सत्यमेव जयते

Government of India

INTEGRATED DISEASE SURVEILLANCE PROGRAMME

TRAINING MANUAL FOR VETERINARY CONSULTANTS UNDER IDSP

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D.O.NO. 18015/2/68/2011-IDSP

दिनांक/Dated 26.11.2015

FOREWORD

Human and animal health is inextricably linked to each other. This link between human and animal populations, and with the surrounding environment, is particularly close as animals provide transportation, fuel and clothing as well as proteins. This also aids in transmission of diseases from animals to humans.

Zoonotic diseases are omnipresent globally. Several zoonotic diseases are major public health problems not only in India but also in different parts of the world. Some of them have been plaguing mankind from time immemorial and some have emerged as major problems in the recent times. Diseases like plague, Japanese encephalitis, leishmaniasis, rabies, leptospirosis and dengue fever etc. have been major public health concerns in India and are considered important because of large human morbidity and mortality from these diseases. Recently, new zoonotic entities Crimean Congo Hemorrhagic fever (CCHF), Nipah virus infection and Avian Influenza have stirred the public health machinery in India. In addition to existing zoonoses, country faces potential threat of exotic zoonotic infection viz Yellow Fever, Hanta virus infection, Rift Valley fever, Ebola & Marburg disease. The vector, susceptible host and conducive environment are prevalent in our country.

Global surveillance is necessary to contain the growing threat of zoonotic diseases. Government of India launched Integrated Disease Surveillance Program (IDSP) to strengthen disease surveillance for early detection and response to outbreak prone diseases. Under this programme, surveillance units have been established in all the States/UTs and Districts. Recently MOHFW, GOI approved the post of Veterinary Consultant at Centre and at State Headquarters under IDSP.

This manual captures important information needed to sensitize Veterinary Consultants on disease surveillance, their role in the National Surveillance System and outbreak control esp. in context of Zoonotic diseases.

Jprasad

(Dr. Jagdish Prasad)

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PREFACE

Zoonotic diseases pose a significant threat to health security. Past experience shows that outbreak of these diseases could not only potentially cause large numbers of human deaths as they spread, but also have huge social and economic impact in today's interconnected world.

With human health, animal health, and ecosystem health being inextricably linked, the need of the hour is to promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians and other scientific, health and environmental professionals.

A training manual for Veterinary Consultants has been developed by Integrated Disease Surveillance Programme (IDSP) in pursuant to the Mission Statement on One Health Initiative by the Ministry of Health & Family Welfare.

The manual is an attempt to bridge the gap between expertise related to human and animal health. The first five chapters of the manual describe the roles and responsibilities of Veterinary Consultants appointed under IDSP in the National Surveillance System. It also throws light on the structure and functioning of IDSP, inter-sectoral coordination of IDSP with Departments of Animal Husbandry/ Agriculture, Wildlife and other sectors. It apprises them about the Zoonotic diseases of public health importance and their role in early detection and rapid response to outbreaks of Zoonotic origin.

A chapter has been included on Outbreak Investigation, to help the veterinary science expert in responding to the zoonotic diseases outbreaks in co-ordination with Rapid Response Teams. Further chapters include detailed description of common endemic, emerging and re-emerging zoonotic diseases in the country including their lab diagnosis.

We hope this manual will enable the Veterinary Consultants to actively contribute in the management of zoonotic diseases in the country and in responding to outbreaks in an effective and timely manner.

Venkatesh
26.11.15
(Dr. S. Venkatesh)

CONTENTS

Abbreviations

AES - Acute Encephalitis Syndrome

AI - Avian Influenza

APTT - Activated Partial Thromboplastic Time

AWBI - Animal Welfare Board of India

BI - Breateau Index

BSL - Biosafety Level

CADRAD - Centre for Animal Disease Research and Diagnostic Centre

CCHF - Crimean Congo Hemorrhagic Fever

CDRMU - Central Disease Reporting & Monitoring Unit

CHC – Community Health Centre

CI - Container Index

CMC - Christian Medical College

CNS – Central Nervous System

CSF – Cerebro Spinal Fluid

CSU - Central Surveillance Unit

CT - Computed Tomography

DADF - Department of Animal husbandry, Dairy and Fisheries

DBP - Dibutylphthalate

DEET - N,N-Diethyl-meta-toluamide

DGHS - Director General of Health Services

DIC - Disseminated Intravascular Coagulation

DMP - Dimethylphthalate

DRIT – Direct Rabies Immunohistochemistry Test

DSO - District Surveillance Officer

DSU – District Surveillance Unit

DVO - District Veterinary Officer

Dte GHS - Directorate General of Health Services

ECG – Electrocardiography

EDTA – Ethylene Diamine Tetraacetic Acid

EEG – Electroencephalography

EVD - Ebola Virus Disease

ELISA – Enzyme Linked Immunosorbent Serologic Assay

FAT - Fluorescent Antibody Test

FIR - First Information Report

GIS - Geographical Information System

GOI - Government of India

GSAT - Geo stationary Satellite

HSADL - High Security Animal Diseases Laboratory

HENV - Hendra Virus

ICMR - Indian Council of Medical Research

ICAR - Indian Council of Agriculture Research

ICT - Information and Communications Technology

I/D – Intra Dermal

IDSP – Integrated Disease Surveillance Programme

IEC – Information, Education and Communication

IFA – Iron Folic Acid

IgG - Immunoglobulin Type G

IgM – Immunoglobulin Type M

IT – Information Technology

IU – International Unit

IVRI - Indian Veterinary Research Institute

JE - Japanese Encephalitis

JIPMER - Jawaharlal Institute of Postgraduate Medical Education and Research

KFD - Kyasanur Forest Disease

KFT – Kidney Function Test

LFT – Liver Function Test

MAT - Microscopic Agglutination Test

MOHFW - Ministry of Health and Family Welfare

MRI – Magnetic Resonance Imaging

MSVC – Media Scanning & Verification Cell

MVRC - Manipal Virus Research Centre

NADRS - National Animal Disease Reporting System

NADRES - National Animal Disease Referral Expert System

NCDC – National Centre for Disease Control

NIHSAD - National Institute of High Security Animal Diseases

NRCP - National Rabies Control Programme

NIV – National Institute of Virology

PCR - Polymerase Chain Reaction

PDADMAS - Project Directorate on Animal Diseases Monitoring and Surveillance

PHC – Primary Health Centre

PUO – Pyrexia of Unknown Origin

RBT - Rose Bengal Test

RIMS - Rajendra Institute of Medical Science

RNA – Ribo Nucelic Acid

RRT - Rapid Response Team

RTPCR – Reverse Transcription Polymerase Chain Reaction

SC – Sub-Centre

SCZ - Standing Committee on Zoonoses

SGOT - Serum Glutamic Oxaloacetic Transaminase

SGPT - Serum Glutamic Pyruvic Transaminase

SHOC - Strategic Health Operations Centre

SSU – State Surveillance Unit

UT – Union Territory

VTM - Viral Transport Medium

WHO - World Health Organization

1. ROLE OF VETERINARY CONSULTANTS UNDER IDSP

Veterinary Consultants recruited under IDSP are expected to perform following duties as per the Terms of Reference approved by Ministry of Health and Family Welfare, Government of India:-

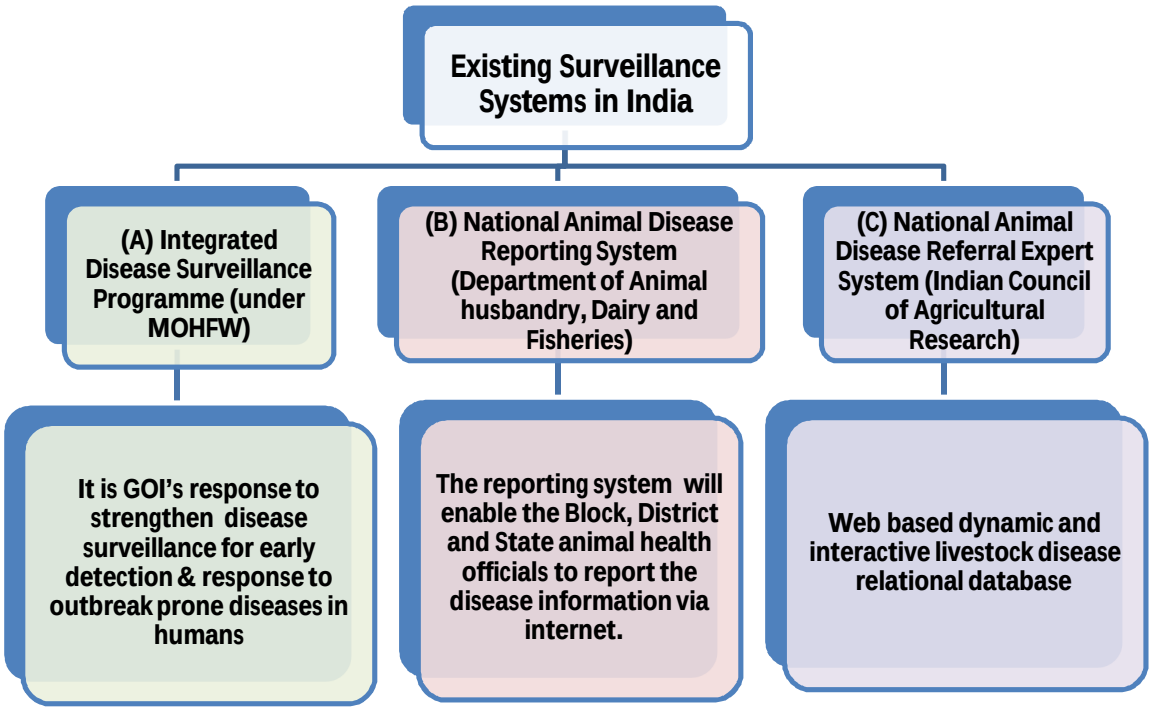
- Establishment of inter-sectoral coordination with Departments of Animal Husbandry, Environment & Forest, Agriculture & Other department as and when required.
- To look at the data from NADRS and NADRES and match the data with IDSP data to bring them on one platform.
- Support effective operational integration of disease control efforts based on the surveillance data.
- Coordinate regular meetings of key strategic stake holders and assist in inter-sectoral coordination for effective IDSP implementation.
- Organize and monitor timely collection, compilation and analysis of surveillance data from the districts.
- Regular visits for establishing the coordination mechanism with the animal husbandry department in the districts.
- Coordinate joint training of health and animal husbandry department officials for the prevention and control of zoonotic diseases in the State.
- To be part of RRT for Zoonotic disease outbreak investigation.
- Quarterly performance report to be prepared for appraisal.
- Performing other duties as and when required.

2. INTER-SECTORAL COORDINATION

About 75% of the new diseases that have affected humans over the past 10 years have been caused by pathogens originating from an animal or from products of animal origin. Currently, there are parallel surveillance systems running in our country for both human and animal diseases which are

Human diseases: Integrated Disease Surveillance Programme (IDSP)

Animal Diseases: National Animal Disease Reporting System (NADRS)
National Animal Disease Referral Expert System (NADRES)



There is need to establish **inter-sectoral coordination** between these surveillance systems for generating Early Warning Signals, joint investigations & response to outbreaks of zoonotic diseases of public health importance.

A. Integrated Disease Surveillance Programme (IDSP)

IDSP was launched in November 2004 with the objective to detect and respond to early warning signals of disease outbreaks. The programme is explained in detail in chapter 4.

B. National Animal Disease Reporting System (NADRS)

The Department of Animal husbandry, Dairy and Fisheries (DADF), Govt. Of India with the help of National Informatics Centre has started an ambitious project known as National Animal Disease Reporting System (NADRS) which involves a computerized network integrating both MIS & GIS, which would link each block, district and the state / UT headquarters in the country to the Central Disease Reporting & Monitoring Unit (CDRMU) in the DADF at New Delhi with the objective to monitor 143 animal diseases through 7000 locations at sub district level in the country. All the notified diseases scheduled in 'The Prevention and Control of Infectious & Contagious Disease in Animals Act 2009 are included in this reporting system.

Flow of information

The detailed workflow has been developed for Block level officers to report animal diseases. Each Veterinary Officer has four major functions for NADRS system as described below:

- Daily Incidence Disease Cases Reporting
- Creation of First Information Report (FIR) in case of Outbreak
- Escalation of daily case as Outbreak, in case of outbreak
- Follow up for outbreak

For Daily incidence Disease Case Reporting, each veterinary centre will maintain the following information-

- Location details-state, district, block, veterinary centre etc.
- Case information-Date, animal species, livestock owner, etc.
- Animal details-species, habitat, breed, number of animals etc.
- Disease Symptoms
- Animal wise details for each animal like adult/young, age, Gender, etc.
- Treatment details-vaccination details

C. National Animal Disease Referral Expert System (NADRES)-ICAR

Accurate information about the health status of a nation's animal population is critical in the fight against livestock diseases and this forms the basis for initiating disease control strategies through optimal utilization of meagre funds, veterinary resources and manpower. Controlling major livestock disease in largely rural based societies has the potential to dramatically improve the quality of life of the rural poor.

