

# Elimination of Rabies in Bangladesh

## Strategy Plan

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Directorate General of Health Services  
Ministry of Health and Family Welfare  
**Government of People's Republic of Bangladesh**

## ***Strategy Plan: Elimination of Rabies in Bangladesh, 2010***

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## Foreword

Rabies, a zoonotic viral disease and continues to be a public health problem in Bangladesh. It is estimated that more than 2000 people die of Rabies and more than 300,000 persons take post-exposure treatment. But the exact magnitude of problem is much more & alarming . About 300- 500 animal bite cases come to outdoor daily and about 150 cases of human rabies are admitted to the Infectious Disease Hospital, Dhaka (IDH) every year but a large number patients could not be admitted because of lack of treatment facilities.

Government of Bangladesh is determined to eliminate rabies by controlling rabies in animal specially dog and cat, preventing animal bite, providing post exposure prophylaxis and to make available modern anti rabies Tissue Culture Vaccine (TCV) in public sector.

To operationalise the introduction of cost-effective vaccine prophylaxis, adequate treatment care and appropriate logistic and medicinal support there is an urgent need to develop national strategy for planning and implementation of activities required for elimination of rabies in Bangladesh. Director, Disease Control convened expert group meeting and framed this Strategy plan. I congratulate Director, Disease Control and expert contributors for bringing out this strategy plan.

I am very optimistic that this Strategy Plan will be extremely useful for concerned sectors to make decision, plan and to take implementation program to control and eliminate rabies in Bangladesh.

Prof. Dr. Shah Monir Hossain

Director General of Health Services

Bangladesh

## PREFACE

Rabies, a neglected zoonotic disease has been killing an estimated 2000 people annually. This is a fatal disease but hundred percent preventable by timely and appropriate post-exposure treatment. Based on vaccine utilization approximately 300,000 people receive post-exposure treatment yearly. High cost and inadequate supply are limiting factors for its wider use. A need is felt to have a government strategy to prevent animal bite, proper management of bite, and thus to prevent death from rabies.

In comparison to other communicable disease, rabies being a completely preventable but incurable disease needs to be given special attention with modern ways and means. So, it is a very high time to look into the matter with special attention to control and then to eliminate this public health problem in Bangladesh.

An expert group meeting was held at IEDCR, Dhaka to formulate the strategy plan with participants including policy makers, administrators, practitioners managing anti-rabies clinics, laboratory medicine specialist, public health experts from both public and private sector. The Strategy from the consensus deliberations of the expert group, have been brought out in this publication.

It is sincerely hoped that this strategy plan will help in decision making, planning, implementation, monitoring and evaluation of Rabies control activity in human as well as animal health sectors. It will also show a way out to LGRD and other NGOs and private sectors to overcome the obstacles to provide essential services to poor rabies victims. It is the strategy of health sector that Rabies program will ensure better management of animal bite cases, availability of modern rabies cell culture vaccine for all to prevent rabies, and availability of appropriate care support, logistics and medicine for poor rabies cases.

We are grateful to all resource persons who worked hard in developing this document.

Prof. Dr. Moazzem Hossain

Director, Disease Control

Directorate of Health Services, Bangladesh

## abbreviations

WHO – World Health Organization  
PEP- Post-exposure Prophylaxis  
IDH- Infectious Disease Hospital  
NTV- Nerve Tissue Vaccine  
CCV- Cell Culture Vaccine  
ERIG- Equine Rabies Immunoglobulin  
ID-Intradermal  
IDRV- Intradermal Rabies Vaccination  
EPI-Expanded Programme of Immunization  
HDCV- Human Diploid Cell Vaccine  
PVRV- Purified Vero Cell Rabies Vaccine  
PCECV- Purified Chick Embryo Cell Vaccine  
TRC-Thai Red Cross  
HRIG-Human Rabies Immunoglobulin  
PCR-Polymerase Chain Reaction  
IEC-Information, Education and Communication  
BCC-Behavior Change Communication  
SOP- Standard Operating Procedure  
NGO- Non-Government Organization  
PM-Program Manager  
DPM-Deputy Program Manager  
DGHS-Director General of Health Services  
MoHFW- Ministry of Health and Family Welfare  
TWG-Technical Working Group  
HNPSP- Human Nutrition and Population Sector Program  
DLS – Department of livestock Services  
LGD - Department of Local Government  
LGRD - Local Government of Rural Development  
UHC - Upazilla Health Complex  
RIA – Rabies in Asia Foundation  
FAO – Food and Agriculture Organization  
ARC – Alliance for Rabies Control  
AREB- Asian Rabies Expert Bureau

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## 1. Introduction

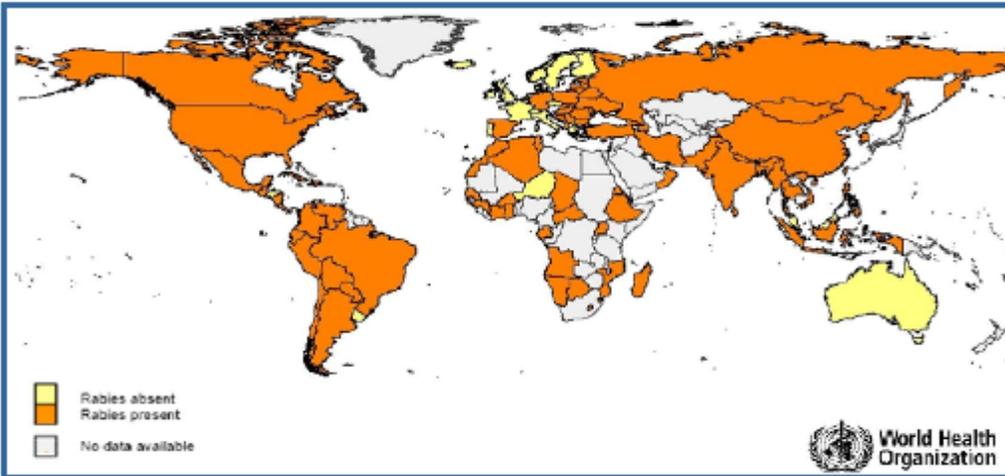
Rabies, a dreadful zoonotic disease caused by bullet shaped single stranded enveloped RNA viruses in the Family *Rhabdoviridae*; Genus *Lyssavirus*, with horrifying symptoms. After entering the central nervous system of the host, the virus causes an acute, progressive encephalomyelitis that is almost always 100% fatal but 100% preventable. The disease is transmitted from animal to animal or from animal to human. Human infection by rabies virus usually occurs as a result of transdermal bite or scratch from an infected animal. Other modes of transmission from animals to humans are possible, for example, when infectious material such as saliva from a rabid animal comes into contact with a victim's mucous membranes (mouth, nose, eyes) or fresh skin lesions. Although transmission has also been reported to have occurred through inhalation of virus-containing aerosols, however this mode of transmission is extremely rare. In addition, man-to-man transmission through transplantation of tissue and two anecdotal cases of transmission through a bite have been reported.

Though rabies is such a horrifying, fatal and incurable disease, it is still neglected in many developing countries due to involvement of many stakeholders, complexity of rabies control programme and dog population management. Minimum initiative has been taken for this deadly disease and most of the attention and resources are being spent to some glamorous diseases. Compared to other communicable diseases, when death is not inevitable, rabies has got much less attention. One of the reasons for rabies being a neglected disease is that it is a disease that occurs in the extremely poor population and there is no advocate for them, In comparison to other communicable disease, rabies being a completely preventable but incurable disease needs to be given attention. There are modern ways and means being developed and practiced right now. So, it is very high time to look at the matter with special attention to prevent and eliminate this disease as a public health problem from Bangladesh.

## 1.1 Global Situation

Although rabies is 100% preventable, this fearful disease still claims over 55,000 human lives annually with one victim dying every 10 min. Most of the victims are children and most of the death occurs in Asia and Africa. None of these deaths need have occurred as all of the tools required to prevent rabies are available.

