approach and immunize a limited number of dogs with the available resources and therefore do not achieve and sustain the required level of immunization coverage. Though this provides individual protection to the animal, it has no bearing upon the epidemiology of the disease. From a programme perspective, this does not achieve adequate results. In the Region there is no comprehensive national rabies control programme with proper planning, funding resources and intersectoral coordination. This is a major impediment in the control and subsequent elimination of human rabies transmitted by dogs. Additionally, motivation for animal rabies control is lacking due to competing priorities and lack of disease burden data.

2.3 Epidemiological surveillance

The success of any elimination programme depends on accurate assessment of the ground realities, morbidity and mortality data and an understanding of the epidemiological trends. These require a strong epidemiological surveillance mechanism. Unfortunately dog and human rabies are not notifiable diseases in most endemic countries.

In the absence of any successful medical treatment for clinical rabies, and because of the severe nature of the disease and the inevitability of death, most rabies victims die at home rather than being admitted to a hospital. These circumstances add to the general underestimation of the health and economic implications of rabies among public health policy-makers. Currently a passive reporting system is in practice in most of the countries of the SEA Region. In the absence of an efficient surveillance mechanism it is impossible to generate accurate evidence-based data. It is therefore difficult to convince policy- and decision-makers to prioritize rabies and it is also difficult to assess the impact of control programmes.

2.4 Laboratory diagnostic facilities

Timely and accurate human and canine laboratory diagnosis is necessary for the generation of reliable surveillance data and to aid decision-making for PEP. The infrastructure and utilization of laboratory services are inadequate

in the SEA Region. Some countries, such as Bangladesh and Nepal, have only one laboratory each at the central level. Even India has a very limited number of rabies diagnostic laboratories. Rabies laboratory services are shared for the diagnosis of human and animal rabies in some countries, which can be advantageous. Fluorescent antibody test (FAT) is the gold standard test for human rabies diagnosis.

Though an efficient laboratory system can support rabies control activities, the clinical and epidemiological features of rabies in humans are not dependent on laboratory support. Most human rabies cases are reported on the basis of clinical observation. Paralytic rabies is often not recognized unless preceded by a dog bite and is often misdiagnosed as acute neurological syndrome.

Rabies diagnosis in dogs is often neglected. Seller's staining is still widely used in many countries although it is not a reliable diagnostic test. Although FAT is the gold standard for rabies diagnosis, its use is limited due to irregular supply of quality brain samples, high cost of rabies conjugates and lack of maintenance and proper use of the fluorescent microscope. Direct rapid immunohistochemistry test (dRIT) is a promising and field-applicable rabies diagnostic test for resource-constrained, rabies-endemic countries.

Laboratory diagnostic tests recommended for antemortem and postmortem confirmation of rabies in human and animals are presented in Annex 1.

There are three WHO Collaborating Centres for Rabies in the SEA Region with prominent experts and they can provide technical support in implementing the Regionally coordinated programme for elimination of human rabies. These centres are:

- WHO Collaborating Centre for Reference and Research in Rabies: National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India
- WHO Collaborating Centre for Rabies Epidemiology: National Institute of Communicable Diseases (NCDC), New Delhi, India
- WHO Collaborating Centre for Research on Rabies Pathogenesis and Prevention: Queen Saovabha Memorial Institute, Bangkok, Thailand

2.5 Dog population management

The success and sustainability of dog immunization coverage depends heavily on appropriate management of the dog population. The efforts towards population management (animal population control and habitat control, etc.) are limited and disjointed in most countries. Many countries have tried strategies for the elimination of stray dogs but there has been little tangible effect in the long run. Surgical sterilization of dogs in small numbers and at irregular intervals does not yield any benefits in reduction of dog populations.

There are success stories of animal birth control/animal rabies (ABC/AR) vaccination in limited urban areas by leading nongovernmental organizations (NGOs). However, they are location-specific and have not been replicated at rural levels with community participation. A number of international NGOs and professional organizations are involved in promoting community-based animal welfare and rabies control activities through partnerships with local NGOs.

2.6 Availability of rabies vaccines and immunoglobulins

Following the first WHO recommendation in 1984 to replace nerve-tissue vaccines (NTVs), many developing countries of South-East Asia discontinued the production and use of NTVs for human use. In 2004, the WHO Expert Consultation issued a definitive statement to the effect that NTVs should be discontinued and that only tissue-culture vaccine (TCV) or purified chick embryo cell-culture vaccine (PCECV) should be used in humans. The following countries of the SEA Region have discontinued production and use of Semple and suckling mouse brain-type NTVs:

- Thailand (1993)
- Sri Lanka (1995)
- Indonesia (1996)
- India (2005)
- Nepal (2006)

In Thailand, discontinuation of local production of NTVs and importation of increasing quantities of modern rabies vaccines have played a major role in the drastic reduction in the number of cases of human rabies[6]. Bangladesh

is committed to phasing out production and use of NTVs by 2011, whereas Myanmar is still producing and using NTVs.

Intradermal rabies vaccination (IDRV) was pioneered by the Queen Saovabha Memorial Institute of the Thai Red Cross Society during the 1980s and is a cost-effective vaccination schedule. WHO has been providing technical support to introduce IDRV in rabies-endemic countries and to improve availability, accessibility and affordability of the vaccines. Thailand, Sri Lanka and India have already introduced this vaccination schedule and Bangladesh, Bhutan, Indonesia and Nepal are in the process of doing so. This will help to reduce the huge financial burden on health ministries of supplying rabies vaccinations.

2.7 Health education

Rabies is a disease of both rural and urban areas. However, most rabies patients do not seek proper PEP in health-care facilities, and many visit traditional healers. Community participation is an essential element of any disease control programme. Information, Education and Communication (IEC) activities for rabies control are insufficient. Inadequate efforts are being made to educate the public about the epidemiological features of rabies and simple precautions that can protect the individual and bring about a reduction in the overall incidence of rabies. Communities must be made aware of the importance of practices such as responsible dog ownership and proper washing of wounds after animal bites.

2.8 Intersectoral coordination

Rabies comes under the responsibility of two or more ministries in most countries of the Region. There is a lack of coordination and collaboration among line agencies and inadequate technical and financial resources for rabies control. Most countries have no national rabies control programme.