As such the innovative NADRES is developed as web based dynamic and interactive livestock disease relational database supported by Geographic Information System (GIS) which serves as an Epidemiology software. This software addresses the needs of data collection, transmission, retrieval, analysis of critical reporting of disease events as and when they occur and useful for field veterinarians, administrators, technocrats, research personnel, farmers, veterinary colleges and students.

Role of Inter-sectoral Coordination for Prevention and Control of Zoonotic Diseases

As human and animal health are linked with each other the role of inter-sectoral coordination between department of health, animal husbandry, agriculture, forest & environment becomes vital in prevention and control of zoonotic diseases.

Existing structure and future scope of inter-sectoral coordination

i. Inter-sectoral coordination between health and agriculture in control of some of the zoonotic diseases

India has shown exemplary inter-sectoral coordination in control of some of the zoonotic diseases like Avian Influenza which has prevented occurrence of human cases, investigation of Crimean Congo Hemorrhagic Fever which probably averted a bigger outbreak, diagnosis of trypanosomiasis etc. But now it is time to have a holistic "One Health" strategy for control of Zoonoses, which recognizes the vital interconnectedness of microbes and the environment. Through a comprehensive approach involving many scientific disciplines, one can attain better health for humans and animals and improve our environment.

ii. **Joint training courses:** Joint orientation training programmes for health and veterinary professionals for better understanding of the diseases, transmission, prevention and control. This course is conducted by NCDC in collaboration with Indian Veterinary Research Institute (IVRI). Participants include one veterinary and one health officer preferably from same district for development of inter-sectoral coordination. This helps in better understanding of zoonotic diseases and initiation of inter-sectoral coordination for prevention of disease in humans and animals.

iii. **Preparation of IEC material:** For prevention and control of both human and animal diseases IEC material for creating awareness in general community has been developed jointly by health and animal husbandry sector eg: IEC material for prevention and control of Rabies and Leptospirosis under the pilot projects was developed jointly by health and veterinary professionals.

iv. **Support to National programmes:** Health sector provides support to national programmes as follows:
    - Health education: Health education is provided to veterinary professionals, for example, in Control programme of Avian Influenza, Brucellosis, etc. as it is an occupational hazard.
    - National rabies control programme includes both components viz: human and animal. NCDC will be the nodal agency for human component and AWBI is the nodal agency for animal component. Funds are being provided by Ministry of Health and Family Welfare.

v. **Formulation of Prevention and control guidelines:** Inputs of health, animal husbandry and environment sectors have been taken while formulating guidelines for treatment, prevention and control of zoonotic diseases.

vi. **Joint Outbreak investigations of Zoonotic infections**: Outbreak investigations of Zoonotic diseases are carried out jointly for effective prevention and control e.g. Avian Flu, Anthrax, and CCHF etc.

vii. **Strengthening Laboratory facility:** For certain zoonotic diseases, the laboratories can undertake diagnosis in both human and animal samples e.g. Rabies, Anthrax Brucellosis, Trypanosomiasis, plague, leptospirosis etc. Hence, laboratories are encouraged to undertake diagnosis of both human and animal samples. Joint training in laboratory diagnostic techniques are organized.

However, for certain diseases like influenza, human and animal samples are not recommended for testing in the same laboratory as there are chances of re-assortment of the viruses and evolution of newer virus strains. Hence, laboratories for testing animal and human samples should be strengthened separately and the reports should be shared.

viii. **Research:** Indian council of Medical Research and Indian Council of Agriculture research (ICMR-ICAR) have a Joint Task force for development of research projects on priority zoonotic diseases.

ix. **Standing Committee on Zoonoses:** Standing Committee on Zoonoses (SCZ) is in existence since 2006 under the chairpersonship of Director General of Health Services (DGHS). It meets biannually/annually to advise on various facets of the work on Zoonoses in India, ensuring inter-sectoral coordination between medical, animal husbandry and other allied institutes, strengthening of laboratories in health and animal husbandry sectors and formulation of projects on priority problems. Zoonoses Coordination Cell at NCDC, Delhi coordinates the activities of the Standing Committee on Zoonoses.

A. The Program for strengthening inter-sectoral coordination

Department of Health & Family Welfare, Ministry of Health and Family Welfare, Govt. of India has initiated a new scheme "Strengthening of inter-sectoral coordination for prevention and control of zoonotic diseases" to be implemented in 12th Five year plan during 2012-13 to 2016-17.

For strengthening inter-sectoral coordination the following mechanism will be followed:

State

- Existing state surveillance committees under IDSP will be strengthened. For effective co-ordination between the medical and animal husbandry sectors at the state level, SSO and Veterinary officer under IDSP will co-ordinate the activities between animal husbandry, municipal corporation/committees, other local bodies and agencies involved in the subject.
- IDSP will identify the institutions/centres/units in the animal and human health sectors for coordination and surveillance in health and animal husbandry sectors. The State will collect and compile the data with weekly reporting to the centre.

- State will coordinate with the district for data collection, outbreak investigation and provide them feedback for necessary action as per requirement.
- State will report any unusual event of zoonotic disease.
- State will generate a coordinated response for outbreak investigation, diagnosis and prevention and control measures.
- State will conduct epidemiological investigations in coordination with the Zoonosis Division/ identified institutions to identify zoonotic infectious agents or route of transmission from animal to human or vice versa.
- IDSP will coordinate with the Core trainers to organize the training courses for further training of medical and veterinary professionals at state and district level.
- IDSP in collaboration with Zoonosis Division will organize sensitization meetings for the district officials

District

For effective coordination between the medical and veterinary professionals at the district and the block levels, District Surveillance Officer (DSO), under IDSP will coordinate the activities between animal husbandry, municipal corporation/committees and other local bodies and voluntary agencies involved in the subject.

Proposed Mechanism of Integration between IDSP, NADRS and NADRES for Prevention and Control of Zoonoses

1. Inter-sectoral coordination with NADRS

For establishing the coordination between IDSP and NADRS the following mechanism will be established:

A. Data sharing:

Data on Zoonotic diseases in human and animals will be shared among IDSP & NADRS at district and state level preferably on weekly basis.

B. Rapid Response Teams

Existing Rapid Response Teams (RRTs) under state health and Animal Husbandry departments be strengthened by incorporating both public health and veterinary specialists in respective RRTs.

RRTs will also incorporate the available manpower under wildlife departments.

C. Joint trainings

For better understanding of zoonotic diseases and initiation of inter-sectoral coordination for prevention and control of diseases in humans and animals, the proposed training programmes under health and Animal Husbandry departments will include one veterinary and one health officer from the same district.

D. Joint outbreak investigations

Outbreak investigations of zoonotic diseases will be carried out jointly for effective prevention and control.

E. Sharing of laboratory facilities

2. Inter-sectoral coordination With Animal Husbandry Department

i. At Block Veterinary Officer's level

- Verification of alerts on suspected disease reported by Block Veterinary Officer
- Coordination for sample collection, laboratory testing and lab test result delivery
- Unified view on prevailing disease in Block Veterinary Officer covered area

ii. At District Veterinary Officer's (DVO) level

- Unified approach on prevailing disease scenario, control measures adopted in the district
- Advisory on disease control
- Based on alert to provide preventive measures to the surrounding area of the outbreak occurrence place
- Alerts to neighbouring districts/states on outbreak
- Instant interaction with State Officials and take guidance to control the disease
- Advisory/training to District Rapid Response Teams in order to improve the technical knowledge to tackle any emergency

iii. At State Animal Husbandry Department's Level

- Analysis of the data in collaboration with Director Animal Husbandry
- Over-view on prevailing disease scenario in the state
- Online interaction with neighbouring State/Centre/Experts on disease control
- Formulation of guidelines pertaining to priority Zoonoses/state specific Zoonoses

iv. At Veterinary Colleges/State & Central Government Institutions/Disease Diagnostic Laboratories

- Establishment of linkages to utilize their facilities for prompt laboratory testing of outbreak samples
- Regular data collection on priority/state specific Zoonoses to understand the trends/burden of Zoonoses in the state

Inter-sectoral Coordination with Department of Environment & Forests

- Establishment of linkage with State Forest Department
- Establishment of linkages with Wild Life Institutions.
- Advisory on disease control.

Inter-sectoral Coordination with Public

- Create awareness on disease impact/losses.
- Create awareness on prevention & control of zoonotic diseases of public health importance.

Expected outcome

- Unified information dissemination to all the stakeholders.
- Generation of Early Warning Signals, joint investigations, prevention & control of zoonotic diseases in both humans & animals.

The above activities will lead to development of one health approach for prevention and control of zoonotic diseases at all levels.

3. DISEASE SURVEILLANCE

Disease surveillance is defined by World Health Organization (WHO) as "the systematic ongoing collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary"

The final link in the surveillance chain is the application of these data to prevention and control. Without action data collection is not surveillance. In short, surveillance is **information for public health action.**

Objectives of Disease Surveillance

The primary objective of disease surveillance is to immediately detect and rapidly respond to epidemic-prone diseases. In other words, it helps the health services to keep a close watch on health events occurring in the community and detect outbreaks in timely manner.

Key Elements of Surveillance System

All the surveillance systems involve six key elements:

- Detection and notification of health event
- Collection of data
- Investigation and confirmation (Epidemiological, clinical, laboratory)
- Analysis and interpretation of data
- Response – a link to public health programme specially actions for prevention and control
- Feedback and dissemination of results

Uses of Surveillance:

- Recognize cases or cluster of cases to trigger interventions to prevent
- Transmission or reduce morbidity and mortality
- Assess the public health impact of health events or determine and measure trends
- Demonstrate the need for public health intervention programmes and resources and allocate resources during public health planning
- Monitor effectiveness of prevention and control measures
- Identify high-risk groups or geographical areas to target interventions and Guide analytic studies

- Develop hypothesis that lead to analytic studies about risk factors for disease Causation, propagation or progression.

Table 3.1 Levels at which surveillance activities are performed

Activities	Periphery	District	State
Detection and notification of cases	+++	++	-
Collection and consolidation of data	+	+++	+++
Analysis and Interpretation	+	+++	+++
Investigation and confirmation	+++	+++	+
Feed Back	+	+++	++
Action	++	+++	+

(- Nil + Some activity ++ Considerable activity +++ Great deal of activity)

Veterinary Consultants appointed at SSUs will have major role in collection & consolidation of data on zoonotic diseases, analysis & interpretation of this data & feedback to DSUs. They may be required to investigate & confirm the outbreaks & take necessary action if the capacity of district is overwhelmed. The Veterinary Consultant appointed at CSU will monitor all these activities & assist states in all these activities.

4. INTEGRATED DISEASE SURVEILLANCE PROGRAMME (IDSP)

- IDSP was launched in November 2004 with the objective to detect and respond to early warning signals of disease outbreaks. The project continues in the 12th Five Year Plan domestic budget as Integrated Disease Surveillance Programme under NHM for all States/UTs at an outlay of Rs 640 crores.

Main Objectives & Strategies

- To strengthen/maintain a decentralized laboratory based IT-enabled disease surveillance system for epidemic prone diseases to monitor disease trends and to detect and respond to outbreaks in early rising phase through trained Rapid Response Teams.
- To establish a functional mechanism for inter-sectoral coordination to tackle the Zoonotic diseases.