### Presence/Absence of rabies worldwide 2006



SOURCE: The WHO essential rabies map web page. Available from: URL:[http://www.who.int/rabies/rabies\\_maps/en/](http://www.who.int/rabies/rabies_maps/en/). Accessed 04/2008

In the recent years many developed countries have completely eradicated rabies and the others have reduced its incidence to the minimum level. This has happened in Asian countries such as Malaysia, Japan and Taiwan a longtime ago ( e.g. in Japan 1957) through implementation of strict control measures. Tables show below the rabies free countries in world and animal reservoir of rabies

**Table 1: Countries and territories reported to be free of Rabies  
(World survey of Rabies, WHO 1994)**

<b>AFRICA</b>	<b>ASIA</b>	<b>OCEANA</b>	<b>AMERICA</b>	<b>EUROPE</b>
Cape Verde	Bahrain	Cook Islands	Antigua and Barmuda	Albania
Congo	Cyprus	Fiji	Bahamas	E.Y.R. of Macedona
Libya	Hong Kong	French Polynesia	Barbados	Finland
Mauritius	Japan	Guam	Belize	Gibraltar
Reunion	Malaysia	New Caledonia	Falkland	Greece
Seychelles	Maldives	New Zealand	Jamaica	Iceland
	Qatar	Papua New Guinea	Saintkitts and Nevis	Isle of Man
	Singapore	Samoa	Trinidad and Tobago	Malta
	Lakchyadeep, Andaman and Nicobar islands of India	Solomon Islands	Uruguay	Norway (except Svalbard and isl.)
	Timor-Leste	Vanuatu		Portugal
	Australia			Spain (except centa + Melilla)
				Sweden
				United Kingdom

**Table 2 : Worldwide animal reservoirs of rabies**

**Principle animal vectors of rabies:**

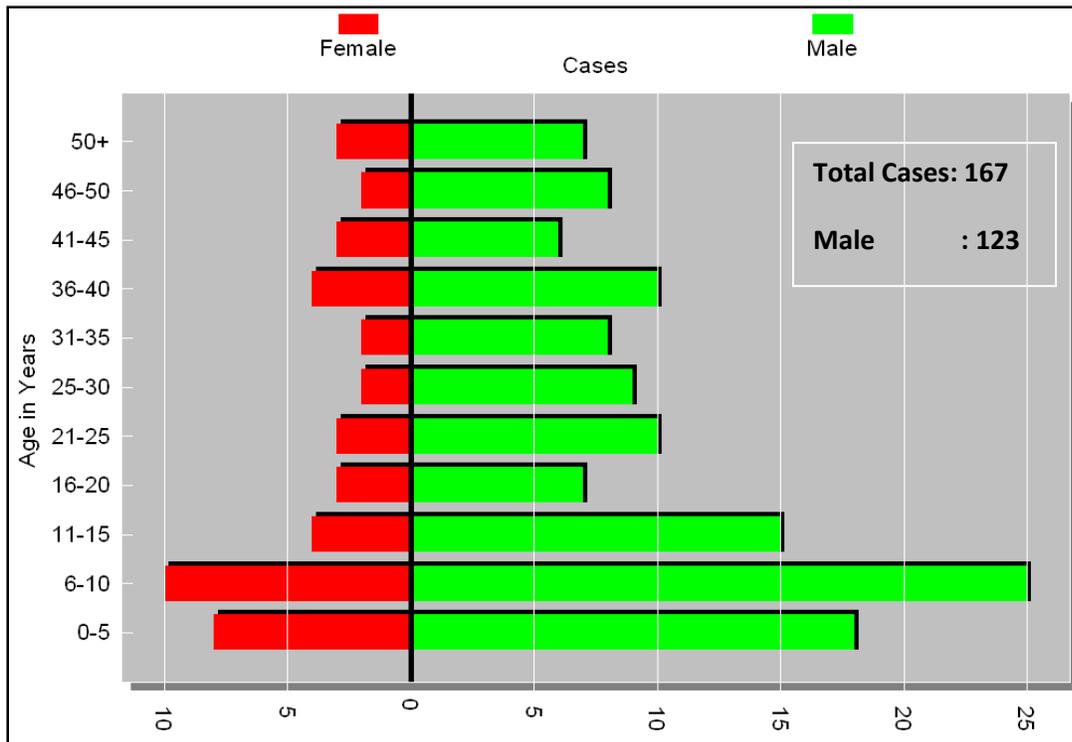
<b>Continent</b>	<b>Major Vectors</b>
<b>Asia</b>	<b>Dogs, cats, monkeys, mongooses, arctic foxes</b>
<b>Africa</b>	<b>Dogs, jackals, mongooses, foxes</b>
<b>Latin America</b>	<b>Dogs, bats</b>
<b>North America</b>	<b>Skunks, raccoons, foxes, bats</b>
<b>Caribbean</b>	<b>Mongooses</b>
<b>Eastern Europe</b>	<b>Foxes, dogs, bats</b>
<b>Western Europe</b>	<b>Foxes, bats</b>

Source : Plotkin SA. Rabies. Clin Infect Dis. 2000;30(1):4-12. **10.** Lina PHC, Huston AM. Bat rabies in Europe: a Review.Dev Biol. 2006;125:245-54.

**1.2. Bangladesh Situation:**

Rabies is an important public health problem in Bangladesh and is at the top of the list among the zoonotic diseases. Since Bangladesh has got no well equipped centralized surveillance system, reliable data about the incidence of rabies, animal bites and use of Vaccines are difficult to get. According to WHO, 1550 people die of rabies and about 300,000 people are getting post- exposure prophylaxis (PEP) each year. More than thirty thousand animals are given post exposure anti rabies vaccine (According to vaccine supply). The number of post-exposure prophylaxis with vaccine is increasing in human and animal every year. A recent survey by Disease Control Unit (2007) shows that number of rabies death is more than 2000 per year and recent vaccine consumption shows post-exposure vaccination is taken by more than 3,00,000 person per year and a good number of victims of animal bite remains untreated. In Bangladesh dog is the main transmitter of the disease but cats and jackals also involved in rabies transmission.

### Age & sex wise distribution of Rabies cases attended at IDH, Dhaka in 2006



The above chart reveals that maximum cases occurred in children and young age group.

Bangladesh is a developing country having a low per capita income and the mass population cannot afford the modern tissue culture vaccine. The country is producing phenolised sheep brain vaccine i.e Nerve Tissue Vaccine (NTV) and consuming a large amount of vaccine. Few people also use modern tissue culture vaccine. In national vaccination program, only the Sheep brain vaccine (NTV) is supplied for post-exposure prophylaxis. The other two types of Modern Cell culture vaccines (CCV) are imported by the private sectors. Very few doses of Equine Rabies Immuno Globulin (ERIG) are being used. In Bangladesh there is no organized rabies control program. Use of NTV is discouraged by WHO and requested the Member countries to phase out because of its neuroparalytic effect and low antigenicity. Except Bangladesh, Myanmar and Pakistan in Asia, all of the countries have already discontinued the production and use NTV. But in Bangladesh no attempt has yet been taken to discontinue this unsafe and low potent vaccine. NTV is supply with subsidized rate but yet it is not sufficiently available. So, the hardcore poor sometimes fails to get that treatment also.

## **2. Goal and Target**

### **2.1 Goal:**

To eliminate dog mediated Human rabies in Bangladesh.

### **2.2 Target:**

The target is to eliminate rabies by the year 2020.

- a. Short term target: 2010-2012:
  - i. Registration and vaccination of dogs  
Procurement, supplies and staff training and activity including piloting of Intradermal (ID) vaccine (IDRV) in IDH for human rabies
- b. Mid term target: 2012-2016: Implementation of program with cell culture vaccine
- c. Long term target: 2015-2020: Manufacture of vaccine and Immunoglobulin locally

## **3. Objectives of Rabies Elimination Programme**

### **3.1 Impact objective:**

- a. To strengthen local and National capacity.
- b. To improve the effectiveness of the programme management with a focus on policy, planning and regulation
- c. To promote early and appropriate post-exposure prophylaxis to humans
- d. To plan and implement selective and suitable preventive measures for the reduction of incidence of human and animal rabies
- e. To conduct applied research and surveillance study for Rabies elimination.
- f. To reduce the risk of transmission of Rabies with particular attention for the vulnerable populations.
- g. To raise awareness among mass people about Rabies prevention and control

### **3.2 Process Objectives:**

- a. To strengthen the institutional capacity for rabies elimination through intersectoral coordination and collaboration between health, local government and Department of Livestock at all level.