Since rabies control is not the responsibility of a single agency, intersectoral coordination among various agencies is of key importance. A nationally coordinated and supervised comprehensive programme is mandatory for achieving success. Programmes can yield tangible results only if supported by commitment at the highest level in the country through a national, intersectoral policy on the control of rabies.

National policy needs to be accompanied by appropriate legislation enforced in consideration of local situations. Most SEA Region nations do not have legislation to require responsible dog ownership. Legislation must be introduced and implemented with public support, and the registration, licensing and vaccination of dogs should be provided free of charge.

2.9 Partnership between various administrative agencies, NGOs and communities

Rabies control requires the active involvement of communities and NGOs. To date this relationship has not generally been sufficiently explored to galvanize communities to actively participate in the rabies control campaigns. Initial management of animal bites, timely, adequate and complete PEP for victims of animal bites and educating communities on the regular immunization of dogs are some of the activities where NGOs, civic society and local community groups can play a crucial role. It is necessary to forge partnerships with NGOs and professional organizations to sustain such activities.

2.10 Training of health professionals

There is a lack of awareness amongst medical doctors and health professionals about the importance of wound-washing, appropriate use of anti-rabies vaccines and the utility of RIG in saving the lives of rabid dog bite victims. Passive immunization is insufficiently practised even in cases of third-degree bites. Continuous education of medical and health professionals on PEP is necessary to provide quality medical services to dog bite victims.

2.11 Research and development

Only limited attempts are being made to develop and promote local technology for the control of rabies. There is a need for operational research to remove or alleviate the main constraints and obstacles to rabies control programmes, which are outlined below:

(1) Develop tools to assess the magnitude of the problem.

(2) Evaluate simpler and more economical diagnostic tests.

(3) Study and promote implementation of "soft" population control projects such as dog population control, responsible dog ownership and proper garbage disposal.

(4) Conduct studies on the basic parameters of dog populations (size, turnover, accessibility and ownership status) in different settings in country-specific situations.

(5) Promote community awareness and knowledge of dog bite prevention, first aid and management of animal bites, PEP and responsible dog ownership. Mobilize NGOs, community-based organizations, animal welfare societies, the media, religious leaders, local community leaders and other influential groups to achieve this, and involve animal welfare societies in decision-making.

(6) Carry out operational research to improve health-care-seeking behaviour for PEP.

3

Rationale

In modern times, with the availability of safe and effective cell culture vaccines (CCVs) and RIG, no person should die of rabies. The WHO recommendations for PEP are presented in Annex 1. Since rabies PEP using intramuscular regimens is expensive for developing countries, WHO in 1992 recommended the use of the cost-effective IDRV. This helps to improve accessibility, availability and affordability of modern rabies vaccines for at risk people in rabies-endemic countries. It also provides an opportunity for some Member countries to phase out production and use of NTVs.

The SEA Region has a unique capability and infrastructure to meet the demands of the whole Region in production and supply of veterinary and human anti-rabies vaccines and other biologicals such as RIG. India is the only country in the Region producing modern rabies CCV such as human diploid cell vaccine, purified verocell rabies vaccine, purified duck embryo vaccine and PCECV. India produces more than 15 million doses of human rabies vaccines annually (Personal communication, Dr. RL Ichhpujani). Other countries are importing human rabies vaccines. India and Thailand produce purified equine RIG, which facilitates the use of RIG in category-three bites since it is much more cost-effective than human RIG.

Control of rabies through vaccination in the canine population is fundamental to the elimination of human rabies. This is illustrated by the successful rabies prevention and control programmes in Latin America. The Pan American Health Organization initiated a regionally coordinated programme for elimination of human rabies transmitted by dogs in 1983, mainly based on mass immunization of dogs[7]. Country-level legislation for responsible dog ownership was introduced to support the programmes. This has led to the reduction of human rabies by more than 90% and elimination of dog rabies

from Chile and major urban centres of other Latin American countries[8]. In Mexico, after five years of a nationwide dog vaccination campaign, the number of human rabies deaths was reduced from 60 per year to less than 20[9]. Rabies elimination programmes focused mainly on mass dog vaccination are largely justified by the savings in costs associated with future human rabies prevention programmes.

New tools and techniques are available which will help to improve dog vaccination coverage, accessibility and affordability of modern rabies vaccines and dog population management. Historical evidence indicates that parenteral vaccination of dogs was successful in those areas where stray or ownerless dog numbers were controlled as an integral part of a rabies control programme[10]. Oral rabies vaccine (ORV) delivery strategies for dogs which cannot be reached by parenteral vaccines have also been designed and tested in parts of Asia. Animal Birth Control (ABC) may be considered in conjunction with rabies vaccination as a complementary tool to reduce the density of dog populations and rabies incidence. ABC includes surgical sterilization and immunocontraception.

Global rabies experts from the Partners for Rabies Prevention (PRP) have developed a user-friendly online guideline called *Blueprint for Rabies Prevention and Control*, which is available at www.rabiesblueprint.com[11]. This guide contains information obtained from different sources, including previously published guidelines by WHO, the World Society for the Protection of Animals (WSPA) and other international organizations, together with scientific findings on rabies prevention and control. The ultimate goal of the *Blueprint* is to provide relevant authorities and personnel in rabies-affected areas with a standard operating procedure to develop their own programmes for preventing human rabies through dog rabies elimination.

A number of Regional control strategies have provided the basis for a strategy for the elimination of human rabies in South-East Asia.