Programme Component & Activities:

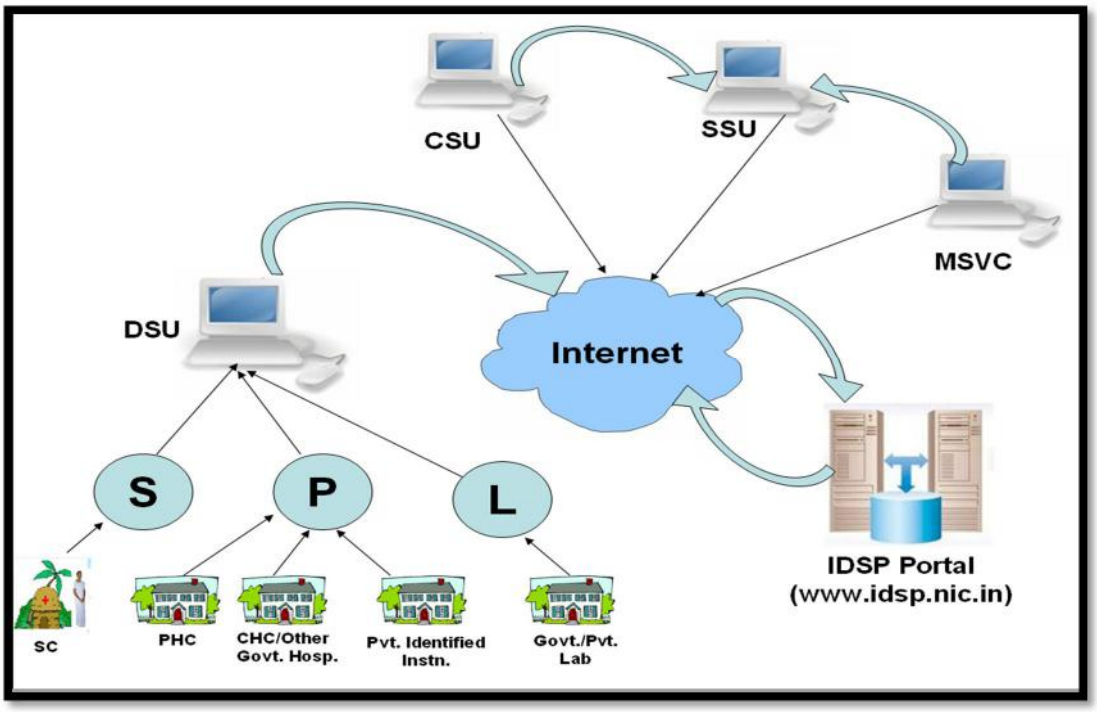
- Integration and decentralization of surveillance activities through establishment of surveillance units at Centre, State and District level.
- Human Resource Development – Training of State Surveillance Officers, District Surveillance Officers, Rapid Response Team and other Medical and Paramedical staff on principles of disease surveillance.
- Use of Information Communication Technology for collection, collation, compilation, analysis and dissemination of data.
- Strengthening of public health laboratories.
- Surveillance units have been established in all States/Districts (SSU / DSU). Central Surveillance Unit (CSU) established and integrated in the National Centre for Disease Control (NCDC), Delhi.
- IDSP receives weekly disease surveillance data from about 90% Districts in the country.
- States/Districts have been asked to report the outbreaks immediately to the system. On an average, 30-40 outbreaks are reported every week by the States/UTs. 553 outbreaks were reported and responded to by states in 2008, 799 outbreaks in 2009, 990 in 2010, 1675 outbreaks in 2011, 1584

outbreaks in 2012, 1964 outbreaks in 2013, 1562 outbreaks in 2014 and 1719 outbreaks have been reported till 8th November 2015.

- Media scanning and verification cell was established under IDSP in July 2008. It detects and shares media alerts with the concerned states/districts for verification and response. A total of 3063 media alerts were reported from July 2008 to November 2014 and 214 till 30th June 2015. Majority of alerts were related to diarrhoeal diseases, food poisoning and vector borne diseases.
- The IT network has been established for data entry, training, video conferencing, and outbreak discussion. Data centre has been established in 776 sites which help in online entry of data and for speedy data transfer. A total of 745 Video conferencing sites have been established. IDSP has started one stop portal (http://www.idsp.nic.in) for data access and transmission, trend analysis and free resources like guidelines, advisories for health personnel related to disease surveillance.
- 105 District Public Health Labs have been strengthened in the country for diagnosis of epidemic prone diseases in 29 states as on September 2015. These labs are also being supported by a trained manpower to manage the lab and an annual grant of Rs.4 lakhs per annum per lab for reagents and consumables.
- A referral lab network has been established in 22 states by utilizing the existing functional labs in the medical colleges and various other major govt. institutes in the States and linking them with adjoining districts for providing diagnostic services for epidemic prone diseases during outbreaks. Currently, there are 97 referral labs in these 22 states.
- Strategic Health Operations Centre (SHOC) was established in January 2013 with the objective of strengthening disease surveillance and response using the latest information and communication technology & to act as a command centre to manage disease outbreaks, public health emergencies or any disaster situation. The SHOC was activated to manage the upsurge in H1N1 cases in January 2015 & to respond to AES outbreaks in Muzzaffarpur, Bihar & Maldah, West Bengal.
- Posts of 36 Veterinary Public Health Specialists, to be posted at State Surveillance Units in each State/UTs have been sanctioned in addition to one post at Central Surveillance Unit. To expedite the recruitment, the State Health Societies have been authorized for filling up the remaining contractual positions at the State level.

5. DATA FLOW UNDER IDSP

- Presently under IDSP the information is collected on three specified reporting formats, namely “S” (suspected cases), “P” (presumptive cases) and “L” (laboratory confirmed cases) filled by Health Workers, Clinicians and Laboratory staff respectively. S form (Annex.1) is filled by the health workers to report data on suspected cases/syndromes. On the other hand P form (Annex.2) is filled up by Medical Officers to report data on probable/clinically suspected cases. L form (Annex. 3) is designed to collect data on lab confirmed cases.



Information flow of data related to target diseases

- The weekly data gives information on the disease trends and seasonality of diseases. Whenever there is a rising trend of illnesses in any area, it is investigated by the Rapid Response Teams (RRT) to diagnose and control the outbreak. Data analysis and actions are being undertaken by respective State/District Surveillance Units. Emphasis is now being laid on reporting of surveillance data from Major Hospitals and also from Infectious Disease Hospitals.

6. OUTBREAK INVESTIGATION

The occurrence of an outbreak always signals some significant shift in the existing balance between the agent, host and environment. Emergencies caused by epidemics remain one of the most important challenges to national health administrations. The objectives of an outbreak investigation are.

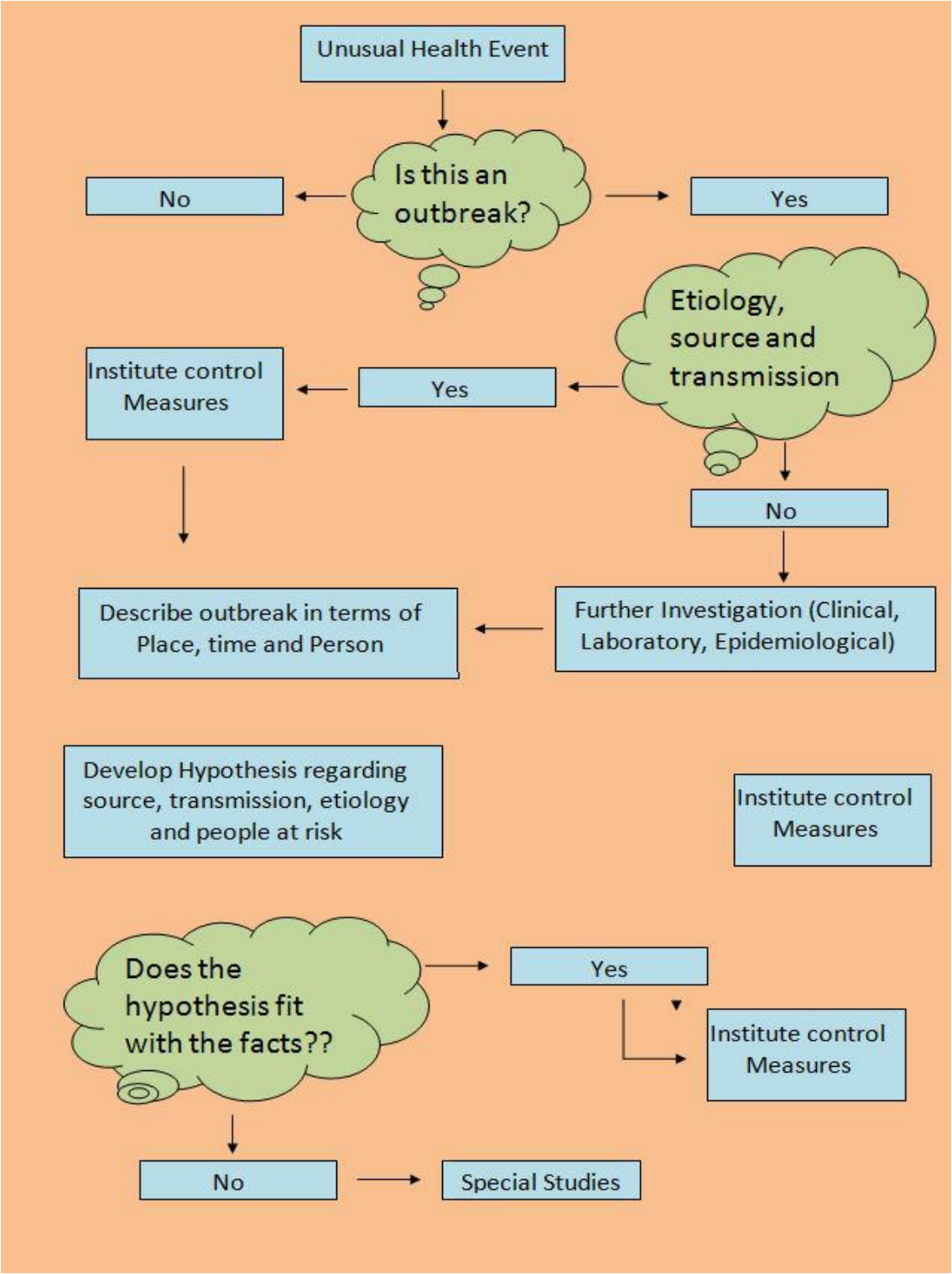
a. To define the magnitude of the outbreak or involvement in terms of time, place and person.
b. To determine the particular conditions and factors responsible for the occurrence of the outbreak
c. To identify the cause, source of infection, and modes of transmission to determine measures necessary to control the outbreak
d. To make recommendations to prevent recurrence

There are some basic steps to any outbreak investigation and are applicable to practically any outbreak with modifications. These steps need not to be sequential but may be used as a guide to any outbreak investigation

Steps of outbreak investigation

1. Verification of diagnosis
2. Confirmation of the existence of an outbreak
3. Defining population at risk
4. Rapid search for all cases and their characteristics
5. Data analysis
6. Formulation of hypothesis
7. Evaluation of ecological factors
8. Further investigation of population at risk
9. Writing the report

Investigation of an Outbreak



Information to be included in the final report of an outbreak investigation

Section contents
1. Background — Geographical location — Climatic conditions — Demographic status (population pyramid) — Socio economic status — Organization of health services — Surveillance and early warning system — Normal disease prevalence
2. Historical data — Previous occurrence of epidemics — Occurrence of related disease — Discovery of first case of present outbreak
3. Methodology of investigation — Case definition — Questionnaire used in investigation — Rapid Response Teams
4. Analysis of data Clinical data — Frequency of signs and symptoms — Course of disease — Differential diagnosis — Death or sequel rate Epidemiological data — Mode of occurrence — In time — By place — By population groups Modes of transmission — Source of infection — Routes of excretion and portal of entry — Factors influencing transmission Laboratory data — Isolation of agent — Serological confirmation — Significance of results — Interpretation of data — Comprehensive picture of data — Hypothesis as to cause
5. Prevention & Control

7. ZOONOTIC DISEASES OF PUBLIC HEALTH IMPORTANCE

Zoonoses are defined by the **WHO** as **"those diseases and infections which are naturally transmitted between vertebrate animals and man".** Zoonoses include only those infections where there is either a proof or a strong circumstantial evidence for transmission between animals and man.

Zoonotic diseases are a major public health problem in India. While on the one hand India is struggling with pre-existing zoonotic diseases like plague, rabies, leptospirosis, leishmaniasis, rickettsial diseases since time immemorial, on the other hand diseases like Japanese Encephalitis (JE), Ebola Virus Disease (EVD), MERS CoV and Crimean Congo Hemorrhagic Fever (CCHF) are posing an emerging threat.

Table: 7.1 List of zoonotic diseases of Public Health Importance in India

Endemic Diseases	Re-emerging Diseases	Emerging Diseases
Anthrax Brucellosis Rabies	Leptospirosis Scrub Typhus AES/JE Kyasanur Forest Disease (KFD) Plague	Crimean Congo Hemorrhagic Fever (CCHF) Nipah Avian Influenza

A. ENDEMIC DISEASES

➢ ANTHRAX

Anthrax is a bacterial disease that usually affects herbivorous animals, but outbreaks involving humans are increasingly being reported. The disease does not spread from human to human, and most forms are curable when diagnosed early and treated with antibiotics. Case fatality with pulmonary anthrax is very high compared to cutaneous anthrax. Anthrax spores are a potential bioterrorist weapon.