- b. To ensure prompt post exposure prophylaxis of suspected rabid dog and other animal exposure
- c. To establish effective surveillance system in domestic, peridomestic and wild animal to identify incidences of rabies and molecular characterization of rabies virus
- d. To establish effective surveillance to identify suspected rabid animal exposure and human rabies cases
- e. To manage dog population through animal birth-control and environmental control measures and control of animal rabies through vaccination
- f. To do euthanasia of suspected rabid dog and animal
- g. To ensure community participation and multi-sectoral collaboration
- h. To conduct operational research on important elements of elimination program
- i. To raise awareness about Rabies through health promotional activities.

#### **4.Strategies of Rabies elimination programme**

Effective implementation of the strategy requires:

- a) Sustained political commitment from all levels and sectors of the government
- b) Rabies elimination programme should be an integral part of health, livestock and local government system
- c) Partnership of communities and NGOs in rabies control activity
- d) Adequate mobilization of human and financial resources.

Note: Rabies elimination can not be the isolated concern of the public health and animal health sectors. It is everybody's concern, and every one should contribute. It requires the partnership of community members and involvement of those engaged in education, the environment and community development.

#### **Five main strategy for rabies control and elimination:**

- A. Control of human rabies
- B. Control of animal rabies
- C. Effective disease and animal reservoir surveillance.
- D. Operational research
- E. Social mobilization and partnership.

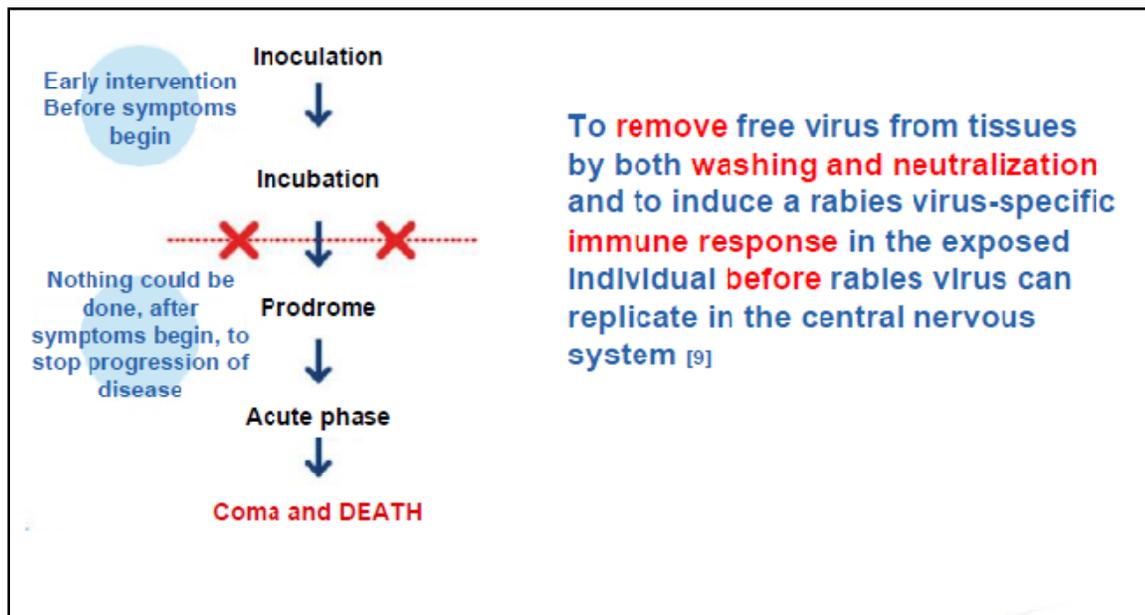
## 4.A. Control of Human Rabies

- I. Baseline survey on animal bite and rabies cases
- II. Early and appropriate post-exposure treatment to humans

### 4.A.II. Early and appropriate post-exposure treatment to humans.

Administration of rabies post-exposure prophylaxis is a medical urgency, but decisions must not be delayed.

#### Principle for Post-exposure Prophylaxis



Source : Plotkin SA. Rabies. Clin Infect Dis. 2000;30(1):4-12.

#### a. Immediate local wound management

#### b. Post Exposure Prophylaxis

- i. Local treatment of wound
- ii. Active immunization
- iii. Passive immunization (Use of immunoglobulin in class III bite)

#### 4.A.II.a Local Treatment of wounds

The eighth report of the WHO Expert Committee emphasized the importance of prompt treatment of all bite wounds and scratches that may be contaminated with rabies virus, even if the person presents after a prolonged period. Recommended first-aid procedures are immediate thorough flushing and washing of the wound with soap and water, detergent for 15 minutes or other substances of proven lethal effect on rabies virus. People who live in rabies infected areas should be educated in simple local wound treatment and warned not to use procedures that may further contaminate the wounds. If possible, suturing of wounds should be avoided; however, if suturing is necessary, anti-rabies immunoglobulin should be infiltrated around the wound. Other treatments, such as administration of antibiotics or anti-tetanus procedures, when indicated, should follow the local treatment.

#### PEP – Local wound treatment

**Aims to remove as much of the virus as possible from the site of inoculation by [3,18,19]**

- ▶ Physically removing virus particles
- ▶ Further inactivation of the remaining virions by chemical disruption
- ▶ Delay as much as possible the suturing of the wound

**IMMEDIATELY**

Vigorous washing and flushing of wound(s) with water and soap or detergent for about 15 minutes

**THEN**

Application of virucidal treatment such as alcohol (70%), tincture or iodine solution

Source: WHO Expert Consultation on Rabies, First report, Technical Report Series 931, 2005;1-121. **18.** Dutta AK, Kanwal SK. Rabies and its preventions. *Pediatrics today*. 1998;1(2):183-8. **19.** Bornpart F, Dutta AK, Wood SC. Rabies immunoglobulins in WHO category III Exposure. *Journal of APCRI*. 2000;1(2):7-11.

#### 4.A.II.b. Post-Exposure Prophylaxis (PEP):

##### WHO guide for Post-Exposure Prophylaxis

Category	Type of contact	Recommended treatment
I	Touching or feeding of animals Licks on intact skin	None, if reliable case history is available
II	Nibbling of uncovered skin Minor scratches or abrasions without bleeding	Administer vaccine immediately *
III	Single or multiple transdermal bites or scratches, licks or broken skin Contamination of mucous membrane with saliva (i.e. licks) Exposure to bats **	Administer rabies immunoglobulin and vaccine immediately *

Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121.

\*Stop treatment if dogs or cats remain healthy throughout an observation period of 10 days or if animal is euthanized and found to be negative for rabies by appropriate laboratory techniques

\*\*Post exposure prophylaxis should be considered when contact between a human and a bat occurred unless the exposed person can rule out a bite or scratch, or exposure to mucous membrane

##### Note:

1. Exposure to Rats, Rabbits and hares seldom if ever requires specific anti-rabies treatment
2. This observation period applies only for applied to dog and cats.
3. Except in the case of threatened or endangered species, other domestic and wild animals suspected as rabid should be killed humanely and their tissues examined using appropriate laboratory technique



Class III Category

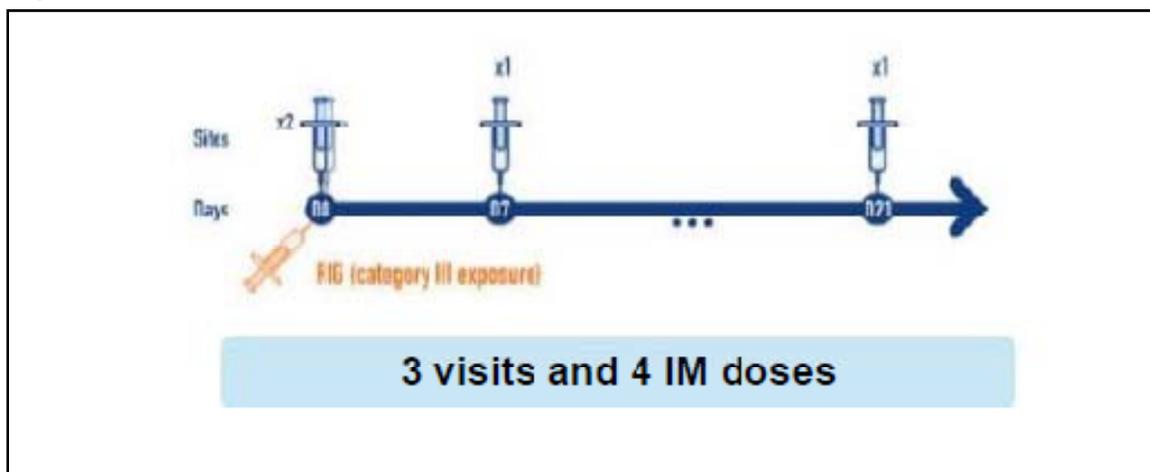
#### 4.A.II.b.1. Vaccines and Immunoglobulin

Tissue-culture or purified duck-embryo vaccines of potency at least 2.5 IU per single intramuscular immunizing dose should be applied according to **the following schedules.**

#### 4.A.II.b.2. Abbreviated multisite schedule (Intramuscular schedules Zagreb Schedule): 2-1-1( DO, D7 and D21)

In the abbreviated multisite schedule, the 2-1-1 regimen, one dose is given in the right arm and one dose in the left arm at day 0, and one dose applied in the deltoid muscle on days 7 and 21. The 2-1-1 schedule induces an early antibody response and may be particularly effective when post-exposure treatment does not include administration of rabies immunoglobulin.