Regionally coordinated efforts are necessary for elimination of human rabies. WHO launched a Regional rabies control project in the 1980s in Asia[12]. Many countries developed and strengthened national capacity for rabies surveillance, diagnosis, vaccine production and dog population management based on country-specific needs and sociocultural acceptability. This has encouraged coordination and cooperation between human and animal health sectors for rabies prevention and control at the country level. The following rabies control strategies provide the basis for the strategy for elimination of human rabies in the Region:

- Considering the importance of consolidating achievements in rabies control in Member countries, WHO SEA Regional Office developed a Regional strategy for human rabies elimination from South-East Asia in 1998[13]. However, it was an advocacy document and there was no timeline and resource mobilization plan for implementation of the strategy at the Regional level. Sri Lanka used some strategic approaches to improve rabies control activities at the country level.
- WHO SEA Regional Office organized an intercountry meeting on Rabies in Colombo, Sri Lanka from 10 to 12 November 2005[14]. The objectives of the meeting were to review the rabies situation in the SEA Region and to formulate mechanisms for implementation of strategies for elimination of rabies.
- Member States of the Association of Southeast Asian Nations (ASEAN) and the South Asian Association for Regional Cooperation (SAARC) have also identified rabies as a priority public-health problem, and national governments of SEA Region countries have expressed concern and commitment for the elimination of human rabies.
- The ASEAN Plus Three countries (China, Japan and Republic of Korea) adopted the call for action to prevent and control rabies, with the goal of rabies elimination by year 2020[15]. The Rabies in Asia (RIA) Foundation conference held in Hanoi in September 2009 passed resolutions to reach the goal of human and dog rabies elimination by 2020. Through appropriate channels the WHO Regional Committees of the SEA and Western Pacific Regions will reinforce their respective Regional Offices' capabilities to meet the demands from Member countries for technical assistance, technology transfer and the launching of regional rabies initiatives in close collaboration with ASEAN and SAARC.
- A SAARC Rabies Meeting in Colombo, Sri Lanka in 2003 was attended by government officials of Member countries. The meeting recommended development of a SAARC strategy for rabies elimination. As a follow-up of the previous meeting, RIA Foundation in collaboration with the SAARC Secretariat and WHO SEA Regional Office hosted a SAARC-level rabies meeting in February 2011 in Mysore which called for regionally coordinated rabies control activities.
- Progress in prevention and control of rabies made by Sri Lanka and Thailand indicates that human deaths due to rabies can be prevented through implementation of a national comprehensive rabies control

programme. These countries have registered a progressive decline in the number of human rabies deaths through improved accessibility to rabies PEP and an effective vaccine delivery system and mass dog vaccination campaign.

- India launched a pilot project for rabies control in five metropolitan cities in 2008 and is planning to launch a nationwide rabies control programme in 2012-2017. Bhutan has developed national guidelines for rabies control and strengthened animal rabies control programmes in recent years.
- Bhutan has been reporting human rabies cases in bordering districts for the last years, illustrating the importance of cross-border rabies surveillance and control activities with neighbouring countries. Bangladesh and Nepal have developed a blueprint for a National Rabies Control Programme.

Since the beginning, WHO has recommended establishing and strengthening intersectoral coordination between health, veterinary and various other departments for prevention and control of rabies in the SEA Region. But despite the sincere efforts of many countries, effective coordination has not be established in most as control of dog rabies has been accorded low priority. Nevertheless, the recent outbreak of avian influenza provided an opportunity to appreciate the value of establishing and strengthening intersectoral coordination and working in an organized manner to prevent the spread of avian influenza to humans. Both animal health and public health sectors implemented their component of a common strategy through the respective nodal agency which was monitored by a Joint Task Force or Monitoring Committee with the participation of high-stature bureaucrats from various sectors. Strong political and governmental commitment resulted in the success of this strategy. Such a mechanism may be effective in implementation of a strategy for prevention and control of rabies in the countries of the SEA Region.

The elimination of human rabies in South-East Asia is feasible with appropriate intersectoral coordination and technical, political and public support. An initiative has been taken to develop a strategic framework for elimination of human rabies in the SEA Region based on past achievement and lessons learnt. The strategic framework will provide technical leadership, and advocate with national health authorities in Member countries to develop consensus among major stakeholders for a comprehensive rabies elimination programme and to implement a national strategy for elimination of human rabies considering the epidemiological situation, technical feasibility and sociocultural context.

4

Objectives

To eliminate human rabies through progressive control of dog rabies and human rabies prophylaxis in rabies -endemic countries and to maintain the rabies-free status in rabies-free areas of the SEA Region.

5

Guiding principles of the Strategic Framework

- Dog bites are the primary source of human rabies. Human rabies prevention is possible through mass dog vaccination, promotion of responsible dog ownership and dog population control programmes with a partnership approach.
- Dog bites are a medical emergency and thorough cleansing of a wound after a dog bite is an important step which needs to be promoted at the community level through advocacy, awareness and education.
- Post-exposure rabies prophylaxis should be easily accessible, affordable and available for those that require it.

6

Strategic elements

- Prevention: Introduce cost-effective public health intervention techniques to improve accessibility, affordability and availability of PEP. Develop mass dog vaccination programmes.
- Promotion: Improve understanding of rabies through advocacy, awareness, education and operational research. Promote responsible dog ownership.
- Partnership: Provide coordinated support for the anti-rabies drive with the involvement of community, civil society, government and non-government sectors and international partners.

7

Strategic actions

7.1 Human health component

- To promote early and appropriate post-exposure rabies prophylaxis to patients exposed to rabid or suspect rabid dogs.
- To train of professionals in dog bite management.
- To introduce cost-effective vaccination schedules.
- To encourage pre-exposure prophylaxis for high-risk groups.
- To promote research to introduce new, cost-effective biologicals and shorter PEP regimens.

7.2 Animal health component

- To carry out dog population surveys and develop a strategic plan for mass dog vaccination campaigns and dog population management.
- To promote operational research to introduce cost-effective tools and techniques in order to improve dog vaccination coverage and dog population management.

7.3 Component involving intersectoral coordination

- Community involvement:
- To promote timely and appropriate dog bite management including immediate wound-washing
- To promote responsible dog ownership
- To assist in mass vaccination of community/stray dogs

7.4 Maintaining rabies-free areas

- To build and verify a strategy ensuring sustainability of rabies-free status.

8

Targets

8.1 Rabies-endemic countries

Elimination of human rabies transmitted by dogs: definition

Elimination of human rabies transmitted by dogs is defined as the absence of any human rabies case following a bite or other exposure to an indigenous dog for a period of two years in an area where:

(1) dog rabies virus circulation between dogs has been stopped by immunization and other means;

(2) an effective system for human and dog rabies surveillance and diagnosis is in place.

It is desirable that a regionally coordinated rabies elimination programme is initiated in each WHO SEA Region Member country before 2014. Elimination of human rabies transmitted by dogs should be achieved preferably by 2020. Each participating country will set its own target considering the country-specific epidemiological situation.

8.2 Countries with no rabies case reporting or rabies-free

Maintain rabies-free status through verification and appropriate action at points of entry for the importation of dogs, cats and wild animals.