In India, anthrax cases have been reported from Andhra Pradesh, Jharkhand, Odisha, Tamil Nadu, and West Bengal

Epidemiology:

Agent: Bacillus Anthracis

Reservoir: Reservoir host include domestic and wild animals such as cattle, buffalo, sheep, goats, pigs and horses.

Transmission:

People can become infected in four main ways: by the cutaneous route, e.g. direct skin contact of anthrax spores with a cut or abrasion; by contact with infected animals or animal products (usually related to occupational exposure); through consumption of undercooked or raw meat or dairy products from infected animals (gastrointestinal form); and by inhaling large number of anthrax spores suspended in the air (Pulmonary form of anthrax, which is rarest and most severe).

Incubation Period: 1-7 days for the cutaneous form; 12 hours – 5days for the gastrointestinal form; and 1-5 days for the pulmonary form.

Clinical Presentation

- Cutaneous form: red marks on the exposed area of skin, which swells and forms blisters. The skin tissue then dies, leaving a black central scar. These signs are accompanied by fever and malaise. The vast majority of anthrax cases (up to 95%) are Cutaneous.

- Gastrointestinal form: loss of appetite, fever, vomiting and diarrhoea.
- Pulmonary form: fever, cough, difficulty in breathing, respiratory failure and, in severe forms, death within 24 hours.

Animal Anthrax

Animals exhibit sudden acute illness, high fever, localized swelling, bleeding from natural orifices (nose, mouth, ear, anus), or death. Tonsillitis is seen in pigs, and colic in horses.

Case Definitions:

Recommended case definition in humans

Suspect:

A case that is compatible with the clinical description and has an epidemiological link to confirmed or suspected animal cases or contaminated animal products.

Presumptive:

A suspect case with smear positive for short chain of capsulated bacillus when stained with polychrome methylene blue

Confirmed:

A suspect case that is laboratory confirmed by one or more of the

following:

- The clinical specimen in culture shows
- Encapsulated, non-motile, non-hemolytic gram positive
- Bacilli susceptible to penicillin and the isolate are susceptible to gamma phage lysis.
- PCR confirming presence of toxin and capsule genes.

Laboratory diagnosis

- Collection, storage & transportation of samples from suspected anthrax Cases
- Laboratory diagnosis -for anthrax should be attempted only by laboratory
- Well trained to do so.

- High index of suspicion of the disease is important.
- Collection and transportation should be carried out under strict aseptic Condition

Collection of Specimen

(a) Cutaneous Anthrax

•In early stage vesicular exudates from the lesions by sterile swab can be collected.

•In later stage swabs to be taken from underneath of eschar after lifting up of eschar with sterile forceps. The swab should be put in Carry-Blair transport medium and with another swab smear on microscopic slide may be prepared and heat fixed. Smear should be made wherever feasible.

(b) Intestinal Anthrax

- If patient is not severely ill, a faecal specimen can be collected
- If patient is severely ill ascetic fluid (peritoneal fluid) can be collected.

(c) Pulmonary Anthrax

- If patient is not severely ill, sputum can be collected.
- In severely ill children bronchial lavage should be collected.

For details on collection, storage & transportation of blood & CSF samples refer to Chapter 8.

Laboratory confirmation for anthrax is made by:

Direct demonstration, culture, identification & characterization of organism by PCR & sequencing.

Diagnostic facilities are available at NCDC Delhi, CMC Vellore, JIPMER Pondicherry, PDADMAS Bangalore & IVRI Izatnagar.

Treatment:

Anthrax responds well to antibiotic treatment. Antibiotics must be prescribed and taken with medical advice. Penicillin, Amoxicillin Ciprofloxacin and Doxycycline are effective.

Prevention and control

Control measures aim at breaking the cycle of infection. It is primarily around proper disposal of animal carcasses, disinfection, decontamination and disposal of contaminated materials, and vaccination of exposed susceptible animals.

IEC - Key Messages

- Avoid examination of (suspected) infected carcasses.
- Dispose of carcasses by deep burial or burning.
- Prevent movement of livestock from affected premises during an outbreak.
- Control dust in industries handling wool or hides.
- Wash and disinfect wool / hair from endemic areas (e.g. 10% formalin)
- Vaccinate livestock in endemic areas.

Inter-sectoral cooperation

Good communication and cooperation including sharing laboratory facilities and knowledge and data between animal husbandry, medical and wild life services are essential to control of anthrax.

➢ BRUCELLOSIS

Brucellosis also known as “Undulant Fever”, “Mediterranean Fever” or “Malta Fever” is a bacterial infection affecting the livestock of our country with humans as an accidental host.

Epidemiology:

Goats, sheep, cattle, buffalo, swine and recently dog has been recognised as source of human infection. Infection persists throughout the lifetime of the animal.

Transmission:

- Ingestion of raw milk or milk products from infected animals or consumption of infected carcasses
- Contact with genital discharge, foetus, placenta, urine, and manure; carcasses especially among veterinarians, farmers and animal handlers.
- By inhalation and accidental inoculation.
- Person to person transmission is extremely rare.

Incubation period: One week to several months

Clinical Presentation

Brucellosis may present with acute or insidious onset, with continued, intermittent or irregular fever of variable duration, profuse sweating, fatigue, anorexia, weight loss, headache, arthralgia and generalized aching. Abscess formation is a rare complication. Brucella endocarditis and neuro-brucellosis lead to most of the deaths.

Case classification (Humans)

Suspected: A case that is compatible with the clinical description and is epidemiologically linked to a suspected/confirmed animal cases or contaminated animal products.

Probable: A suspected case with presumptive laboratory diagnosis.

Confirmed: A suspected or probable case with confirmatory laboratory diagnosis.

Animal Brucellosis:

In animals, the infection typically causes abortion in the pregnant female and epididymitis and orchitis in the male.

Laboratory Diagnosis:

In humans:

Sample**:**

- 3 - 4 ml blood in plain vial (serum)

Storage: at 2 - 4°C (fridge) for serology and -20°C for PCR

Transport: 2 - 4°C (vaccine carrier) for serology and at freezing temperature (dry ice) for PCR under prior intimation to laboratory.

Diagnosis: Serology is carried at NCDC; Serology, culture and RT PCR are carried out at IVRI, Bareilly (based on availability of test reagents)

In animals

- Culture of Brucella from abortion material, milk or tissues collected at autopsy provides a definitive diagnosis.
- Serology is usually the most practicable method.
- Cattle: RBT is recommended for screening; ELISA or complement fixation is recommended for confirmation of infection in individual animals.
- Screening of milk samples by milk ring test or ELISA is useful for surveillance.

Treatment: Medical advice must be sought. There is no vaccine available for humans, but an extended course of antibiotics is recommended.

- Uncomplicated cases in adults and children of 8 or more years: Doxycycline 100 mg twice a day + streptomycin 1 gram daily for 2-3 weeks

OR

- Doxycycline 100 mg twice a day for six weeks + rifampicin 600 – 900 mg daily for 6 weeks.

Prevention and Control

Individuals

- Consume only pasteurized or boiled milk and dairy products from cows, sheep, and goats.
- Ensure meat is thoroughly cooked.
- Exercise care in handling and disposal of placenta, discharges and foetuses.

Community

- Ensure farmers and slaughterhouse workers are aware of the risks of handling animal tissue and provide instructions in infection-control practices to minimize risk of exposure.
- Bury discarded animal remains.
- Animal brucellosis is best prevented by careful herd management and hygiene and vaccination.

IEC-Key Messages

- Consume pasteurized milk or boiled dairy products
- Ensure meat is fully cooked before consumption
- People, who handle meat, including hunters, should wear protective glasses and clothing and protect skin breaks from infection.
- Wash and disinfect items upon returning from high-risk areas

➢ RABIES

Rabies is a viral zoonotic disease primarily infecting domestic and wild animals. It spreads to people through close contact with infected saliva via bites or scratches. It is 100% fatal. There is no treatment globally once the disease develops.

It is endemic in whole India except Andaman & Nicobar Islands and Lakshadweep Island. An estimated 20000 deaths and 17.5 million animal bites are reported annually in the country.

Epidemiology

In India, dogs are responsible for about 97% of human rabies, followed by cats (2%), jackals, mongoose and others (1%).

Causative agent: Lyssavirus of rhabdoviridae family

Transmission: Through the skin following a bite or scratch by an infected animal.

Incubation Period: Usually 30 to 90 days after the bite of an infected animal, may be longer.

Signs & Symptoms:

The symptoms of rabies include fever, headache and fatigue, and then progress to involve the respiratory, gastrointestinal and/or central nervous systems leading to hydrophobia, aerophobia, coma, death.

Clinical description and recommended case definition

Case classification (humans)

Clinical case definition: A person presenting with an acute neurological syndrome (encephalitis) dominated by forms of hyperactivity(furious rabies) or paralytic syndromes (dumb rabies) progressing towards coma and death, usually by respiratory failure, within 7-10 days after the first symptom if no intensive care is instituted.

Laboratory criteria One or more of the following:

- Detection of rabies viral antigens by direct fluorescent antibody test (FAT) or DRIT by ELISA in clinical specimens, preferably brain tissue (collected post mortem).
- Detection by FAT on skin biopsy (ante mortem).
- FAT positive after inoculation of brain tissue, saliva or CSF in cell culture, or after intra-cerebral inoculation in mice or in suckling mice.
- Detectable rabies-neutralizing antibody titre in the serum or the CSF of an unvaccinated person.
- Detection of viral nucleic acids by PCR on tissue collected post mortem or intra vitamin a clinical specimen (brain tissue or skin, cornea, urine or saliva).

Case classification (humans)

- Suspected: A case that is compatible with the clinical case definition.
- Probable: A suspected case plus history of contact with a suspected rabid animal.
- Confirmed: A suspected case that is laboratory-confirmed.

Animal Rabies

Rabies in dogs is also classified as dumb (predominantly paralytic manifestation with docile behaviour of animal) or furious (mainly convulsions and aggressive behaviour with greatly exaggerated biting tendencies).

Clinical features in cats and cattle

Rabid cats show extreme aggressiveness, great sensitivity to touch/voice, profuse salivation and may attempt to attack dog or man. In cattle, rabies is manifested as abnormal movements of posterior extremity, foamy yellow froth from mouth and decrease in yield of milk.

Treatment after exposure:

Timely and appropriate treatment including wound washing with soap and water, application of antiseptic, instillation of rabies immunoglobulin's (in severe exposures – category III) and anti-rabies vaccination done as soon as possible after suspect animal bite or contact with infected material can prevent the onset of rabies in virtually 100% of exposures.

Prevention & Control of Rabies

Humans

- Pre-exposure prophylaxis to high risk group.
- Post exposure prophylaxis to all exposed humans.

Dogs:

- Through parenteral vaccination

National Rabies Control Programme:

Based on the experience gained under the Pilot Project, the NRCP is being implemented en approved under XII Five year plan consisting of both human & animal health components.

Human component: NCDC is the nodal agency. The strategy consists of training of Medical & Paramedical Professionals in timely appropriate Animal Bite Management, implementation of I/D route of vaccination, Strengthening of diagnostic activities, sensitization of other sectors (veterinary, wild life, animal husbandry) & creating awareness in the community (IEC) for prevention of human deaths due to rabies.

Animal Component: AWBI is the nodal agency. The strategy consists of animal birth control, Anti-rabies vaccination and creating awareness. The strategy will be piloted in the state of Haryana & Chennai city followed by country wide implementation.

IEC-Key messages

- Wash the wound immediately with water & soap
- Do not ignore animal bites/scratches
- Consult doctor/hospital for anti-rabies treatment immediately

Rabies is 100% fatal yet easily preventable

B. RE-EMERGING DISEASES

➢ LEPTOSPIROSIS

Leptospirosis is a disease caused by spiral-shaped Leptospira bacteria (leptospires). It occurs worldwide.

In India, Leptospirosis outbreaks have been reported from Kerala, Gujarat, Tamil Nadu, Karnataka, Maharashtra and Andaman & Nicobar Island.

Epidemiology Reservoirs

Leptospirosis affects humans and animals. Rodents are one of the primary reservoirs for Leptospira. Human disease caused by Leptospira species. can be an occupational hazard for veterinarians, rice field workers, livestock handlers and sewer workers. It has been associated with swimming, wading, and white-water rafting in contaminated lakes and rivers.

Transmission

Leptospirosis is spread largely through exposure to urine of infected animals or contaminated water or soil. Leptospires enter the body through mucous membranes of the eyes, nose, or mouth, or through broken skin.