##### Zagreb schedule (2-1-1)



Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121.

##### Note:

Reduced doses regimen

1. Two doses are given on day 0: one dose is given in deltoid region of the right arm and a second dose in the left arm
2. In addition one dose is given in the deltoid region on day 7 and an additional dose on day 21

#### 4. A.II.b.3. Intramuscular schedules ESSEN Schedule :1-1-1-1-1 (DO,D3,D7,D14 and D28)

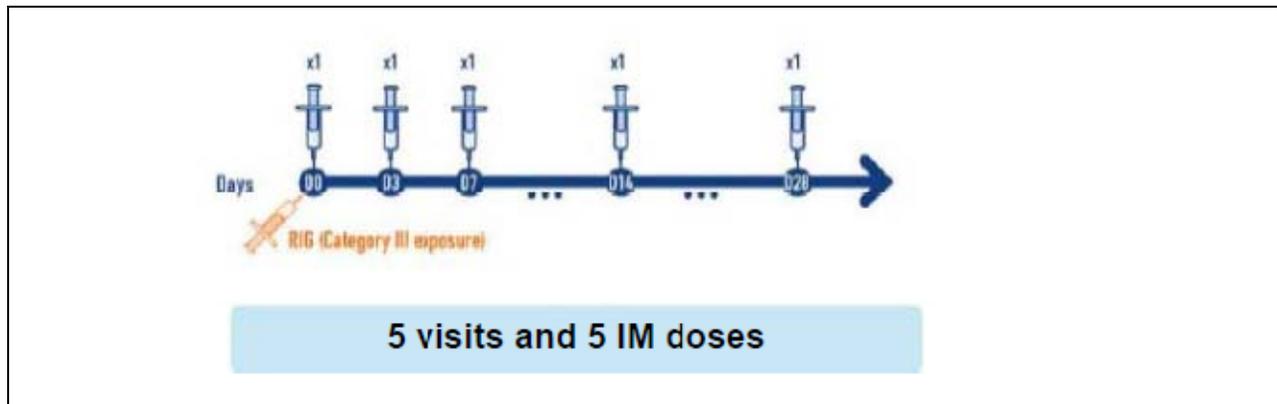
One dose of the vaccine should be administered on days 0, 3, 7, 14 and 28. All

intramuscular injections must be given into the deltoid region or, in small children,

into the anterolateral area of the thigh muscle. Vaccine should never be administered

in the gluteal region.

##### Essen schedule (1-1-1-1-1)



Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121

Note:

1. Cell derived rabies vaccine: inject one full dose (0.5mL / 1ml) intramuscularly into the deltoid muscle (or anterolateral part of the thigh in small children) on days 0,3,7,14 and 28 and never inject into the gluteal muscle

2. Immunoglobulins should be administered to all patients presenting with exposure to rabies-infected material onto mucous membranes or into transdermal wounds

Guideline for PEP1. **For category II injury:**

**Immunocompetent: Zagreb schedule**

**Immunocompromised: Essen schedule+ RIG**

**2. For category III injury**

**Immunocompetent: RIG+ Zagreb Schedule**

**Immunosuppressed: RIG+ Essen Schedule**

**4. A.II.b.4. Strategy for phasing out Nerve Tissue Vaccine (NTV): The followings are pre requisites for phasing out NTV**

- I. Availability of CCV in health complex, sadar hospital, pouroshava, municipal office and city corporation according to primary, secondary and tertiary care facilities.
- II. Access to EPI cold chain for supply and preservation
- III. ID schedule should be piloted during short term before implementing at national level.
- IV. IM schedule will be used at all other places where IDR V implementation is not feasible or possible.
- V. Promote Modern Cell culture vaccine (CCV)

#### 4. A.II.b.5 Intradermal (ID)schedule

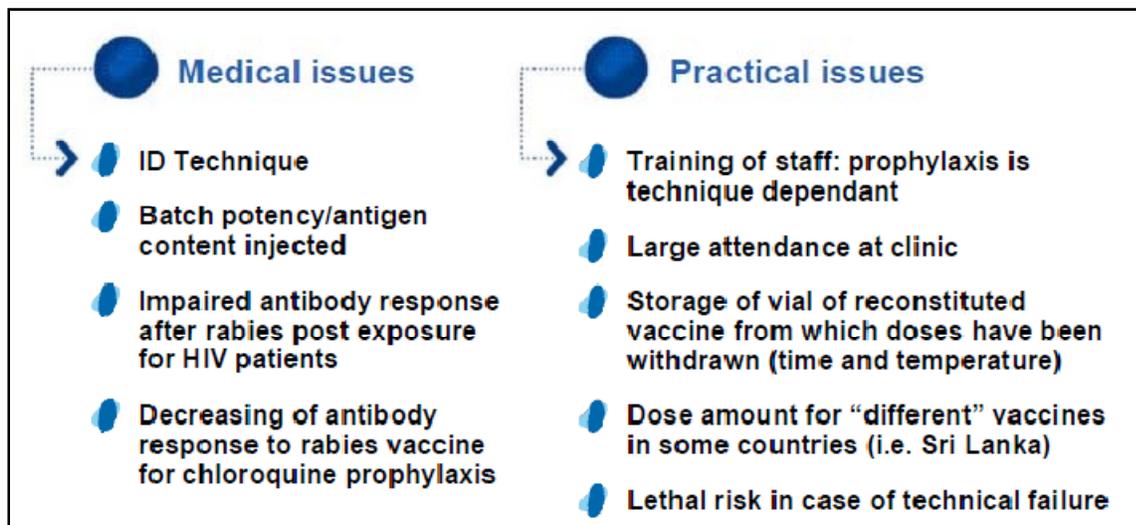
##### 4.5.a.Intra-dermal Rabies Vaccination.

#### Precaution for ID regimens

(Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121. **13.** Rabies vaccines WHO position paper. Weekly epidemiological record. 2007;82(49/50):425-36.)

1. Staff training
2. Conditions and duration of vaccine after reconstitution
  - a)The remaining doses may be kept in the vial at +2°C and +3°C after withdrawal of the 1st dose
  - b)To be used for another patient immediately or according to WHO recommendation to be used within 8 hours after reconstitution
3. Use of appropriate 1ml sterile syringes and a sterile needle for each withdrawal and for patient
4. Use of short intradermic sterile needles for each patient

#### Important issues to be considered while applying ID regimens



Source: Centers for disease control and prevention. Morbidity and Mortality Weekly reports. Available from: URL: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00056176.htm>. Accessed in 04/2008. **20.** Tantawichien T, Jaijaroensup W, Khawplod P, Sitprija V. Failure of multiple-site intradermal post-exposure rabies vaccination in patients with human immunodeficiency virus with low CD4+ T

lymphocyte counts. Clin Infect Dis. 2001;33(10):E122-4. **21.** Papaioanou M, Fishbein DB, Dressen DW, et al. Antibody response to pre exposure human diploid cell rabies vaccine given concurrently with chloroquine. N Engl J Med. 1986;314(5):280-4. **22.** Dodet B. Report of the third meeting of Asian Rabies Expert Bureau. APCRI Journal.2006;8(2):24-7.