9

Indicators to monitor and evaluate progress at country and Regional level

9.1 Country level

Input indicator:

Human health

- Budget allocated
- Human resources (medical service providers for PEP and vaccination)
- Logistics (availability of vaccine, RIG, diagnostics)

Animal health

- Budget allocated
- Human resources (dog vaccinators, dog catchers, social mobilizers)
- Logistics (availability of dog rabies vaccine, diagnostics)

Performance indicator:

Human health

- Proportion of peripheral health facilities with availability of rabies vaccines and RIG and trained human resources
- No. of pre-exposure vaccinations delivered per year
- No. of people receiving post-exposure vaccination after dog bites
- No. of people receiving RIG after dog bites

Animal health

- No. of dog samples received by rabies laboratory
- Percentage of dog rabies cases confirmed in laboratory
- Dog vaccination coverage
- No. of districts estimating dog populations and having proper dog population control plans in place
- Percentage of female dogs sterilized

Impact indicator:

Human health

- Number and incidence of human rabies per year
- Proportion of districts/provinces with zero human rabies case reporting

Animal health

- No. of dog rabies cases per year
- Percentage of dog rabies cases confirmed in laboratory

9.2 Regional level

- No. of countries with a comprehensive rabies elimination programme and implementation plan
- No. of countries with human rabies surveillance with mandatory reporting
- No. of countries with zero human rabies case reporting
- No. of countries introducing IDRV with national guidelines and protocols
- No. of Regional Resource Centres supporting rabies elimination programme at Regional and country levels

- No. of countries with animal rabies surveillance with mandatory reporting
- No. of countries reporting at least 50% dog rabies cases with laboratory confirmation
- No. of countries estimating dog populations and having proper dog population control plans in place

10

Strategy implementation

10.1 Rabies-endemic areas

- Define a country-specific strategy taking into consideration the local needs and sociocultural acceptability
- Sustained and continuous political commitment
- Assign roles and responsibilities to each sector
- Identify areas where resources can be shared by developing intersectoral coordination
- Mobilize human and financial resources

Details are given in Annex 3.

10.2 Countries or territories with no rabies case reporting or rabies-free

All countries and territories that are rabies-free or have had no rabies cases reported must develop and test a contingency plan for containment of rabies in the animal population. The introduction of rabies in Flores Island and Bali are examples of the potential for rapid spread of rabies when appropriate action is delayed or not executed. Standard protocols should be followed to declare and verify rabies-free status, and surveillance for rabies should be in place.

Maintain rabies-free status through:

- Verification of animal rabies-free status based on international guidelines and recommendations, i.e. OIE guidelines for consideration of rabies-free status in the Terrestrial Animal Health Code (16). OIE criteria for declaration of rabies-free status are set for the purposes of animal health, international trade and movement of animals and are elaborated in Annex 4.
- Appropriate action at point of entry, such as quarantine facilities and involvement of airport and sea port authorities.
- Appropriate guidelines for PEP.
- Ensuring availability of laboratory diagnostic facilities.
- Ensuring availability of rabies vaccine and serums for emergency prophylaxis.

11

Role of WHO and other international organizations

Today there are many players for rabies control and dog population management. WHO has been playing a proactive role in developing standards and guidelines based on evidence and scientific information. It has been issuing recommendations and providing technical support to Member countries for the prevention and control of human rabies.

OIE is developing standards, guidelines and recommendations for animal rabies control and dog population management. An emergency vaccine bank is planned for targeted supply of dog rabies vaccine at the Regional level. Since combating rabies requires strong veterinary systems, the OIE's Performance of Veterinary Services Pathway allows countries to strategically adopt a staged approach to provide targeted support for the systematic and sustainable strengthening of veterinary services based on international standards.

Similarly, FAO has been providing technical support for animal rabies control in a number of countries.

The involvement of regionally specialized organizations such as the ASEAN and SAARC communities is important for sustained political commitment. The involvement of international donors and partners is crucial to launch and sustain Regionally coordinated programmes for elimination of human rabies and to provide generous support to high-burden countries.

There are a number of donors, regionally specialized organizations and international NGOs who are willing to contribute to dog rabies control and dog population management in the SEA Region. These include the Global Alliance for Rabies Control (GARC), Humane Society International, Vets Beyond Borders, WSPA and RIA Foundation. GARC and PRP have been encouraging endemic

countries to launch a comprehensive rabies control programme. World Rabies Day (28th September) is a GARC initiative to raise awareness of the disease. They are also advocating with international donors and partners to provide financial and technical support for resource-constrained countries.

Each of these agencies plays an important role in the prevention and control of rabies. It is vital that they collaborate to reach the target of eliminating human rabies transmitted by dogs in South-East Asia by 2020.

12

Timeframe and plan of action

Goal: To eliminate human rabies in rabies-endemic countries and to verify and maintain freedom in rabies-free areas of the SEA Region.

Objectives	Strategic actions	Cost Estimate (million US$)	Timeframe					Objectively Verifiable Indicators
			2012	2013	2014	2015	2016	
To implement regionally coordinated human rabies elimination programme.	All countries with consensus on national rabies elimination strategy	0.4						No. of countries with comprehensive rabies elimination programme and implementation plan
	Regionally coordinated human rabies elimination programme	1.4						No. of regional activities and pilot projects for human rabies elimination
	Human rabies surveillance system established and diagnosis improved	5						Human and animal rabies surveillance data available and laboratory-confirmed rabies cases reported
	All countries with national human rabies elimination programme	0.2						Countries with national programme, targets and indicators for human rabies elimination

Objectives	Strategic actions	Cost Estimate (million US$)	Timeframe					Objectively Verifiable Indicators
			2012	2013	2014	2015	2016	
To make available early and appropriate post-exposure rabies prophylaxis.	Access to post-exposure rabies prophylaxis in peripheral areas	0.5						No. of districts/ provinces with zero human rabies case reporting
	All rabies-endemic countries introducing intradermal rabies vaccination (IDRV).	0.8						No. of countries introducing IDRV with national guidelines and protocols
	Advocacy at policy level for phasing out production and use of nerve tissue vaccines (NTVs)	0.1						Zero countries with production and use of NTVs.
	Operational research to improve health-seeking behaviour	0.5						Research findings disseminated at Regional workshops and new techniques adopted.
To encourage pre-exposure prophylaxis of high-risk groups.	Pilot study on impact of pre-exposure immunization of school children in hyperendemic areas	0.2						No. of school children receiving pre-exposure rabies vaccination in hyperendemic zone
To promote responsible dog ownership and cleansing of bite wounds with community participation.	Promotion of responsible dog ownership in coordination with stakeholders in hyperendemic areas.	1						No. of districts/ provinces with low incidence of dog rabies
	Advocacy and awareness on cleansing of bite wounds.	2.2						Percentage of people doing wound-washing after a dog bite
	Promotion of community-based rabies elimination activities.	6.6						No. of community-based rabies elimination projects in hyperendemic areas