Clinical description

After an incubation period of 2 days to 4 weeks patient presents acute febrile illness with headache, myalgia and prostration and may be associated with conjuctival suffusion, meningeal irritation, anuria or oliguria and/or proteinuria, jaundice, hemorrhages (from the intestines; lung bleeding is notorious in some areas), cardiac arrhythmia or failure, skin rash and a history of exposure to infected animals or an environment contaminated with animal urine. Other common symptoms include nausea, vomiting, abdominal pain, diarrhoea, and arthralgia.

Case definition

Suspected: Acute febrile illness with headache, myalgia and prostration

Associated with a history of exposure to infected animals or an

environment contaminated with animal urine with one or more of the

following

- Calf muscle tenderness
- Conjunctival suffusion
- Anuria or oliguria and/or proteinuria
- Jaundice
- Hemorrhagic manifestations (intestines, lung)
- Meningeal irritation
- Nausea, Vomiting, Abdominal pain, Diarrhoea.

Probable: Suspected case with positive presumptive laboratory diagnosis.

Confirmed: Suspect/Probable case with confirmatory laboratory test.

(Note: The classification of suspected, probable and confirmed does not in any way explain the severity and that has to be assessed based on the severity and rapidity of organ involvement.)

Laboratory criteria for diagnosis

Presumptive diagnosis

- A positive result in IgM immune- assays, slide agglutination test or Latex agglutination test or immune-chromatographic test.
- A Microscopic Agglutination Test (MAT) titer of 100/200/400 or above in Single sample based on endemicity.
- Demonstration of leptospires directly or by staining methods

Confirmatory diagnosis

- Isolation of leptospires from clinical specimen
- Four fold or greater rise in the MAT titer between acute and convalescent Phase serum specimens run in parallel.

- Positive by any two different type of rapid test.
- Sero-conversion.
- PCR test.

Samples:

- Blood in plain vial/serum for antibody detection
- Blood, urine, CSF, autopsy tissue such as kidney or liver for isolation of leptospires

  Collection of all the samples should be done taking recommended universal precautions. Gloves should be used at all times for personal protection. For details on collection, storage & transportation of blood & CSF samples refer to Chapter 8.

Diagnosis

The definitive diagnosis of leptospirosis depends on sero-conversion or four fold rise in antibody titer, PCR or isolation of leptospires from clinical specimen.

Treatment

Leptospirosis should be treated early in the infection with antibiotics (e.g., doxycycline or penicillin). People with more severe symptoms may require intravenous antibiotics. People with symptoms suggestive of leptospirosis should contact their health care provider.

Prevention and Control of Leptospirosis

1. **Personal protection**

   Hygienic methods such as avoidance of direct and indirect human contact with animal urine are recommended as preventive measures.

   Workers in flooded fields should be cautioned against direct contact with contaminated water or mud and should be advised to use rubber shoes and gloves.

   In case of any cuts or abrasion on the lower extremities of the body, the worker should apply an antiseptic ointment e.g. Betadine before entering after exit.

2. **Health education**

   The main preventive measure for leptospirosis is to create awareness about the disease and its prevention. This has to be

conceptualized through intensive educational campaign, IEC templates/software for audio visual, print, press, outdoor outreach modes, new and emerging electronic media.

3. Chemoprophylaxis

During the peak transmission season Doxycycline 200 mg, once a week, may be given to agricultural workers (e.g. paddy field workers, canal cleaning workers) in endemic areas from where clustering of cases has been reported. The chemoprophylaxis should be for six weeks and never to be extended for more than eight weeks.

4. Rodent control

It is established beyond doubt that rodents are the major reservoirs of bacterium Leptospira interogans. Four species of rodents Rattus rattus (House rat), Rattus norvegicus (Norway rat), Bandicotabengalensis (Lesser bandicoot) and Bandicotaindica (Larger bandicoot) are so far found to be reservoirs for this bacterium in India. Hence controlling these reservoir species with proper strategy planning and management planning will reduce the incidence of the disease in the affected areas. The strategic planning should cover the following:

1) Identifying the reservoir species of affected area
2) Delineating areas for anti-rodent activities
3) Completion of activities in pre monsoon months.
4) Adopting appropriate technology for anti-rodent operations. This includes correct inputs and appropriate application technology.
5) Capacity building
6) Creating awareness in general community and community participation

Nodal Agency for prevention & control: National Centre for Disease Control, Dte GHS, MoH&FW

IEC-Key messages

- Wear protective clothing (gloves, boots, long pants, and long-sleeved shirts) when working with wet soil or plants.
- Avoid swimming or wading in muddy ponds and slowly moving streams, especially those located near farms or stagnant water.
- Control rats and mice around the home on regular basis.
- Go to a medical doctor immediately:
  - If you have been in contact with contaminated water or mud during the rainy season, and
  - If fever develops with chills, headache and/or muscle pain

➢ SCRUB TYPHUS

Scrub typhus is a rickettsial infection caused by small, gram negative bacteria Orientia Tsutsugamushi. The disease has been reported from Jammu & Kashmir, Himachal Pradesh, Sikkim, Vellore, Rajasthan, Delhi, Darjeeling, Meghalaya, Manipur, Nagaland, Haryana, Maharashtra, Chandigarh, Uttarakhand and Chhattisgarh. Important reservoirs are rodents. During 2011 to 2014 outbreaks have been reported under IDSP from Karnataka, Himachal Pradesh, Nagaland, Uttarakhand, Tamil Nadu, Arunachal Pradesh, Rajasthan, West Bengal, Manipur and Meghalaya with 41 cases and 3 deaths (2011), 627 cases and 39 deaths (2012), 381 cases and 8 deaths (2013) and 72 cases and no deaths(2014).

Epidemiology

Transmission: It is transmitted by bite of the vector infected chigger (larva of mite).

Clinical presentation: Scrub typhus is one of the important causes of pyrexia of unknown origin (PUO).The patient present with high fever, headache, myalgia, malaise, lymphadenopathy and eschar. If untreated complications like pneumonia, meningo-encephalitis or myocarditis may develop.

Laboratory diagnosis

Scrub typhus may be diagnosed in the laboratory by:

i. Isolation of the organism
ii. Serology
iii. Molecular diagnosis (PCR)

Detection of antibodies in patient serum by Weil- Felix test and IgM ELISA remains the mainstay of the diagnosis.

Samples:

i. Serum
ii. Blood collected in tubes containing EDTA or Sodium citrate
iii. Blood clot

For details on collection, storage & transportation of blood & CSF samples refer to Chapter 8.

Treatment: Tetracycline/Doxycycline is the drugs of choice.

Prevention and control

- Vector Control by Insecticidal spraying.
- Uses of protective clothing impregnated with miticide (e.g. benzyl benzoate) and apply a mite repellent - diethyltoluamide, to the exposed skin while in infested terrain.
- No vaccine is available.

IEC-Key Messages

- Wear protective clothing
- Insect repellents containing dibutyl phthalate, benzyl benzoate, diethyltoluamide, and other substances can be applied to the skin and clothing to prevent chigger bites.
- Do not sit or lie on bare ground or grass; use a suitable ground sheet or other ground cover.
- Clearing of vegetation and chemical treatment of the soil may help to break up the cycle of transmission from chiggers to humans to other chiggers.

➢ ACUTE ENCEPHALITIS SYNDROME (AES)/JAPANESE ENCEPHALITIS (JE)

Acute Encephalitis Syndrome (AES) including Japanese Encephalitis (JE) is a group of clinically similar neurologic manifestation caused by several different viruses, bacteria, fungi, parasites, spirochetes, chemical/ toxins etc.

Epidemiology

There is seasonal and geographical variation in the causative organism. The outbreak of JE usually coincides with the monsoon and post monsoon period when the density of mosquitoes increases while encephalitis due to other viruses especially enteroviruses occurs throughout the year as it is a water borne disease.

Japanese Encephalitis (JE), a mosquito borne zoonotic viral disease, is one of the causes under AES. The virus is maintained in animals and birds. Pigs and birds,
Particularly the birds belonging to Family Ardeidae (e.g. cattle egrets, pond herons, etc.) are the natural hosts. Pigs and wild birds are reservoir of infection and are often called as amplifier hosts in the transmission cycle, while man and horse are .dead end hosts. Similarly other virus, fungi, parasite, spirochetes, toxin etc may cause similar illness.

Clinical Manifestations

Following an incubation period a prodrome of fever, headache, nausea, diarrhoea, vomiting, and myalgia occurs lasting for few days (1-5 days) followed by irritability, altered behaviour, convulsions and coma.

The progression of disease is rapid. Signs of raised intra cranial tension are commonly present in acute stage of illness. The patient may develop difficulty of speech and other neurological deficits like ocular palsies, hemiplegia, quadriplegia and extra pyramidal signs in the form of dystonia, choreoathetosis and coarse tremors.

Case definition of Acute Encephalitis Syndrome (AES) as per NVBDCP/IDSP

Clinically, a case of AES is defined as a person of any age, at any time of year with the acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, come, or inability to talk) AND/OR new onset of seizures (Excluding simple

febrile seizures). Other early clinical findings may include an increase.
In irritability, somnolence or abnormal behaviour greater than that seen with usual Febrile illness

Case classification

A case that meets the clinical case definition for AES i.e. suspected case should be classified in one of the following four ways

a) **Laboratory-confirmed JE:** A suspected case that has been laboratory-confirmed as JE with any of the following markers

- Presence of lgM antibody in serum and/ or CSF to a specific virus including JE/Entero Virus or others
- Four fold difference in lgG antibody titre in paired sera
- Virus isolation from brain tissue
- Antigen detection by immunofluorescence
- Nucleic acid detection by PCR

In the sentinel surveillance network, AES/JE will be diagnosed by lgM Capture ELISA, and virus isolation will be done in National Reference Laboratory.

b) **Probable JE:** A suspected case that occurs in close geographic and temporal Relationship to laboratory-confirmed case of JE, in the context of an outbreak.

c) **Acute encephalitis syndrome (due to agent other than JE):** A suspected case in which diagnostic testing is performed and an etiological agent other than JE virus Is identified.

d) **Acute encephalitis syndrome (due to unknown agent)** A suspected case in which, no diagnostic testing is performed or in which testing was performed but no etiological agent was identified or in which the test results were indeterminate.

For practical purposes, the two key definitions to be used are **Suspected JE cases** for those that meet the criteria for AES, and **Confirmed JE cases** for those AES cases which have laboratory confirmation for JE.

Laboratory diagnosis

Investigations, Sample Collection & Transportation

A. Investigations

i. Complete blood counts
ii. Peripheral blood smear-Malarial parasite
iii. Blood glucose, Electrolytes
iv. CSF and Blood for serology by IgM ELISA/ virus isolation, CSF is preferred since by the time patient presents with CNS manifestations the level of viremia in blood has decreased and there is cross reaction with other flavi viruses.
v. Other tests if necessary. (LFT/KFT/Blood Culture/ X-ray/ Ultrasound/ CT/ MRI/ Echocardiography or any specific test, ECG/EEG/ Suspected aetiology)
vi. Virus isolation should be done in Apex Reference Laboratories.

B. Specimen Collection

i. Blood (serum) and CSF specimen are to be collected. Blood specimen should be
ii. Collected within 4 days after onset of illness for isolation of virus and at least 5 days after onset of illness for detection if IgM antibodies. A second convalescent sample should be collected 10-14 days after the first sample.
iii. All attempts should be made to collect CSF specimens for confirmation of diagnosis.
iv. For details on collection, storage & transportation of samples refer to Chapter 8.

Case Management

The treatment of the patients may require, as follow:-

1) Management of Airways and Breathing.
2) Management of Circulation.
3) Control of Convulsion and Intracranial pressure
4) Control of Temperature
5) Maintenance of fluid and electrolytes and Calories/ Nutrition
6) General management
7) Specific treatment if any for treatable cause
8) Reporting of a case
9) Rehabilitation.

Prevention & control

1. The preventive measures are directed at reducing the vector density and in taking personal protection against mosquito bites using insecticide treated mosquito nets. The reduction in mosquito breeding requires eco-management, as the role of insecticides is limited.
2. Three doses of the JE vaccine provide immunity lasting a few years.
3. Piggeries may be kept away (4-5 kms) from human dwellings.

IEC-Key Messages

Dos

- Get vaccination against JE
- Keep doors/windows open during fogging
- Use bed nets or mosquito repellents
- Wear full-sleeve shirts, pants & socks to avoid mosquito bites
- Keep piggeries clean and away from home
- Use India Mark II hand pumps for drinking water purposes
- Keep the surroundings clean

Don'ts

- Don't lay patient in prone position
- In the event of unconsciousness/seizures don't put anything in patient's mouth
- Don't let water stagnate around houses
- Don't defecate in open or in fields
- Don't drink water from hand pumps with depth less than 40 feet
- Don't bathe or wash face in ponds

➢ KYASANUR FOREST DISEASE (KFD)

Kyasanur Forest Disease (KFD), a tick-borne viral disease. KFD was first recognized in 1957 in Shimoga District of Karnataka India, when KFD virus was isolated from a sick monkey in Kyasanur Forest and was followed by an outbreak of hemorrhagic febrile illness in humans.