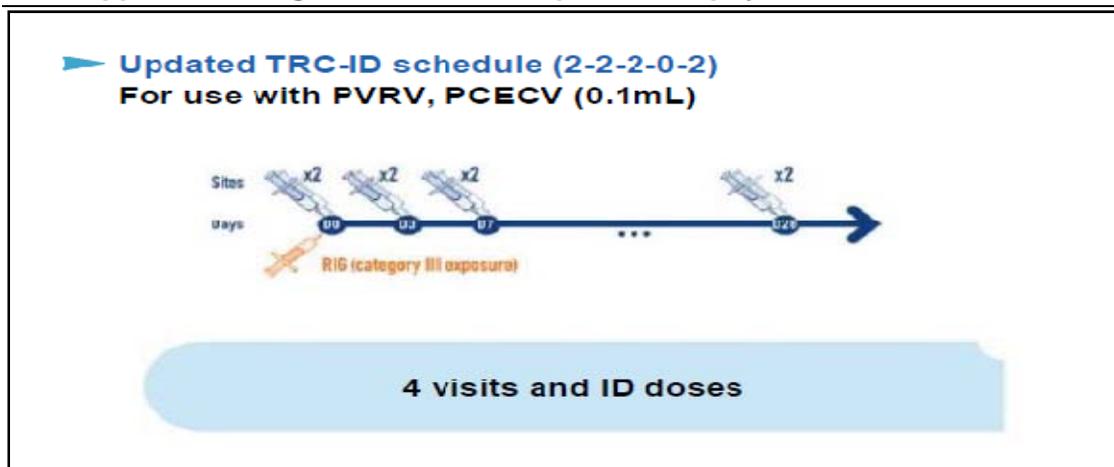
#### 4. A.II.b.5.1. Intra-dermal schedule

2-site intradermal method (Updated Thai regimen(2-2-2-0-2) for use with PVRV and PCECV will be used for convenience, effectively and safety on day 0,3,7 & 28 .

**Potency of approved vaccines:** The vaccines should have stated potency of > 2.5 IU per IM dose, irrespective of reconstituted volume. **The same vaccine is used for ID administration as per stated schedule. 0.1 ml of vaccine**, irrespective of reconstituted volume, is **administered per ID site** .

**Note:** The WHO recommended dose for IDRV is 0.1 ml per site irrespective of 0.5 mL (PVRV) or 1.0 mL (PCECV) I/M vaccination dose. In this sense, 1.0 ml (PCECV) is cost-effective. Different doses were used at the beginning but thorough investigation of using 0.1 ml per site was approved irrespective of manufacturer. One thing we have to remember, IDRV is based on skill of the medical practitioner and there may be chance of slipping ID to S/C or I/M which must be taken into account. Since rabies does not give second chance, vaccination failure will have major setback and long term effect in mind of medical practitioners.

#### WHO approved ID regimens for Post-Exposure Prophylaxis



Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121.

#### WHO approved rabies vaccines for ID RV regimen

Only the cell-derived vaccines that meet the WHO requirements regarding safety, potency and efficacy for this application may be considered for intradermal use.

Vaccine	Manufacturer
HDCV	Sanofi Pasteur
PVRV	Sanofi Pasteur

Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121.

#### 4.1.A b.2. Rabies immunoglobulin:

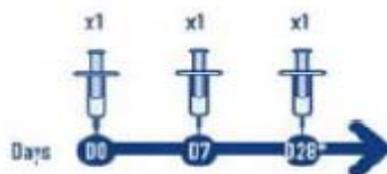
Rabies immunoglobulin should be given to all category III bites (exposure), irrespective of interval between exposure and beginning of treatment . Two kinds either equine rabies immunoglobulin(ERIG) or human rabies immunoglobulin(HRIG) can be used. A sensitivity test must be performed before administering ERIG. As much as possible of the recommended dose (20 IU / Kg.body wt. of HRIG and 40IU/ Kg.body wt. of ERIG ) should be infiltrated into and around wounds. The remainder should be administered I.M(in to gluteal region) in a single dose and followed by a complete course of vaccination. HIG should be used within 7 days of giving vaccine.

#### 4.1.A.II.c. Pre-Exposure Prophylaxis (PEP):

All persons at high risk of exposure, such as laboratory staff working with rabies virus, veterinarian, animal handlers and wildlife officers should take pre-exposure immunization. Immunization consists of three full intra-muscular injection of tissue culture vaccine on days 0,7 and 28. Periodic booster is recommended for person at continuing risk of exposure to rabies.

#### Pre-Exposure vaccination schedule

#### Primary course: according to WHO recommendations



Source: WHO Expert consultation on Rabies, First report, Technical Report Series 931, 2005;1-121.

IM injections in the deltoid muscle Or in anterolateral part of the thigh, if necessary (children) Or 0.1mL ID for WHO recognized rabies vaccines.

\* D28 injection may also be given at D21

#### 4.A.II.6. Treatment of confirmed rabies:

Rabies in humans inevitably ends in death. Efforts to treat the patients with rabies using vaccine, rabies immunoglobulin and other viral drugs are not successful. The clinical course of the disease, with either excitation or paralysis as the predominant symptom, is of short duration and entails much suffering. Patient remains conscious, often aware of the nature of their illness, and are usually extremely agitated and excited. This is exaggerated since they are isolated because of their perceived risk of transmission of

the disease through contact. Although rabies transmission from person to person has never been documented, it is theoretically possible since secretion may contain virus.

Nursing staff should therefore be informed about the potential risk of Contamination(especially during intensive care) and should wear goggles, mask and gloves. Patient should be sedated with appropriate tranquilizers. The nursing and medical staff should offer pre-exposure vaccination. If contamination does occur through the skin or mucous membrane, the nursing staff should receive post-exposure treatment. An comprehensive ICU at Infectious Disease Hospital( IDH) Dhaka will initially build up. Then gradually ICU facilities will be made available in all ID hospital and medical college hospital

#### **4.A.II.7. Diagnosis and immediate supportive management**

- Early diagnosis and supportive management would help to reduce the risk of transmission, morbidity and peaceful mortality.
- For early diagnosis and supportive treatment has to be undertaken in all district hospitals and Medical college hospitals
- It requires trained health care providers ( doctors, nurses, paramedics and field staff), diagnostic facilities and adequate supply of effective logistics and emergency medicines
- Patient management will be done at the Infectious Disease Hospitals of Bangladesh
- Rabies will be diagnosed based on clinical presentation and lab diagnosis. In certain percentage of cases, Viral isolation by culture or polymerase chain reaction (PCR) will be done for confirming the diagnosis

Treatment and management of the cases will be done according to the national guideline

#### **4.B. Control of animal Rabies**

##### **Animal rabies control measures: focus on Dog**

- I. Estimation of dogs population of Bangladesh and identification of source of stray dog
- II. improve health and welfare of owned and stray dog population;
- III. reduce numbers of stray dogs to an acceptable level through animal birth control;
- IV. promote responsible dog ownership;
- V. assist in the creation and maintenance of a rabies immune or rabies free dog population;
- VI. Environmental control of stray dogs by proper food waste disposal
- VII. Community participation through the establishment of community funds and mobilization of community volunteers during vaccination campaign should be promoted

**Steps: Dog rabies control measures might be effective by taking following steps**

#### 4. B.1. Identifying the sources of stray dogs

- a) Owned dogs that roam freely;
- b) dogs that have been abandoned by their owner, including puppies resulting from uncontrolled breeding of owned dogs;
- c) unowned dogs that reproduce successfully.

#### 4.B.2. Estimating the existing number, distribution and ecology

Practical tools that are available include registers of dogs, population estimates, and surveys of dogs, owners, community members, and veterinarians. The important factors relevant to the dog carrying capacity of the environment include food, shelter, water and human attitudes and behavior.

Established methodology should be used to estimate dog population throughout the country.

#### 4. B.3. Regulatory framework

A regulatory framework that would help authorities establish successful dog control programmes could include the following key elements:

- a) registration and identification of dogs
- b) licensing of dog pet animal breeders;
- c) vaccination against rabies and other preventive measures against zoonotic disease, as appropriate;
- d) veterinary procedures (e.g. surgical procedures);
- d) control of dog movement (national and international);
- e) control of suspected rabid dogs;
- f) regulations on the breeding and sale of dogs;
- g) environmental controls (e.g. abattoirs, rubbish dumps, dead stock facilities);
- h) animal welfare obligations of owners and authorities.