Objectives	Strategic actions	Cost Estimate (million US$)	Timeframe					Objectively Verifiable Indicators
			2012	2013	2014	2015	2016	
To promote partnership for elimination of human rabies through better coordination with stakeholders.	Regional alliance for human rabies elimination established.	0.4						No. of activities for coordination and resource mobilization with partners
	National committee for human rabies elimination established with the involvement of major stakeholders	0.2						No. of functional national human rabies elimination committees with networking at peripheral level
To verify and maintain freedom in rabies-free areas	Tools for monitoring of progress in rabies elimination and verification of rabies-free status developed	0.5						Declaration and verification of rabies-free territories and zones

13

References

(1) Gongal GN. The epidemiological trend of animal rabies in Nepal and future control strategy. *J Assoc Prev Control Rabies India*. 2006; 8(1).

(2) World Health Organization, Regional Office for South-East Asia. *Rabies in the South-East Asia Region*. New Delhi: WHO-SEARO. http://www.searo.who.int/LinkFiles/CDS_rabies.pdf.pdf - accessed 7 Aug 2012.

(3) Knobel DL, Cleaveland S, Coleman PG, Fèvre EM, Meltzer MI, Miranda ME, et al. Re-evaluating the burden of rabies in Africa and Asia. *Bulletin of the World Health Organization*. 2005; 83(5): 360–368.

(4) World Health Organization. *WHO expert consultation on rabies: first report*. WHO Technical Report Series 931. Geneva: WHO, 2005.

(5) Association for the Prevention and Control of Rabies in India. *Assessing the burden of rabies in India: a national multicentric survey: progress report*. Bhubaneswor, 2003.

(6) World Health Organization. *Strategies for the control and elimination of rabies in Asia: report of a WHO Interregional Consultation, Geneva, Switzerland, 17-21 July 2001*. Geneva: WHO, 2002.

(7) Schneider M. C. et al (2007): Current status of human rabies transmitted by dogs in Latin America. *Cad. Saúde Pública*. 2007; 23(9): 2049-63.

(8) Belotto A, Leanes LF, Schneider MC, Tamayo H, Correa E. Overview of rabies in the Americas. *Virus Res*. 2005; 111: 5-12.

(9) *Global Alliance for Rabies Control*. http://www.rabiescontrol.net/EN/About-Rabies/Rabies-Facts.html - accessed 7 Aug 2012.

(10) Editions Foundation Marcel Merieux. *Proceedings of the Southern and Eastern African rabies group meeting, Nairobi, Kenya, 4-6 Mar 1997*. Lyon. http://searg.info/fichiers/articles/1997L.PDF - accessed 7 Aug 2012.

(11) *Blueprint for Rabies Prevention and Control*. www.rabiesblueprint.com – accessed 7 Aug 2012.

(12) Gongal GN, Wright AE. Human rabies in the South East Asia Region: forward steps for elimination. *Advances in preventive medicine*. 2011; 2011: 383870.

(13) World Health Organization, Regional Office for South-East Asia. *Regional strategy for elimination of rabies: report of an informal consultation, New Delhi, 31 March-2 April 1998*. New Delhi: WHO-SEARO, 1998.

(14) World Health Organization, Regional Office for South-East Asia. *Rabies elimination in South East Asia: report of a workshop, Colombo, Sri Lanka, 10-12 Nov 2005*. New Delhi: WHO-SEARO, 2005.

(15) ASEAN. Towards the elimination of rabies in the ASEAN member states and the plus three countries. Ha Long, 2008. http://www.aseanplus3-eid.info/newsread.php?nid=1581&gid=3 - accessed 7 Aug 2012.

(16) World Organisation for Animal Health. Rabies. In: World Organisation for Animal Health. Terrestrial animal health code. 2 vol. Paris: OIE, 2011. http://web.oie.int/eng/normes/mcode/en_chapitre_1.8.10.pdf - accessed 7 Aug 2012.

Annex 1

Laboratory techniques for rabies diagnosis

Technique	Objective and limitation	Type of specimen
Molecular techniques: – RT-PCR – Real-time PCR – NASBA – RT-LAMP	– Ante-mortem and post-mortem diagnosis – Standard precautions have to be taken seriously to avoid carryover contamination in all processes	– Saliva – Skin biopsy at the nape of neck containing hair follicles – Cerebrospinal fluid (CSF) – Urine – Extracted hair follicles – Brain tissue*
Antigen detection by fluorescent antibody technique (FAT)	– Ante-mortem and post-mortem diagnosis – Gold standard method	– Brain tissue* – Neck skin biopsy (not accurate)
Virus isolation	– Ante-mortem and post-mortem diagnosis – High specificity but low sensitivity	– Saliva – CSF – Brain tissue*
Antibody detection by rapid fluorescent focus inhibition test	– For detection of antibody response from vaccination – Low sensitivity – Can be used as diagnostic test if no history of rabies vaccination in that patient	– EDTA blood – CSF

RT-PCR = reverse transcription polymerase chain reaction
NASBA = nucleic acid sequence based amplification
RT-LAMP = reverse transcription loop-mediated isothermal amplification
* Brain tissue can be obtained by autopsy or necropsy

WHO Recommendations for rabies post-exposure prophylaxis*

The indication for PEP depends on the type of contact with the suspected rabid animal:

- Category I – touching or feeding animals, licks on intact skin (i.e. no exposure);
- Category II – nibbling of uncovered skin, minor scratches or abrasions without bleeding;
- Category III – single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks, licks on broken skin, exposure to bats.