Earlier KFD was unique to 5 districts (Shimoga, Chikkamagaluru, Uttara Kannada, Dakshina Kannada and Udupi) of Karnataka State, but in 2013, KFD virus was detected in autopsy of dead monkeys in Nilgiris District, Tamil Nadu. Human cases were detected from Wayanad district, Kerala in February 2015 and North Goa District of Goa in March-April2015.

Epidemiology: It is caused by Kyasanur Forest disease virus (KFD virus), a member of family Flaviviridae. KFD virus commonly infects the black faced langur (Presbytis entellus) and red faced bonnet monkey (Macaca radiate).

Transmission: KFD virus is transmitted by the bite of infected ticks (Hemaphysalis spinigera), especially at its nymphal stage, and the ticks remain infectious throughout their lives. Transmission to humans may occur after a tick bite or contact with an infected animal, most importantly a sick or recently dead monkey. No person-to-person transmission has been described.

Host: Rodents, shrews, and monkeys are common hosts for KFD virus after being bitten by an infected tick. KFD virus can cause epizootics with high fatality in primates.

Clinical presentation: The symptoms of KFD begin suddenly with chills, fever, and headache. Severe muscle pain with vomiting, gastrointestinal symptoms and bleeding problems may occur 3-4 days after initial symptom onset. Patients may experience abnormally low blood pressure, and low platelet, red blood cell, and white blood cell counts. The estimated case-fatality rate ranges from 3 to 5%.

Diagnosis: In the early stage of illness diagnosis can be made by molecular detection by PCR or virus isolation from blood. Later, serologic testing using enzyme-linked immunosorbent serologic assay (ELISA) can be performed. Diagnostic facilities are available at NIV, Pune, Viral diagnostic lab, Manipal.

Samples**:**

(i) Human: 3-4 ml blood in plain vial (serum)
(ii) Animals: Necropsy tissue
(iii) Ticks

For details on storage & transportation of samples refer to chapter 8.

KFD diagnosis (anti-KFD virus IgM antibodies by IgM ELISA and for KFD viral RNA by real-time RT-PCR is carried out by National Institute of Virology.

Treatment: There is no specific treatment for KFD, but early hospitalization and supportive therapy is important. Supportive therapy includes the maintenance of hydration and the usual precautions for patients with bleeding disorders.

Prevention and Control

- Formalin inactivated tissue culture vaccine is available for KFD and is used in endemic areas of India. NIV has developed an inactivated chick embryo tissue culture vaccine against KFD. This vaccine evokes neutralizing antibodies response in about 70% of the vaccinated persons. The technology has been transferred to the Karnataka Public Health Department for production and vaccination

  Dosage

  - Children - 6 to 14 years 0.5 ml subcutaneously.
  - Adult - 15 to 65 years 1.0 ml subcutaneously.

- Malathion dusting in 50m radius of monkey death and controlled burning in forest area for tick control.

Use of insect repellents and wearing protective clothing while going in forest in areas where ticks are endemic.

IEC-Key Messages

- Get timely treatment
- Use tick repellents such as DEET, DMP, and DBP for protection against tick bite.
- Vaccination of villagers and forest workers is effective.

➢ PLAGUE

Plague is an acute bacterial zoonotic disease caused by Yesinia pestis.

Epidemiology: Plague is endemic in parts of seven states of the country viz: Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Gujarat, Himachal Pradesh and Uttarakhand. Wild and peri-domestic rodents are the reservoir of the disease. In the recent past, outbreaks occurred in district Beed and Surat (1994), Hatkoli, Shimla (2002) and Uttar Kashi (2004).

Transmission:

- It is transmitted by the bite of vector (rodent fleas mainly Xenopsylla species) from infected rodents to other rodents and humans
- Direct contact with infected tissues or fluids from handling sick or dead animals
- Respiratory droplets from cats and humans with pneumonic plague

Incubation Period: For bubonic plague- 2-6 days. In pneumonic plague- 1-3 days.

Clinical presentation:

There are three different types of plague: Bubonic, Septicemic and Pneumonic**.** The common symptoms of plague are sudden onset of fever with chills, weakness, enlarged tender lymph nodes and cough with sputum.

Case Definition

Suspected Plague

Compatible clinical presentation and consistent epidemiological featu such as exposure to infected animals and/or evidence of flea bites and/or residence in or travel to a known endemic focus within the pre 10 days.

Presumptive Plague

Meets the definition for suspected case plus; at least two of the follow tests must be positive;

- Microscopy: material from bubo, blood or sputum contains Gram negative coccobacilli, bipolar after Wayson or Geimsa staining;
- F 1 antigen detection in bubo aspirate, blood or sputum

- A single anti-F1 serology without evidence of previous of Yersinia infection or vaccination.
- PCR detection of Y. pestis in bubo aspirate, blood or sputum

Confirmed plague

Meets the definition of suspected case plus

- An isolate from a clinical sample identified as Y. pestis (colonial morphology and two of the four following tests must be positive); phage lyses of cultures at 20-25°C and 37°C; F 1 antigen detection; PCR; Y. pestis biochemical profile;
- Or a fourfold difference in anti-F antibody titre in paired serum samples;
- Or (in endemic areas when no other confirmatory test can be performed) a positive rapid diagnostic test using Immunochromatographic to detect F1 antigen.

Diagnosis:

Collection, storage & transportation of sample

Humans:

- Bubonic plague: bubo aspirate
- Septicemic plague: blood
- Pneumonic plague: sputum
- Post-mortem specimen

Rodent: blood, organs-spleen, liver

Flea specimens

Material for laboratory diagnosis of plague can be obtained from the following sources:

1. Human beings suffering from infection
2. Post-mortem specimens
3. Specimens from rodent tissues
4. Flea specimens
5. Soil specimens

The human material consists of the followings:

a) Aspirate from bubo
b) Blood
c) Sputum
d) Throat swab

Collection of samples from patients

Blood culture should be collected from all the patients in appropriate blood culture media. Acute and convalescent specimens of blood sera should be collected from all the patients. The convalescent specimen should be collected at least 10 - 14 days after the first sample. It is also desirable to collect single specimen for retrospective study from any patient who has recovered from the disease. For details refer to www.ncdc.gov.in

Transportation of specimens

Specimens from human beings

Cary-Blair transport medium is usually adequate for the transport of all clinical and autopsy material with the exception of blood collected for bacteriological and serological studies. Blood culture bottles and bottles with sera should be sent directly to laboratory with due precautions to protect against breakage or extreme heat

Gross tissue specimens

For shipment to laboratory gross specimens, tissues from rodents or autopsy material should be placed in stout screw capped bottles and frozen. Refrigeration with wet ice can also work if the transportation is not to take long time.

Flea specimens

Flea pools may be sent to laboratory in vials containing 2.5% saline. A flea pool that is prepared in the field, however, should never consist of more fleas than those collected from a single host.

While collecting and transporting specimens following precautions must be undertaken:

a. Sample should be properly labelled
b. Details of sample (matching those on label) should be sent on one separate sheet also
c. A detailed and complete history should be recorded and sent to the laboratory
d. The complete address where the report is required should also accompany the specimen.
e. Diagnostic facilities are available at Central Plague Lab, NCDC, Delhi & Plague Surveillance Unit, Bangalore.

Treatment

Antibiotics viz. Streptomycin, Tetracycline, Chloramphenicol and Gentamicin are effective.

Prevention and control

- Patients with diagnosis of suspect plague should be kept in strict isolation for 48 hour after initiation of specific therapy.
- Case Contact Management: Casual contacts of plague patients and those who have had similar exposure to probable sources of infection generally do not require antibiotic prophylaxis, but should be placed under disease surveillance for 6 to 10 days. Those developing fever or other symptoms during the observation period should undergo medical evaluation and, if needed, given tetracycline or other appropriate therapy.
- Close family members or others having intimate contact with patients who display signs of pneumonia should be immediately placed on abortive therapy and monitored closely for the development of plague like illness.
- The vaccines are variably immunogenic and moderate to highly reactogenic. They do not protect against primary pneumonic plague. In outbreak situation vaccination is of little use as it takes a month or more to develop protective immune response. The vaccinated persons who have been exposed to a definite risk of infection must be given prophylactic antibiotics.
- Environmental control measures: Rodent & vector control measures should be implemented. Ectoparasites control must precede or be concomitant with rodent control measures.

Surveillance:

Central Plague Lab, NCDC Delhi, Plague Surveillance Unit Bangalore along with State Plague Control Units in Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Gujarat, HP & Uttarakhand undertake plague surveillance in plague endemic states to detect the evidence of plague infection among wild and peri-domestic rodents and to ascertain the current status of sylvatic plague.

C. EMERGING DISEASES

➢ CRIMEAN CONGO HEMORRHAGIC FEVER (CCHF)

Crimean Congo Haemorrhagic Fever (CCHF) is a viral hemorrhagic fever. It has high fatality rate. First outbreak was reported in Gujarat in January 2011 where 9 cases & 4 deaths were reported. Subsequently, outbreaks have been reported from Gujarat, Rajasthan and Uttar Pradesh.

Transmission:

Animal to Human Transmission: Human beings may acquire the CCHF virus by direct contact with blood or other tissues of infected livestock or they may become infected through a tick bite or crushing of infected tick. Meat itself is not a risk because the virus is inactivated by post-slaughter acidification of the tissues and would not survive cooking.

Human to Human Transmission: Humans can become infected if blood, body fluids and wastes from patients with the disease comes into contact with broken skin or mucous membranes, as occurs when medical care personnel sustain accidental needle stick injury. In advanced stages of the disease, aerosol contact of blood of the patient can also lead to transmission of the virus.

Clinical presentation:

CCHF has nonspecific clinical presentation with sudden onset of high fever with headache, body aches, abdominal pains, vomiting and rash with hemorrhagic manifestation in later stages which may lead to multi-organ failure and death.

Patients are divided into 3 categories:

Category-A: Those that have relatively mild disease (fever less than 38.5°C, No systemic bleeding, Alanine Transaminase (SGPT) levels less than 150 IU, Platelet count more than 50,000). These patients improve spontaneously in about day 10 of illness. Patient can be managed with supporting therapy and regular monitoring for worsening of symptoms. These patients do not require Ribavirin.

Category-B: Those who are in the first 5 days of illness and are severely ill with high grade fever (more than 38.5°C), local and systemic bleeding manifestations, having Alanine Transaminase (SGPT) levels of 150 IU or more, Aspartate Aminotransferase (SGOT) of 200 IU or more, platelets (less than 50,000) or Activated Partial Thromboplastic Time (APTT) of 60

seconds or more. Even if the patients still look comparatively well at this stage these clinical path values are markers of poor prognosis if recorded during the first 5 days of illness and persons in this group should be treated as soon as possible with ribavirin.
Those who are recognized and treated early enough respond remarkably well to ribavirin.

Category C: Patients first seen/recognized as CCHF after day 5 and are in comatose/terminal state with DIC and multi organ failure. Treatment with ribavirin is indicated but the prognosis is very poor.
Category B&C patients, even if they subsequently test negative, should receive the full course of ribavirin.

Case definition

Suspected case: A patient with abrupt onset of high fever more than38.5°C and one of the following symptoms: severe headache, myalgia, nausea, vomiting, and/or diarrhoea

AND/OR

- History of insect (tick) bite within 14 days prior to the onset of symptoms; or
- History of contact with tissues, blood, or other biological fluids from a possibly infected animal (e.g., abattoir workers, livestock owners, veterinarians) within 14 days prior to the onset of symptoms; or
- History of exposure to a suspect, probable, or laboratory-confirmed CCHF case, within 14 days prior to the onset of symptoms (contacts of the patient including health care workers)

Probable case: A probable CCHF case is defined as a suspected CCHF case fulfilling in addition the following criteria:

Thrombocytopenia less than 50,000/cm AND

Two of the following hemorrhagic manifestations: hematoma at an injection site, petechiae, purpuric rash, rhinorrhagia, Hematemesis, hemoptysis, gastrointestinal hemorrhage, gingival hemorrhage, or any other

hemorrhagic manifestation in the absence of any known precipitating factor for hemorrhagic manifestation.