**Details are illustrated on Annexure II**

#### 4.C. Effective disease and animal (Dog) surveillance

- Surveillance comprises active and passive surveillance of human and animal bite and rabies cases and Dog surveillance.
- Effective surveillance will have to be ensured through organizing a system of data collection, regular reporting, analysis, review and feedback of information.

- Regular reporting and exchange of information should be organized upwards, downwards and laterally in the system that comprise government, private sector, NGOs and the community as partners.
- Mapping of the dog bite cases and dog density will be carried out through GIS mapping
- Periodical dog surveys to assess dog density, distribution, dog behaviour and susceptibility to vaccines will have to be done to plan dog control interventions.
- Post vaccine bioassay tests should be carried out to monitor the residual effect of vaccines on dog and as well as on human

#### **4.D. Operational Research**

Operational research will include the following issues:

- Estimation of disease burden and Dog density
- Assessment of best approaches to increase awareness about Rabies and its rabid animal
- Improving the healthcare seeking behavior of the affected population to maximize the utilization of available services for the diagnosis and treatment of human and animal rabies
- Pharmacovigilance of vaccines
- Evaluation of diagnostics, drugs and vaccines recommended for the Rabies elimination programme
- Evaluation of interventions for dog control Access to interventions for Rabies pt
- Maximizing utilization of all available resources for rabies elimination through effective public private partnerships
- Exploring the best mechanism to make the surveillance system responsive to specific situation that may prevail in an endemic area

#### **4.E. Social mobilization and building partnerships**

- Social mobilization and building partnership will be an integral part of the Rabies elimination programme.
- Community participation is necessary for early diagnosis and treatment compliance, effective vaccination and reduction of human dog contact.
- Partnerships and multisectoral collaboration among government, NGO and private sectors will be required for best utilization of the available resources.

- Advocacy is necessary to develop an enabling environment to influence political leaders, elected representatives, planners, policy makers, corporate sector, organized sectors, professional bodies and the media (both electronic & printing)
- A well designed IEC material & campaign will be launched to motivate people and raise their awareness for adopting preventive methods and seeking treatment early.
- Different appropriate methods and media will be used for dissemination of messages to the community effectively.

#### **4.E.1. IEC programme for rabies elimination:**

- Identify the current problem regarding rabies control and prevention.
- Describe the job needed to solve the existing problem while preventing and controlling rabies.
- Desired level of performance needed for the job in terms of knowledge, skill and practices addressed towards both trainee and the participants of the community.
- Prioritize the needs according to the performances.
- Formulate specific training objectives to achieve the goal.
- Formulation of standard training programme according to the set objectives and followed by evaluation of the training to implement the desired programme efficiently.

#### **4.E.2 Behavior Change Communication (BCC):**

- Repetitive training to the target people.
- Presenting posters and related literature in native language of the community to build the awareness.
- Make short film and arrange to show them regarding rabies patient, rabid animal, nature of the disease and the sufferings of the patients as well as surroundings.

Involve mass media in order to combat the present situation as well as aware the people for utmost cooperation from the community.

## **5. Implementation Plan**

The main activities include:

- Periodic revision and updating of national policy, strategies and advocacy plans;
- Formation of national steering committee and technical working group to support programme implementation and oversee progress;
- Assessment of disease burden and dog density through baseline epidemiological, and animal census including geographical mapping;
- Development of technical guidelines for diagnosis, treatment, PEP and , disease surveillance and reporting formats;
- Training for health managers, medical doctors, nurses, health education officers, health workers etc
- Development and utilization of IEC materials;
- Identification and conduction of priority research;
- Establishing system of procurement and supplies (drugs, Vaccines, Immunoglobulin and equipment);
- Piloting implementation in selected districts.

### **5.a Short phase: 2010-2013**

The short phase for the Rabies elimination program started after completion of some major activities of the preparatory phase. The main activities to be undertaken are:

- Dog population estimation.
- Registration of Dogs (Pet)
- Transition of NTV to CCV by ID Vaccination.
- Development of SOP.
- Initiation of vaccination of dog and animal birth control .
- Early diagnosis of dog bite and complete PEP
- Disease surveillance with passive and active case detection;
- Animal (especially dog) surveillance to monitor dog density and efficacy of vaccine
- Social mobilization for successful elimination program
- Intensive IEC for improving awareness about rabies and care seeking practices and treatment compliance
- Supervision, monitoring, and evaluation including annual review of input, process and output indicators

- Increasing research capacity and networking

### **5.b Mid phase: 2014-16**

The Mid phase will begin when PEP with ID method will be implemented at all divisions. This phase will end following three years of active surveillance showing the annual incidence of rabies to be reduced by 10%. The main activities to be carried out during this phase include the followings:

- Registration of dogs
- Vaccination of dogs
- Animal birth control particularly male dog sterilization
- Intensified dog bite and rabies detection;
- Early diagnosis of dog bite and complete PEP ( by ID methods) and Immunoglobulin
- Continuation of activities like research, monitoring, review meetings and periodic evaluation including external evaluation.

### **5.c Long phase: 2016 and beyond**

During this phase, the vigilance against resurgence of rabies will be the responsibility of the disease control programme. The affected upazilas where elimination targets have not been achieved would require adoption of corrective measures. The long phase will be followed by certification of elimination status by the competent authority. An international review commission to certify elimination status will review the progress. The vaccination of dogs and birth control to be continued

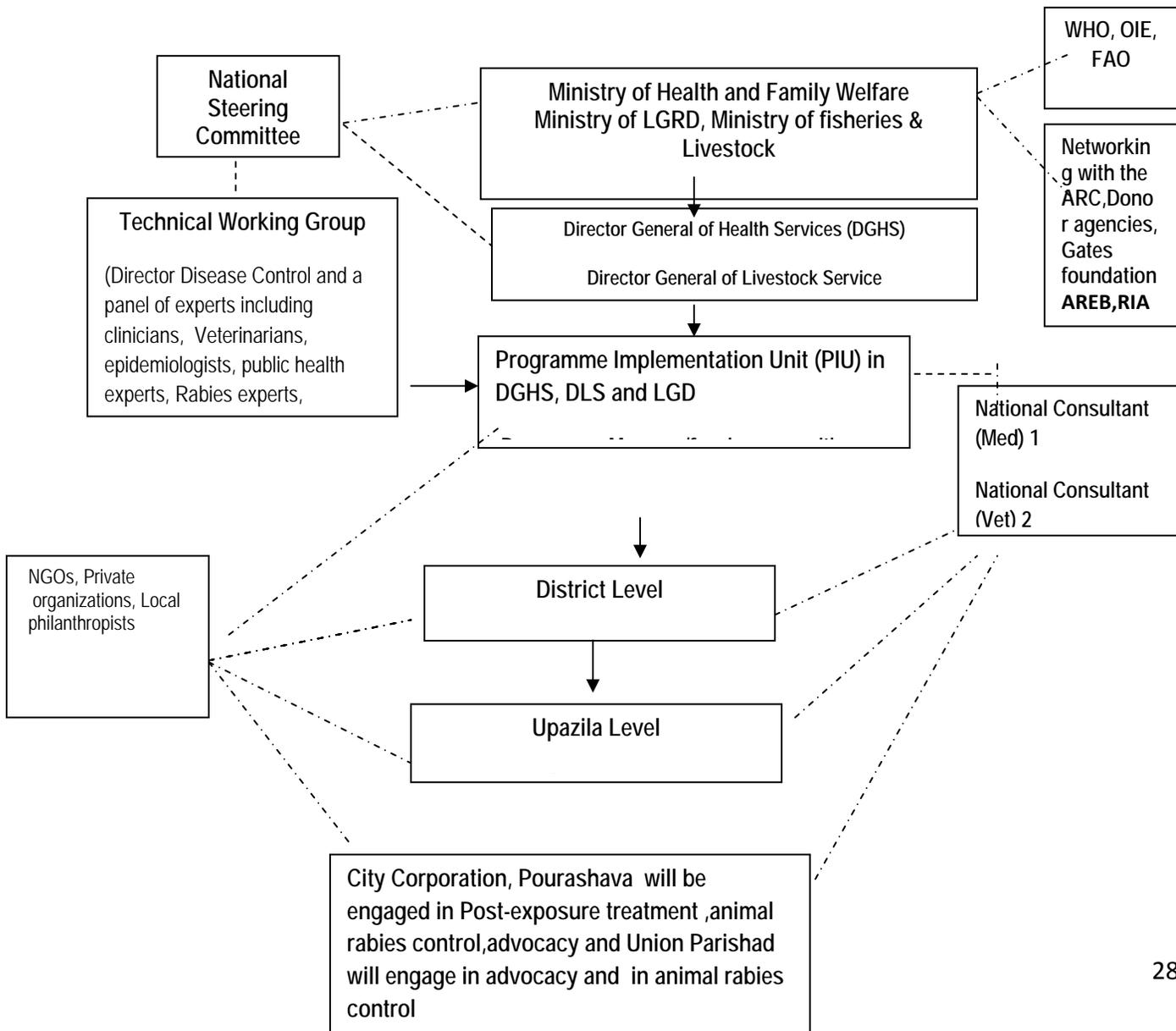
## **6. Organizing Programme Implementation**