For category I contact no prophylaxis is required. For category II exposures, immediate post-exposure vaccination is recommended. For category III exposures, immediate post-exposure vaccination and administration of RIG are recommended. For categories II and III, thorough washing and flushing of all bite wounds and scratches (for about 15 minutes) with soap or detergent and copious amounts of water should be done immediately, or as early as possible. When it is impossible to complete PEP with the same CCV, another CCV should be used instead. However, since no study has been done yet on vaccine immunogenicity following changes in the route of vaccine administration (for example, from intramuscular to intradermal) during PEP, such changes should be the exception.

PEP may be discontinued if the suspect animal is proved by appropriate laboratory examination to be free of rabies or, in the case of domestic dogs, the animal remains healthy throughout a 10-day observation period starting from the date of the bite.

Factors that should be taken into consideration when deciding whether to initiate PEP include the epidemiological likelihood of the implicated animal being rabid, the category of exposure (I–III) and the clinical features of the animal, as well as its availability for observation and laboratory testing. In most situations in developing countries, the vaccination status of the implicated animal alone should not be considered when deciding whether to give or withhold PEP.

Intramuscular administration for PEP

The post-exposure vaccination schedule is based on injecting 1 ml or 0.5 ml (the volume depends on the type of vaccine) into the deltoid muscle (or anterolateral thigh in children aged <2 years) of patients with category II and III exposures. The recommended regimen consists of either a five-dose or a four-dose schedule:

(1) Essen Protocol: the five-dose regimen prescribes one dose on each of days 0, 3, 7, 14 and 28;

(2) Zagreb protocol: the four-dose regimen prescribes two doses on day 0 (1 in each of the 2 deltoid or thigh sites) followed by one dose on each of days 7 and 21.

An alternative for healthy, fully immunocompetent, exposed people who receive wound care *plus* high-quality RIG *plus* WHO-prequalified rabies vaccines, is a post-exposure regimen consisting of four doses administered intramuscularly on days 0, 3, 7 and 14.

Intradermal administration for PEP

The two-site regimen prescribes injection of 0.1 ml at two sites (deltoid or thigh) on days 0, 3, 7 and 28. This regimen may be used for people with category II and III exposures in countries where the intradermal route has been endorsed by the national health authorities.

PEP for previously vaccinated individuals

For rabies-exposed patients who can document previous complete pre-exposure vaccination or complete prior PEP with a CCV, one dose delivered intramuscularly or intradermally on days 0 and 3 is sufficient. RIG is not indicated in such cases. This one-site, two-day intradermal or intramuscular regimen also

applies to people vaccinated against rabies who have demonstrated rabies-virus neutralizing antibody titres of ≥0.5 IU/ml. As an alternative to this regimen, the patient may be offered a single-visit four-site intradermal regimen consisting of four injections of 0.1 ml equally distributed over left and right deltoids or prescapular areas. Vaccination cards recording previous immunizations are invaluable for making correct decisions.

Immunization of immunocompromised individuals

In immunocompromised individuals including patients with human immunodeficiency virus (HIV) or acquired immune deficiency syndrome (AIDS), a complete series of five doses of intramuscular CCV in combination with comprehensive wound management and local infiltration with human RIG is required for patients with category II and III exposures. When feasible, the rabies-virus neutralizing antibody response should be determined 2-4 weeks following vaccination to assess the possible need for an additional dose of the vaccine.

Rabies immunoglobulin (RIG) for passive immunization

RIG for passive immunization is administered only once, preferably at, or as soon as possible after, the initiation of post-exposure vaccination. Beyond the seventh day after the first dose, RIG is not indicated because an active antibody response to the CCV is presumed to have occurred. All of the RIG, or as much as anatomically possible (but avoiding possible compartment syndrome), should be administered into or around the wound site or sites. The remaining immunoglobulin, if any, should be injected intramuscularly at a site distant from the site of vaccine administration. RIG may be diluted to a volume sufficient for all wounds to be effectively and safely infiltrated.

*World Health Organization (2005): WHO Expert Consultation on Rabies. WHO Technical Report Series 931. First Report. Geneva

Annex 3

Defining country-specific strategies

As rabies is a public health issue, it is the mandate of the Ministry of Health to lead this effort. However, successful implementation of a national rabies control programme requires a multi-stakeholder approach with involvement of the local government, department of livestock/agriculture, NGOs and civil society. National strategies should be planned with clear definitions of the roles and responsibilities of each of the different sectors involved.

Many rabies-endemic countries have set targets for rabies control and subsequent elimination. The strategies and approaches used in each country vary due to many factors including policy, incidence of disease, geography, religion, attitude of people in the country, etc. It will be necessary to harmonize planning and implementation of rabies elimination activities through intercountry and regional cooperation.

Sustained and continuous political commitment

Political commitment is essential for elimination programmes based on multidisciplinary and multisectoral approaches. An Intersectoral Coordination Committee should advocate with policy- and decision-makers for political commitment and funding of the national comprehensive rabies elimination programme. It is necessary to use regional forums such as ASEAN and SAARC to achieve political commitment for regionally coordinated activities.

Assigning of roles and responsibilities to each sector

Rabies elimination is a multidisciplinary, multisectoral and multidimensional activity which requires close coordination, collaboration and partnership with various agencies. This is possible if roles and responsibilities of each agency are

well defined. It is important to synergize action, avoid duplication and promote better understanding at all levels. An outline of roles and responsibilities for the agencies concerned is highlighted in Table 2.

Table 2: Possible role of different agencies for effective prevention and control of rabies

Agency	Possible Roles for Rabies Prevention and Control
1. Joint Monitoring Committee	
High-level committee with bureaurocrats and officials from: Ministry of Health Ministry of Agriculture/Livestock Ministry of Finance Ministry of Interior Ministry of Local Government	Monitoring and Evaluation of National Rabies Control/Elimination Programme
2. Public Health component	
Ministry of Health • Central and state health departments along with local civic bodies	Formulation and implementation of strategy for control of rabies in humans • Training of health professionals • Ensuring availability of rabies vaccines and RIG • Ensuring appropriate PEP • Ensuring pre-exposure prophylaxis for high-risk groups
3. Animal Health component	
Ministry of Agriculture/Livestock and local civic bodies/Ministry of Animal Health: • Animal Health • Animal Husbandry • Animal Welfare Boards • NGOs	Formulation and implementation of canine rabies control • Dog census • Vaccination • Dog population control • Legal framework for rabies control and notification • Registration and licensing of dogs • Notification of rabies cases