Confirmed case: A confirmed CCHF case is defined as a case that fulfils the criteria for suspect/ probable CCHF and in addition is laboratory-confirmed with one of the following assays:

- Detection by RT-PCR of CCHF virus genome in a clinical specimen confirmed by sequencing of the PCR product.
- Detection by ELISA or IFA of specific IgM antibodies against CCHF virus or a 4-fold increase in specific IgG antibodies against CCHF virus in two specimens collected in the acute and convalescence phases.
- CCHF virus isolation.
- Laboratory Diagnosis

Diagnosis: As CCHF virus is classified as risk group 4 virus and hence the clinical samples should be handled in specially-equipped, high biosafety level laboratories (BSL 3 plus or 4).

Sample Collection

- Ante-mortem: Blood sample: Serum/Plasma
- Post-mortem: Tissue sample (liver, spleen, bone marrow, kidney, Lung and brain)
- In the first few days of illness diagnosis is achieved by virus / genome detection in blood or tissue samples.

Collection: Samples should be collected with all biosafety precautions and should be accompanied with detailed history of patient on the performa which can be obtained from the testing laboratory. Before dispatching the sample disinfect the outer
Surface of container using 1:100 dilution of bleach or 5% Lysol solution.

Transportation of sample: Sample should be safely packed in Triple container packing and should be transported under cold chain to the reference laboratory with prior intimation. However, in the areas where obtaining such container is difficult.

The samples can be sent as follows:

- The case sheets with complete information about the samples should be completely filled in Case report Form (separate sheet) and provided along with the samples.
- The blood sample [Serum or plasma or blood in EDTA] should be kept in screw cap plastic vials, with proper label.
- The sample containing vials should be kept in good quality plastic bags which should either be sealed by heat or tied with rubber bands so that inside material, if leaks, should not come out of the bag.
- This plastic bag should be placed in another plastic container which should be sealed with adhesive tape. This carrier should then be placed in another plastic bag sealed with rubber bands and be placed in a thermocol or vaccine carrier containing ice
- If plastic container is not available then good quality of double plastic bags can be used.
- The case sheets with complete information should be place in a plastic bags or envelops and be pasted outside of the thermocol or vaccine container.
- Person handling the sample should wear gloves and a gown to avoid direct contact with the infectious material. After completing the packing of samples, person should thoroughly wash hand with soap and water.
- Before dispatching the container, Bleach can be used for disinfection. A 1:100 dilution of bleach or 5% Lysol solution should be used to clean the outer surfaces of the container.

Diagnosis can be established by detection of viral RNA by molecular techniques (PCR), detection of IgM antibodies by ELISA and isolation of virus. The diagnostic facilities are available at NCDC, Delhi; NIV, Pune; and Institute of High Security Animal Diseases (Formerly HSADL), Bhopal. Isolation of virus requires BSL 3+/4 facilities.

Treatment: Treatment is mainly supportive care. Antiviral drug Ribavirin has been is used in treatment. It is available in India.

Prevention and Control

Isolation of patient and infection control precautions in hospitals. No vaccine is currently available. IEC for general community focusing on prevention of tick bites and Vector (Tick) control.

Risk Communication

Hospital setting provides an enabling environment for risk communication. OPD may be used as a venue for educating patients on animal-human-vector interface and simple measures for disease prevention such as personal hygiene, hand washing, daily bath, keeping domestic animals clean and free from ticks, general health and sanitation measures in house and within the surroundings and self-reporting of symptomatic cases.

➢ NIPAH VIRUS

Nipah virus infection is newly emerging Zoonoses that causes severe disease in both animals and humans.

In the Malaysia and Singapore outbreaks, Nipah virus infection was associated with close contact with Nipah virus-infected pigs.

In Bangladesh, where Nipah virus infection is more frequent, exposure has been linked to consumption of raw date palm sap and contact with bats. Importantly, human-to-human transmission has been documented.

In India, 2 outbreaks of Nipah virus infection have been reported. First outbreak was reported in Siliguri district, West Bengal in 2001 & Nadia district, West Bengal in 2005

Epidemiology: Nipah virus is a member of the family Paramyxoviridae, genus Henipavirus.

During the Nipah virus disease outbreak in 1998-99, 265 patients were infected with the virus. About 40% of those patients who entered hospitals with serious nervous disease died from the illness.

Modes of Transmission**:** Transmission of Nipah virus to humans may occur after direct contact with infected bats, infected pigs, or from other Nipah virus infected people.

Incubation Period: 5 to 14 days

Clinical Presentation:

Infection with Nipah virus is associated with encephalitis (inflammation of the brain). After exposure and an incubation period of 5 to 14 days, illness presents with 3-14 days of fever and headache, followed by drowsiness, disorientation and mental confusion. These signs and symptoms can progress to coma within 24-48 hours. Some patients have a respiratory illness during the early part of their infections, and half of the patients showing severe neurological signs showed also pulmonary signs.

Long-term squeal following Nipah virus infection have been noted, including persistent convulsions and personality changes.

Latent infections with subsequent reactivation of Nipah virus and death have also been reported months and even years after exposure.

Diagnosis Laboratory diagnosis of a patient with a clinical history of Nipah virus can be made during the acute and convalescent phases of the disease by

using a combination of tests. Virus isolation attempts and real time polymerase chain reaction (RT-PCR) from throat and nasal swabs, cerebrospinal fluid, urine, and blood should be performed in the early stages of disease. Antibody detection by ELISA (IgG and IgM) can be used later on. In fatal cases, immunohistochemistry on tissues collected during autopsy may be the only way to confirm a diagnosis.

Samples:

- 3-4 ml blood in plain vial (serum) for serology
- Tissue
- For histopathology-formalin fixed tissue of lungs and airways
- For PCR & virus isolation- Non formalin tissue-Lung, spleen, kidney, tonsils and CNS tissue
- Storage: at 2-4°C (fridge) for serology and -20°C for PCR under prior intimation to laboratory
- Nipah virus diagnosis (IgM antibodies by IgM ELISA and for Nipah viral RNA by real time RT-PCR and virus isolation) is carried out by National Institute of Virology, Pune. RT PCR facility is available at NCDC, Delhi.

Treatment

Treatment is limited to supportive care. The drug ribavirin has been shown to be effective against the viruses in vitro, but human investigations to date have been inconclusive and the clinical usefulness of ribavirin remains uncertain.

Passive immunization using a human monoclonal antibody targeting the Nipah G glycoprotein has been evaluated in the post-exposure therapy in the ferret model and found to be of benefit.

Prevention & Control

- Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in endemic areas and not drinking raw date palm sap.
- As Nipah virus encephalitis can be transmitted person-to-person, standard infection control practices and proper barrier nursing techniques are important in preventing hospital-acquired infections (nosocomial transmission).
- Additional efforts focused on surveillance and awareness will help to prevent future outbreaks.

- A subunit vaccine, using the Hendra G protein, produces cross-protective antibodies against Hendra virus and Nipah virus has been recently used in Australia to protect horses against Hendra virus. This vaccine offers great potential for Henipa virus protection in humans as well.

➢ AVIAN INFLUENZA

Avian influenza (AI), commonly called bird flu, is an infectious viral disease of birds. Most avian influenza viruses do not infect humans; however some, such as A (H5N1) and A (H7N9), have caused serious infections in people. Reports of highly pathogenic AI epidemics in poultry, such as A(H5N1), can seriously impact local and global economies and international trade.

Modes of Transmission: Incubation period ranging from 2 to 8 days and possibly as long as 17 days. WHO currently recommends that an incubation period of 7 days be used for field investigations. The likelihood of A (H5N1) infection for ill persons is increased if exposure to birds or environments contaminated with bird droppings or consumption of uncooked poultry products occurred.

Clinical presentation: High fever (usually temperature more than 38°C), and other influenza-like symptoms (cough or sore throat). Diarrhoea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported as early symptoms in some patients. Respiratory distress, a hoarse voice, and a crackling sound when inhaling are commonly seen. Complications of infection include hypoxemia, multiple organ dysfunction, and secondary bacterial and fungal infections.

Case definitions as per WHO

Suspected H5N1 case: A person presenting with unexplained acute lower respiratory illness with fever (more than 38ºC) and cough, shortness of breath or difficulty breathing.

AND

One or more of the following exposures in the 7 days prior to symptom onset:

a. Close contact (within 1 meter) with a person (e.g. caring for, speaking with, or touching) who is a suspected, probable, or confirmed H5N1 case;
b. Exposure (e.g. handling, slaughtering, defeathering, butchering, preparation for consumption) to poultry or wild birds or their remains or to environments contaminated by their faeces in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;

c. Consumption of raw or undercooked poultry products in an area where H5N1 infections in animals or humans have been suspected or confirmed in the last month;
d. Close contact with a confirmed H5N1 infected animal other than poultry or wild birds (e.g. cat or pig);
e. Handling samples (animal or human) suspected of containing H5N1 virus in a laboratory or other setting.

Confirmed H5N1 case

A person meeting the criteria for a suspected or probable case AND One of the positive results from the laboratory diagnosis as mentioned in diagnosis.

Collection, Storage & transportation of sample:

Upper respiratory tract Posterior-pharyngeal (throat) swabs are currently the highest yield upper respiratory tract specimen for detecting A (H5N1). Naso-pharyngeal swabs may be collected if necessary.
If the patient is incubated, take a tracheal aspirate or collect a sample during bronchoalveolar lavage. Blood / Serum (acute and convalescent if possible).

A throat swab should be taken (if possible) within three days of onset of symptoms. Note that the virus is generally detectable in throat swabs from most patients from the point of onset of symptoms (or even just before) until towards the end of the second week, and infrequently beginning of the third week, after onset of symptoms.

Transported upright and secured in a screw cap container or in a rack in a transport box. They should have enough absorbent paper around them to soak up all the liquid in case of spillage

Collected samples for viral isolation can be taken to the laboratory within four days; they may be kept at +4°C and frozen at -70°C on arrival if they are to be stored.

Diagnosis: Oropharyngeal (throat) swab specimens is collected for testing. One of the following positive results from influenza laboratory is accepted by WHO as confirmatory:

a. Isolation of an H5N1 virus;
b. Positive H5 PCR results from tests using two different PCR targets, e.g. primers specific for influenza A and H5 HA
c. A fourfold or greater rise in neutralization antibody titer for H5N1 based on testing of an acute serum specimen (collected 7 days or less after symptom onset) and a convalescent serum specimen. The convalescent neutralizing antibody titer must also be 1:80 or higher.
d. A micro neutralization antibody titer for H5N1 of 1:80 or greater in a single serum specimen collected at day 14 or later after symptom onset and a positive result using a different serological assay, for example, a horse red blood cell hemagglutination inhibition titer of 1:160 or greater or an H5-specific western blot positive result.

Treatment: Treatment is mainly supportive care. Antiviral drug Oseltamavir has been is used in treatment. It is available in India.

Prevention and Control: IEC for general community focusing on prevention. Investigation of ill persons will usually be undertaken in the context of established or highly suspect A (H5N1) infection in domestic or wild bird populations.

Preparedness

i. Government of India has implemented the Integrated Disease Surveillance Programme (IDSP) to detect and respond to disease outbreaks due to epidemic prone diseases including Avian Influenza.
ii. Technical assistance is provided to the States for investigation, prevention and control of the outbreaks by Central/NCDC team.
iii. Under IDSP the District and State capacities have been strengthened. by providing additional manpower, training of identified Rapid Response Team members for outbreak investigations and information and communications technology (ICT) equipment for data entry, analysis and data transfer.
iv. Since Avian Influenza is a zoonotic disease, outbreak investigations are carried out in collaboration with State Animal Husbandry Department

and National Institute of High Security Animal Diseases (formerly HSADL) Bhopal for effective prevention and control measures.

8. COLLECTION, STORAGE AND TRANSPORTATION OF SAMPLES

Sample Collection, Storage and Transportation

Appropriate sample in adequate quantity and timely collection, storage and transportation of sample is of utmost importance for laboratory diagnosis. Fill in the appropriate performa (if available) giving all relevant clinical and epidemiological details. Samples should be collected before giving antimicrobials. If antimicrobials have been given, provide name, dose and duration of administration.

Transport samples to the laboratory after prior intimation.

Samples to be collected

Virus/bacteria Isolation and PCR – illness less than 5 days

- CSF
- Blood
- Tissue Samples

Antibody detection – illness more than 5 days

- Serum
- CSF

Collection of samples

Blood

- Use infection control precautions while collecting blood:
- Personal protective equipment: wear disposable gloves.
- Wash hands thoroughly with soap and water or alcohol□based hand gel before and after the procedure.
- When completed, dispose of the gloves, syringe, needle and swab in hypochlorite solution or any other disinfectant.
- Aseptically collect 5 ml of venous blood in plain vial.
- Preferably separate the serum before storing
- Put the self-adhesive label indicating name of the patient, hospital identification number and date of collection on each tube.