Government of Bangladesh is committed to implement the Rabies elimination programme with technical support from WHO and other partners. A national steering committee has been formed by the MoH&FW which is headed by the Minister. A Technical Working Group (TWG) comprising a panel of experts will play major role in decision making and implementation of the elimination programme.

The elimination programme will be included in the operational plan of HNPSP of Health Budget, Bangladesh and will be included in the next sector wide program. Director (Disease Control), the Line Director for Communicable Disease Control, heads the Rabies Elimination Programme under DGHS. There is a Programme Implementation Unit comprising Programme Manager (PM), and Deputy

Programme Manager (DPM). An organogram has been proposed as under, for strengthening the existing programme under DGHS.

**Organizational Flow Chart**



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*Note: a). Minister of Health and Family Welfare head the National Steering Committee; b). Director, Disease Control in DGHS convner of the Technical Working group; c). Programme Implementation Unit is located in DGHS, DLS and LGD, the Programme Manager/ focal person will be responsible for implementing the elimination programme.*

*Note : b)The Line Director will be responsible to implement the proposed organogram securing necessary fund from HNPSP-Sector Programme. Civil Surgeon will be responsible for the implementation of the program at the district level and below. UHC will be the functional unit in the elimination programme with Upazila Health and Family Planning Officer (UHFPO) as the head of the unit. One medical officer of the UHC will be assigned with specific responsibility.*

## **7. Funding for Elimination Programme**

For the elimination programme the major areas of spending will be procurement of diagnostics, vaccines, immunoglobulins and cost for dog population estimation, registration, animal birth control and vaccination, operational research, surveillance, monitoring and supervision. Cost for the elimination programme will be borne mainly by the government from current HNPSF fund, proposed sector wide program and assistance from international funding agencies. Private sector participation and involvement of NGOs will be encouraged.

## **8. Supervision, Monitoring and Evaluation**

Routine monitoring, periodic assessment and evaluation will be done by the programme at all levels to ensure implementation as per plan. A set of objectively verifiable indicators will be used to measure progress and assess the achievement of elimination programme in line with regional strategy. External independent evaluation will be done to assess the progress and thereby indicate necessary modification in strategies of programme implementation. World Health Organization or any other competent authority will do external evaluation.

### Annexure I: Work Plan ( Road map) of strategic plan for rabies elimination

Activities	Short term Plan				Mid term plan			Long term plan			
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Develop and Update National Strategic Plan</b>	█				█			█			
<b>Estimate burden of human Rabies and Dog population estimation</b>	█	█			█			█			
<b>Develop guideline,training module &amp; treatment plan</b>	█	█			█			█			
<b>Procure drugs and diagnostics</b>	█	█	█	█	█	█	█	█	█	█	█
<b>Procure vehicles</b>	█	█						█	█		
<b>Develop &amp; print forms, registers, etc</b>											
<b>Recruit manpower</b>	█	█			█			█			
<b>Training of manpower</b>	█	█	█	█	█	█	█	█	█	█	█
<b>Dog population estimation</b>	█	█									
<b>Registration of pet dogs</b>	█	█	█	█	█	█	█	█	█	█	█
<b>Vaccination of dog</b>		█		█	█	█	█	█	█	█	█
<b>Birth control of dog</b>		█		█	█	█	█	█	█	█	█
<b>Transition of NTV to TCV</b>	█	█	█								
<b>Development of SOP on patient management, Infection control.</b>	█	█			█	█		█	█		
<b>Promotion of pre exposure vaccination to people</b>		█	█	█	█	█	█	█	█	█	█
<b>BCC</b>	█	█	█	█	█	█	█	█	█	█	█

Surveillance of dog bite cases, rabies pt.											
Identify Dog bite & Rabies cases in community											
Diagnosis, treatment and referral											
IEC campaign											
ICU Support of Rabies pt											
Euthanation of rabid dogs											
Active & passive surveillance											
Special surveys											
Collection of information & analysis											
Stray dog population spot check & monitoring											
internal evaluation											
External evaluation											

## **Annexure II**

### **Dog population control measures**

The following control measures could be implemented according to the national context and local circumstances. Measures may be used in combination. Euthanasia of dogs, used alone, is not an effective control measure. If used, it should be done humanely (see point 11) and in combination with other measures to achieve effective long term control. It is also important that authorities gain an understanding of people's attitudes towards dog ownership so that they can develop a cooperative approach to the control of dog populations.

#### **1. Education and legislation for responsible ownership**

Encouraging dog owners to be more responsible will reduce the number of dogs allowed to roam, improve the health and welfare of dogs, and minimize the risk that dogs pose to the community. The promotion of responsible dog ownership through legislation and education is a necessary part of a dog population control programme. Collaboration with local government authorities, health, veterinary authorities, animal welfare NGOs, private veterinarians and veterinary organisations will assist department of education in establishing and maintaining programmes. Education on responsible dog ownership (for the currently owned dog and any offspring it produces) should address the following elements:

- a) the importance of proper selection and care to ensure the welfare of the dog and any offspring; the latter may include preparing the dog to cope with its environment through attention to socialisation and training;
- b) registration and identification of dogs (see point 2);
- c) disease prevention, in particular zoonotic disease, e.g. through regular vaccination in rabies endemic areas;
- d) preventing negative impacts of dogs on the community, via pollution (e.g. faeces and noise), risks to human health through biting or traffic accidents and risks to other dogs, wildlife, livestock and other companion animal species;
- e) control of dog reproduction.

In order to achieve a shift towards responsible ownership, a combination of legislation, public awareness, education, and promotion of these elements will be required. It may also be necessary to improve access

to resources supporting responsible ownership, such as veterinary care, identification and registration services and measures for control of zoonotic diseases. Awareness about rabies control should be included in the primary and secondary level national educational curriculum.

## 2. Registration and identification of dogs (licensing)

A core component of dog population control by the local government is the registration and identification of owned dogs. This may include granting licenses to owners and breeders. Registration and identification may be emphasized as part of responsible dog ownership and are often linked to animal health programmes, for example, mandatory rabies vaccination and traceability. Registration of animals in a centralized database can be used to support the enforcement of legislation. The control of dog reproduction by surgical sterilization can be encouraged through financial incentives presented by differential licensing fees.

## 3. Reproductive control

Controlling reproduction in dogs prevents the birth of unwanted puppies and can help address the balance between demand for dogs and the size of the population. It is advisable to focus efforts to control reproduction on those individuals or groups in the dog population identified as the most productive and the most likely to be the sources of unwanted and stray dogs, to ensure best use of resources. Methods of controlling reproduction will require direct veterinary input to individual animals. Involvement of both private and public veterinary sectors will be required to meet demand for services. Subsidization of sterilization programmes by government or other organisations may be considered to encourage uptake. The control of reproduction is essentially the responsibility of owners and can be incorporated into education on responsible ownership (see point 1). Methods for controlling reproduction in dogs include:

- a) surgical sterilization;
- b) chemical sterilization;

Surgical sterilization should be carried out by a veterinarian and include appropriate anesthesia and pain management. Any chemicals or drugs used in controlling reproduction should be shown to have appropriate safety, quality and efficacy for the function required and used according to the manufacturer's and competent authorities regulations.