Agency	Possible Roles for Rabies Prevention and Control
4. Intersectoral coordination and interfacing for sharing of resources for both components	
Ministry of Information and Communication Ministry of Health Ministry of Agriculture/Livestock Ministry of Environment and Forest Local Civic Bodies NGOs Community Representatives	IEC Creating awareness in general community • Animals transmitting rabies • First aid at home • Availability of anti-rabies centres • Responsible dog ownership • Participation in mass dog vaccination campaigns • Ongoing programmes on prevention and control of rabies
Professional bodies	Joint training of public health and animal health professionals through continuing medical education/seminars/conferences
National Laboratories (public health and animal health sector)	Laboratory diagnosis of rabies in humans and animals
Council of Medical Research Council of Agriculture/Livestock Research	Operational research on human rabies Operational research on animal rabies
Ministry of Law and Justice	Legislation for dog control
Local civic bodies/authorities	Habitat control and waste management
Ministry of Finance NGOs: National and international	Funding • Public health component • Animal health component

The composition of the intersectoral coordination committee may be proposed as follows:

Joint Monitoring Committee/Intersectoral Coordination Committee

Secretary, Ministry of Health	Co-chair
Secretary, Ministry responsible for animal health	Co-chair
Secretary, Ministry of Finance	Member
Director-General of Health Services	Member
Director-General, Department of Livestock Development	Member
Director-General, Council of Medical Research	Member
Director-General, Council of Veterinary Research	Member
Joint Secretary, Ministry of Home Affairs	Member
Joint Secretary, Ministry of Local Government	Member
Joint Secretary, Ministry of Environment/Wildlife	Member
Representative of Civic Bodies involved in rabies control	Member

Director, focal agency for control of rabies in humans: Member Secretary

Representatives of WHO, OIE, FAO and animal welfare organizations may be invited.

Term of reference

- To identify focal centres for carrying out prevention and control of rabies
- To establish an institutionalized mechanism for policy development for prevention and control of rabies
- To set targets and indicators for elimination of human rabies and approve a National Comprehensive Rabies Elimination Programme
- To coordinate funding for a National Comprehensive Rabies Elimination Programme
- To review progress in programme implementation
- To formulate advisories on technical matters
- To coordinate with national and international agencies supporting rabies elimination activities

Human health component

Focal centre: Ministry of Health – Formulation and implementation of strategy

Implementing agencies: Centre, state/province- and district-level health institutions/local civic bodies

Creating awareness in general community:

Focal agency: To prepare prototype material focusing on:

- Dogs transmitting rabies
- First aid after a dog bite
- Importance of timely and appropriate treatment
- Location of anti-rabies clinics
- Responsible dog ownership
- Behaviour towards dogs to avoid attacks

Implementing agency: To translate into local languages and disseminate the information by appropriate mechanisms to reach the community.

Training of professionals

Focal agency

- To prepare country-specific guidelines for rabies prophylaxis based on WHO recommendations
- To provide training on appropriate dog bite management to core trainers identified by states/provinces.

Implementing agency: Core trainers to provide training to all doctors and paramedical staff, including Accredited Community Health Workers, on appropriate dog bite management up to PHC level.

Implementation of cost-effective IDRV

Focal agency

- Mentor implementation of IDRV
- Approve appropriate vaccines for IDRV

Implementing agency: Implementation of IDRV in major anti-rabies clinics

Ensuring availability of safe and effective anti-rabies vaccines and RIG:

Focal agency

- Phase out production and use of NTVs
- Ensure production/import of quality CCVs and RIG
- Establish post-marketing surveillance mechanism

Implementing agency: Ensure availability of adequate quantity of vaccines and RIG at anti-rabies centres and PHCs

Strengthening surveillance

Focal agency

- Identify methods of data collection and information flow from periphery to centre
- Preparation of format for data collection on dog bite and human rabies cases
- Collection, collation and compilation of data
- Sharing of data with animal health departments
- Sharing of data with national and international agencies

Implementing agency

- Timely collection of data as per formats
- Regular transmission of data

Operational research

Focal agency: Identify priority areas of research as per country needs. Operational research may be considered for the following issues:

- Shorter schedules of PEP immunization, combination vaccinations, passive immunization, alternative biologicals
- Needle biopsy of brain tissue for diagnosis
- Health-seeking behaviour for dog bite management and rabies prophylaxis

Pre-exposure immunization in high risk groups

Encouragement of pre-exposure rabies immunization for high-risk groups

Animal health component

Mass vaccination of dogs

Focal agency (national/provincial/state)

- Develop a national strategy for canine vaccination
- Develop protocol to implement the strategy, e.g. dividing localities in a city among local governments and NGOs
- Coordinate mass dog rabies vaccination campaign
- Promote intercountry collaboration for sharing good practices and cross-border rabies control

Implementing agency

- Plan vaccination campaigns in localities to be completed in a specified time, covering at least 70% of the dog population
- Dog population census of area as per defined methods (WSPA guidelines) or calculations as per human–dog population
- Ensure adequate availability of effective CCVs
- Identify and train dog catchers

- Adopt innovative methods of vaccine inoculation, e.g. use of autoplungers (as used in Sri Lanka)
- Adopt innovative methods to encourage communities to present community dogs for rabies vaccination and sterilization
- Launch widespread awareness campaigns in the locality prior to vaccination camps
- Identify methods of identifying vaccinated dogs in the locality (application of bright colour such as malachite green/indigo blue) that can be seen from a distance
- Carry out annual vaccine camps in the same area
- Creation of immune belts across wildlife parks and reserves through dog rabies immunization

Dog population management

Focal agency: To develop a strategy for dog population management and define the appropriate methods for that area.