#### 4. Removal and handling

The Competent authorities should collect dogs that are not under direct supervision and verify their ownership. Capture, transport, and holding of the dogs should be done humanely. The local government should develop and implement appropriate legislation and training to regulate these activities. Capture should be achieved with the minimum force required and equipment should be used that supports humane handling. Uncovered wire loops should not be used for capture.

#### 5. Environmental controls

Steps should be taken to exclude dogs from sources of food (e.g. rubbish dumps and abattoirs, and installing animal-proof rubbish containers). This should be linked to a reduction in the dog population by other methods, to avoid animal welfare problems. This will be the responsibility of the local government.

#### 6. Control of dog movement – international (export/import)

Recommendations on the international movement of dogs between rabies free countries and countries considered to be infected with rabies.

##### **6.1. General provisions**

For the purposes of the strategic plan, the incubation period for rabies shall be 6 months, and the infective period in domestic carnivores starts 15 days before the onset of the first clinical signs and ends when the animal dies.

##### **6.2. Rabies free country or territory**

For the purposes of international trade and non commercial movement of dogs, a country may be considered free from rabies when:

1. the disease is notifiable;
2. an effective system of *disease surveillance* has been in operation for the last 2 years, with a minimum requirement being an on-going programme to ensure investigation and reporting of ‘suspect’ animals;
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 infection has been confirmed during the past 2 years;
5. no imported case has been confirmed outside a quarantine station for the past 6 months.

**6.3. Recommendations for importation of domestic mammals, and captive wild mammals from rabies free countries**

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

1. showed no clinical sign of rabies on the day of shipment;
2. were kept since birth or for the 6 months prior to shipment in a rabies free country or were imported in conformity with the regulations stipulated in section 6.5., 6.6. or 6.7 (OIE Terrestrial Animal Health Code).

**6.4. Recommendations for importation of wild animal from rabies free countries**

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

1. showed no clinical sign of rabies on the day of shipment;
  2. have been captured in a rabies free country, at a sufficient distance from any infected country.
- The distance should be defined according to the species exported and the reservoir species in the infected country.

**6.5. Recommendations for importation of dogs and cats from countries considered infected with rabies**

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

1. showed no clinical sign of rabies within 48 hours of shipment;
- AND
2. were identified by a permanent mark (such as a microchip) and their identification number shall be stated in the certificate; and
    3. were vaccinated against rabies:
      - a) not less than 6 months and not more than one year prior to shipment in the case of a primary vaccination, which should have been carried out when the animals were at least 3 months old;
      - b) not more than one year prior to shipment in the case of a booster vaccination;
      - c) with an inactivated virus vaccine or with a recombinant vaccine expressing the rabies virus glycoprotein; and

4. were subjected not less than 3 months and not more than 24 months prior to shipment to an antibody test as prescribed in the Terrestrial Manual with a positive result equivalent to at least 0.5 IU/ml;

OR

5. have not been vaccinated against rabies or do not meet all the conditions set out in points 6.2, 6.3 and 6.4 above; in such cases, the import in a country may require the placing of the animals in a quarantine station located on its territory, in conformity with the conditions stipulated in its animal health legislation.

#### **6.6. Recommendations for importation from countries considered infected with rabies**

for rodents and lagomorphs, and lagomorphs born and reared in a biosecure facility. Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

1. showed no clinical sign of rabies on the day of shipment;
2. were kept since birth, in an establishment where no case of rabies was reported for at least 12 months prior to shipment.

#### **6.7. Recommendations for importation from countries considered infected with rabies**

for captive wild mammals (other than non-human primates)

Veterinary Authorities should require the presentation of an international veterinary certificate attesting that the animals:

1. showed no clinical sign of rabies on the day of shipment;
2. were kept in a quarantine station for the 6 months prior to shipment.

#### **7. Control of dog movements – within country (e.g. leash laws, roaming restrictions)**

Measures for the control of dog movement in a country are generally invoked for the following reasons:

- a) for rabies control when the disease is present in a country;
- b) for public safety reasons;
- c) for the safety of 'owned dogs' in an area or locality when a stray dog control programme is in place;
- d) to protect wildlife and livestock.

It is necessary to have a regulatory framework and a national or local infrastructure comprising organization, administration, staff and resources to encourage the finders of stray dogs to report to the Competent Authority.

#### 8. Regulation of commercial dog dealers

Dog breeders and dealers should be encouraged to form or join an appropriate association. Such associations should encourage a commitment to the raising and selling of physically and psychologically healthy dogs, as unhealthy dogs may be more likely to be abandoned to become part of the stray population. They should encourage breeders and dealers to provide advice on proper care to all new owners of dogs. Regulations covering commercial dog breeders and dealers should include specific requirements for accommodation, provision of suitable food, drink and bedding, adequate exercise, veterinary care and disease control and may require breeders and dealers to allow regular inspection, including veterinary inspection.

#### 9. Reduction in dog bite incidence

The most effective means of reducing prevalence of dog bites are education and placing responsibility on the owner. Dog owners should be educated in principles of responsible dog ownership as described in section. Legal mechanisms that enable the Competent Authorities to impose penalties or otherwise deal with irresponsible owners are necessary. Mandatory registration and identification schemes will facilitate the effective application of such mechanisms. Young children are the group at highest risk for dog bites.

Public education programmes focused on appropriate dog-directed behavior have been demonstrated to be effective in reducing dog bite prevalence and these programmes should be encouraged. Authorities should seek advice from dog behavior experts in developing dog safety education programmes.

#### 10. Euthanasia

When euthanasia is practiced, the general principles of OIE should be followed, with the emphasis on using the most practical, rapid and humane methods and ensuring operator safety. The local government authority will be responsible for the euthanasia and disposal of suspected rabid animal. Regardless of the method used, it is important to minimize distress, anxiety and pain by ensuring that operators are appropriately trained.

##### a) Restraint

When a dog needs to be restrained for any procedure, including euthanasia, this should always be done with full regard for operator security and *animal welfare*. Some euthanasia methods must be used in association with sedation or anesthesia in order to be considered humane.

b) Special equipment

When special equipment is needed to perform euthanasia (e.g. gas chamber), the system should be designed for the purpose and regularly maintained in order to achieve operator security and *animal welfare*.

c) The following methods, procedures and practices are unacceptable on *animal welfare* grounds:

i) Chemical methods:

- Embutramide +Mebezonium +Tetracaine without sedation or by other than

IV injection

- Chloral hydrate

- Nitrous oxide: may be used with other inhalants to speed the onset of anesthesia, but alone it does not induce anesthesia in dogs

- Ether

- Chloroform

- Cyanide

- Strychnine

- Neuromuscular blocking agents (nicotine, magnesium sulphate, potassium chloride, all curariform agents): when used alone, respiratory arrest occurs before loss of consciousness, so the dog may perceive pain

- Formalin

- Household products and solvents.

ii) Mechanical methods:

- Air embolism on conscious *animal*

- Burning

- Exsanguination of conscious *animal*

- Decompression: expansion of gas trapped in body cavities may be very painful

- Drowning

- Hypothermia, rapid freezing

- Stunning: stunning is not a euthanasia method, it should always be followed by a method which ensures *death*

- Kill-trapping

- Electrocutation of conscious *animal*.

Because neonatal *animals* and adults with impaired breathing or low blood pressure are resistant to hypoxia, methods that depend upon achieving a hypoxic state (e.g. CO<sub>2</sub>, CO, N<sub>2</sub>, Ar) should not be used. These methods should not be used in animals aged less than 2 months, except to produce loss of consciousness and should be followed by another method to cause *death*. Concussion and cervical dislocation may be used in very small neonatal dogs and only in cases of emergency.

Operators must be well trained in the use of physical techniques to ensure that they are correctly and humanely carried out. The dog must be exsanguinated immediately after concussion or cervical dislocation.

d) Confirmation of death

For all methods of euthanasia used, *death* must be confirmed before animals are disposed of or left unattended. If an animal is not dead, another method of euthanasia must be performed.

e) Carcass disposal

Carcasses should be disposed of in a manner that complies with legislation. Attention must be paid to the risk of residues occurring in the carcass. Incineration is generally the safest way of carcass disposal.

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