Implementing agency

- Plan sterilization camps in localities to be completed within a specified time, covering at least 70% of dog population
- Dog population census of area as per defined methods (WHO/WSPA, 1990: Guidelines for Dog Population Management. WHO/ZOON/90.165. WHO, Geneva,116 p.) or calculations as per human–dog population
- Ensure adequate availability of equipped mobile operation theatres
- Ensure adequate availability of vaccines to immunize all dogs caught for sterilization
- Ensure adequate availability of trained veterinary doctors
- Identification and training of dog catchers
- Adopt new/innovative methods of surgical sterilization
- Adopt methods of chemical sterilization

- Adopt innovative methods to involve the community to bring in community-owned dogs to vaccination camps
- Launch widespread awareness campaigns in the locality prior to the campaigns
- Identify permanent methods of identifying sterilized dogs in the locality (e.g. ear notching) that can be seen from a distance.
- Carry out regular sterilization campaigns in the same area

Ensuring availability of safe and effective anti-rabies vaccines:

Focal agency

- Phase out production and use of NTVs for animals
- Prepare guidelines for dog vaccination as per OIE standards (Annex 4).
- Ensure production/import of quality CCVs including utilization as per OIE dog rabies vaccine standards.
- Establish post-marketing surveillance mechanism

Implementing agency: Ensure availability of an adequate quantity of vaccines for veterinary anti-rabies centres/NGOs/campaigns.

Strengthening surveillance and response

Focal agency

- Identify methods of data collection and information flow from periphery to centre
- Preparation of format of data collection of rabies in animals
- Collection, collation and compilation of data
- Sharing of data with public health department
- Sharing of data with national and international agencies
- Develop joint rapid response to rabies outbreaks

Implementing agency

- Timely collection of data as per formats
- Regular transmission of data
- Ensure submission of brain samples from suspected rabid dogs to the designated laboratory for confirmation

Operational research

Focal agency: Identify priority areas of research which may include:

- Dog ecology and population dynamics
- Social perception and sociocultural behaviour in relation to dogs and rabies
- Innovative, simple and cost-effective techniques for rabies diagnosis
- Needle biopsy of canine brain tissue for diagnosis
- Antigenic characterization of rabies viruses in dog and wildlife
- Innovative techniques for mass dog vaccination
- Community mobilization for rabies control
- Antibody response among vaccinated dogs
- Responsible dog ownership
- Evaluation of impact of animal birth control methodologies on dog population and dog behaviour
- Cost-effective tools for dog population management such as immunocontraception
- Humane methods of euthanizing sick dogs

Information, education and communication

Focal agencies: Human health and animal health agencies should jointly organize and prepare IEC material in collaboration with Ministry of Information and Communication, Ministry of Health, Ministry of Agriculture/Livestock, Ministry of Environment and Forest, local civic bodies, NGOs and community representatives**.** IEC should focus on species transmitting rabies, appropriate

wound management, importance of timely and appropriate treatment, location of anti-rabies clinics, responsible pet ownership, behaviour towards dogs, waste management, habitat control, etc.

Dissemination of the IEC in local languages will be most helpful in creating awareness among the general population. Hoardings and posters at strategic locations along with other innovative methods like messages on electronic media, endorsement by celebrities, radio jingles between popular programmes and displays in public transport are effective means as has been demonstrated in many countries.

Material may be drafted for the education of schoolchildren in the form of posters, films etc., or incorporated into the school syllabus in consultation with Ministry of Education.

Observing Rabies Day/Week or Month, when activities can specifically be focused on prevention and control of rabies, would also aid in creating awareness in the general community.

Joint seminars

Joint seminars of all the sectors should be organized for better understanding of the disease, sharing of experiences and development of intersectoral coordination. Review of rabies control activities and sharing epidemiological and surveillance data and good practices should be encouraged through various workshops and seminars. World Rabies Day (28th September) may be an appropriate time to organize such workshops at national, regional and district levels.

Laboratory strengthening

Laboratories undertaking diagnosis of rabies should undertake diagnosis both of human and animal rabies. Training in laboratory diagnostic techniques may be provided by identified laboratories. Laboratories will play an important role in disease surveillance, characterization of rabies viruses, seromonitoring of vaccinated dogs, decision-making for human rabies PEP and research.

Training of field staff on proper sample collection and transportation, supply of quality diagnostic reagents and validation of diagnostic tests should be institutionalized. dRIT should be introduced for rabies diagnosis at the field level and there should be provision for cross-verification of test results when rapid

diagnostic tests are used at field level. Non-invasive, postmortem needle biopsy of brain tissue is encouraged for diagnosis in humans as well as animals.

Networking of rabies laboratories and internal and external quality assessment of rabies laboratories should be promoted and sustained.

Legislation

The Ministry of Law and Justice in consultation with the Ministry of Health, Ministry of Agriculture/Livestock and local civic bodies should formulate regulations for the prevention and control of rabies in dogs and humans. Law enforcement is a complex challenge and support of the police, administration and local government is essential. Introduction of new legislation needs to have the support of the public. Adequate precautions should be taken to avoid discouraging the public from participating in control measures.

Solid waste management

Regulations for solid waste management should be formulated and enforced. Awareness should be created in the general community to collect and discard waste in bags. Municipal dustbins for waste collection should not be accessible to dogs.

Mobilization of human and financial resources

In addition to that from national governments, funds for the control of rabies should be sought also from the private sector, national NGOs and international funding agencies.

Annex 4

Declaration of rabies-free status as per OIE guidelines

A country or territory may be considered free from rabies when:

(1) The disease is notifiable;

(2) An effective system of disease surveillance is in operation;

(3) All regulatory measures for the prevention and control of rabies have been implemented, including effective importation procedures;

(4) No case of indigenously acquired rabies virus has been confirmed during the past two years. However, this status would not be affected by the isolation of bat Lyssavirus;

(5) No imported case in carnivores has been confirmed outside of a quarantine station for the past 6 months.

World Organisation for Animal Health. Rabies. In: World Organisation for Animal Health. Terrestrial animal health code. 2 vol. Paris: OIE, 2011. http://web.oie.int/eng/normes/mcode/en_chapitre_1.8.10.pdf - accessed 7 Aug 2012.

Dog bites are the primary source of human infection in rabies-endemic countries and account for 96% of rabies cases in the South-East Asia Region. Elimination of human rabies is dependent on elimination of dog rabies. Some countries have a comprehensive rabies control programme but it is a neglected area in others. New innovative tools and techniques have been developed in recent years to improve dog vaccination coverage, dog population management and accessibility of modern rabies vaccines. Considering the importance of consolidating achievements in rabies control in Member countries, the WHO Regional Office for South-East Asia has developed a regional strategy for elimination of human rabies transmitted by dogs in the Region. The strategy aims to eliminate human rabies through progressive control of dog rabies and human rabies prophylaxis in rabies-endemic countries and to maintain the rabies free status in rabies-free areas of the South-East Asia Region by 2020.

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