CSF

CSF sample should be collected by experienced doctor following all aseptic precautions.

Aliquot the CSF sample in the following tubes in the specified quantity in the mentioned priority:

Priority	Quantity	Tests	Remarks
First tube	0.5 ml	Cytology, Biochemistry (Protein and sugar), gram stain and culture	Send to Hospital laboratory
Second	1ml		Store at 4°C for transportation to laboratory

- Put the self-adhesive label indicating name of the patient, hospital identification number and date of collection on each tube.

Specimen container

- Should be leak proof, break-resistant plastic or glass container
- Screw cap, containers are preferable.
- After the container is closed and sealed - Wipe with a disinfectant - a chlorite solution (sodium hypochlorite)

Packaging and storing of samples

- Place all the sample vials of a patient to be transported in a leak proof zip lock bag.
- Place this zip lock bag in a break resistant secondary container or bigger zip lock bag with absorbent material (cotton). Place the filled in performa in the bag.
- Place these samples packed in dual bags/containers at 4°C. and transport within 48hrs of collection
- If the samples cannot be transported immediately than store samples at frozen temperatures (preferably -80°C, if it is not possible than at -20°C)

Transportation

- Place the bags containing the samples of different patients in a vaccine carrier. Pack the vaccine carrier with frozen ice packs. Close the vaccine carrier properly.
- Courier the Vaccine carrier by air to the appropriate laboratory.

9. OUTBREAK INVESTIGATION REPORTS

Human and animal health is inextricably linked to each other. To maintain balance between human and animal health the human and animal health departments need to go hand in hand. The outbreak investigations given ahead are elaborating the importance of inter-sectoral coordination between human and animal health departments.

i. ANTHRAX

Place: Simdega district, Jharkhand
Date: 26th October- 7th November 2014
On 14th October 2014, a village school teacher of Kuruchdega village reported an outbreak of 5 deaths of persons with fever and skin ulcer to CHC Bano (Bano block). The medical officer in-charge of Bano block visited the village on 15th October and informed the civil surgeon and epidemiologist of the Simdega district about the outbreak.

Subsequently, the district surveillance team visited the village on 18th October followed by the State Rapid Response Team (RRT) and experts from Rajendra Institute of Medical Science (RIMS). On 25th October RIMS Ranchi confirmed Bacillus anthracis from one wound swab out of three collected from patients on 22nd October.

OBJECTIVES:

1. To study the epidemiological characteristics of the outbreak
2. To determine potential risk factors associated with the outbreak
3. To propose recommendations for prevention and control of the outbreak

METHODS:

- Medical records of all admitted cases of suspected anthrax cases in the Sadar Hospital, Simdega district were reviewed and a line-list was prepared.
- Data were collected by face-to-face interviews with all suspected cases in Tungritoli hamlet of Kuruchdega village
- Information including name, age, occupation, work practices, disease onset, symptoms and treatment were recorded in the case investigation form.

The following case definition was used for this outbreak investigation:

Case Definition: A person of any age and sex residing in Tungritoli hamlet of Kuruchdega village with painless skin lesions (papule, vesicle or eschar) or systemic symptoms (lymphadenopathy, shortness of breath, or pain in abdomen), appearing between August and October 2014.

Three types of clinical specimens were collected: blood, eschar and blister fluid.

The blood smear with Gram staining and culture was evaluated at the Rajendra Institute of Medical Science (RIMS), Ranchi.

There were 3 bull deaths and one calf death reported from Tungritoli hamlet of Kuruchdega village. 1st bull death was on 21st August followed by a calf death on 28th August. The second and third bull died on 2nd and 9th October respectively.

On 24 October 2014, the Animal Health Department, Jharkhand arrived at Kuruchdega village for the trace back investigation and 50 random blood samples from bulls and cows were collected. The soil particles were collected from the slaughtered site of the bull which died on 9th October and were sent to the Centre for Animal Disease Research and Diagnostic Centre (CADRAD) at Ranchi.

Excel 2007 was used for the database, and data were analysed with Epi Info 7.1.4. Bivariate logistic regression was used and this was found to be statistically significant.

RESULTS:

Descriptive Study

Confirmation of Outbreak:

There was no documented report of an Anthrax case in the last five years as reviewed from the records available at the district and state surveillance unit. This suggests the existence of the outbreak.

On 19th October 2014, a community camp was conducted by the rapid response team from Simdega. An additional 8 suspected Anthrax cases were identified and were admitted at Simdega Sadar hospital for isolation and treatment. All 13 cases were initiated with Ciprofloxacin/ Doxycycline.

During August to October 2014, a total of 13 cases including 5 deaths were reported from Tungritoli hamlet of Kuruchdega village.

Out of 13 cases reported, all were male with a median age of 30 years. The overall attack rate was 11.1% (13/118) and it was maximum among the age group of 20-24 years. The case fatality rate (CFR) was 38.4% (5/13).

All reported consuming dead bull meat; those aged 26-35 years reported also being involved in the slaughtering, handling, and/or chopping of the dead bull meat.

It was reported that all five dead bodies were being cremated as per Hindu cultural practice.

Seven teams Animal health department were deputed to vaccinate all the livestock in and around the affected area. As per the guideline, teams had covered more than 5 kms around the affected community.

Additional active case finding was undertaken by district with the help of the central investigating team in the neighbouring five villages, OPD/IPD registers were screened and no new cases were found.

LABORATORY DATA:

Blood samples and wound swab were collected from three of thirteen suspected cases with cutaneous lesions and processed for laboratory confirmation of Bacillus anthracis at Rajendra Institute of Medical Science (RIMS), Ranchi.

1 of 3 samples tested at RIMS laboratory was culture confirmed for Anthrax and all three samples were positive for staphylococcal infection (secondary infection).

HYPOTHESIS:

Based on the findings of the descriptive study and interview with 26 cases the following hypothesis was generated

“Handling dead bull meat was associated with Anthrax disease”.

Handling involves the process of Slaughtering, chopping and eating the dead bull meat

This hypothesis was tested by conducting a case control study.

Results of Analytic Study:

All enrolled participants in the study had consumed dead bull meat. Slaughtering, chopping or handling the dead bull meat was found significantly associated with having Anthrax disease.

Role of Veterinary Consultant:

The Veterinary Consultant is expected to intimate health department in case animal deaths are reported from an area. On confirmation of outbreak of anthrax he/she is expected to ensure proper disposal of anthrax carcasses, disinfection, decontamination and disposal of contaminated materials, and ring vaccination of exposed susceptible animals, prevent movement of livestock from affected area and ensure vaccination of humans in at risk occupations.

ii. **KYASANUR FOREST DISEASES (KFD)**

Place: North Goa

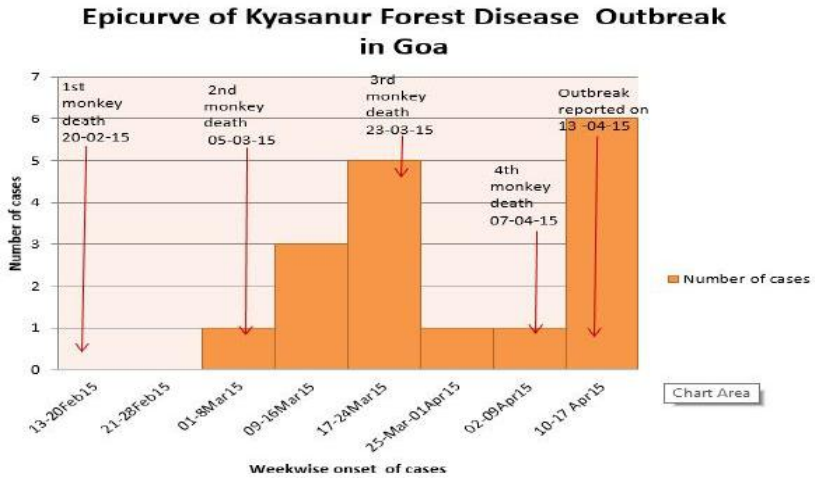
On 13.4.2015, State Surveillance officer, IDSP Goa reported 18 positive cases of KFD from North Goa district to IDSP, NCDC, New Delhi and requested for central assistance to investigate. A central team was constituted by Director NCDC, and the team reached Goa on 16/04/15 and conducted a descriptive study.

On 05.03.2015, a female died of fever and acute gastroenteritis, which triggered the public health action and a cluster of cases of fever with acute gastroenteritis were found at village Pale.

A **Clinical case** was defined as "A person residing in an area under CHC Valpoi in close vicinity to Madahai wild life sanctuary with a presentation of fever with GI symptoms (Diarrhoea/ vomiting) with or without any of the following: headache, myalgia, hemorrhagic or neurological manifestations from 21/2/2015" **Confirmed Case** was defined as "A clinical case positive by RT-PCR".

During the study period i.e., 16th April to 21st April 2015, there were 44 probable cases, and out of 21 samples tested at Manipal Virus Research Centre (MVRC), 19 were found positive for KFD virus by RT-PCR. One confirmed case died and hence case fatality rate was 5.3%.

The team could interview 16 out of 19 positive cases and all the cases had fever, followed by vomiting and diarrhoea which was seen in 50% of cases each. Myalgia and headache was observed in 43.7% and 31.2% of cases respectively. Hemorrhagic manifestations in the form of blood in stools were documented in one of the confirmed cases. Blood reports of only 10 patients were available according to which, thrombocytopenia was seen in 60.0% confirmed cases and leucopoenia in 55.6% confirmed cases which clearly matches with the clinical picture of KFD. A similar clinical picture is seen in dengue, scrub typhus and Leptospira but all the confirmed cases tested for them were negative.



It was concluded that the on-going outbreak of KFD reported from Village Pale, North Goa, is occurring in populations living or working in cashew plantation near the Madei forest reserve, where 04 monkey deaths have been reported between 20/2/2015 to 7/4/2015. Hemaphysalis genera ticks were also been collected for further investigation.

RECOMMENDATIONS:

- This is the first time that Goa has reported an outbreak of KFD. State was advised to consider passive surveillance of cases in areas within 5 km of Madei forest range.
- To consider undertaking tick control measures (dusting of 5% Malathion or controlled burning) in monkey death areas covering 50 meter radius of the hot spot.
- To intensify IEC activities in all the affected villages regarding natural history of disease, personal protection from tick bite, avoiding monkey death areas and seeking health care services in case of appearance of symptoms.
- To consider a vaccination strategy for high risk group in co-ordination with Karnataka Health and Animal Husbandry departments for sharing their expertise regarding KFD.

Role of Veterinary Consultant: The Veterinary Consultant is expected to intimate health department when monkey falls are reported from an area. Veterinary Consultant is expected to work as link between human and animal health department to control the outbreak. They should spread IEC-Key messages in the affected area. In case animal deaths are reported from an area.

10. CASE STUDY

CCHF

On 17th January, Hon'ble Minister of Health, Govt. of Gujarat received a message about occurrence of unusual fevers in two hospitals in Ahmadabad. Subsequently the Hon'ble Minister directed the Deputy Director, Epidemic Cell to take appropriate action. It was found that on 15th January 2011 BS Hospital (name changed), Ahmadabad had sent the serum sample of one of the patient Anju (name changed), working as staff nurse in the same hospital) to NIV, Pune by messenger. On 18th Jan 2011 NIV, Pune declared the sample to be positive for Crimean Congo Hemorrhagic Fever (CCHF). On 19th January, the state Government requested Government of India to investigate the outbreak. Central team reached Ahmadabad on 20th January at 7:30 a.m. On arrival of Central team, the Health Minister and senior health officials, Govt. of Gujarat briefed about the episode.

Details of Investigations:

Case Investigation

A. Details of positive laboratory confirmed cases-

I. Anju (name changed), 25 years female, sister working in BS Hospital (name changed) and had treated Beena (name changed) was admitted in BS Hospital (name changed) on 13th Jan, 2011 with history of high grade fever for four days with nausea, joint pain, body aches, and abdominal pain. She had low platelet count, deranged LFT and other laboratory reports suggestive of viral hemorrhagic fever. She developed generalized bleeding and breathing difficulty and was treated with supportive therapy but did not improve. On 15th January 2011 her blood sample was sent to NIV, Pune for virological studies and was reported to be positive for unusual viral growth on 16-1- 2011 and advised by NIV Pune to be put on Ribavarin. On 18-1-11 she was reported to be positive for CCHF, by RT PCR. She did not improve and developed cardiac arrest and died on 18-01-2011.

II. Ram Prasad (name changed) 32 years, Male (Husband of Beena, Index case) presented with fevers and rigors, body aches, joint pain, weakness and vomiting for 3-4 days and consulted a local Doctor at

Dheeraj Hospital (name changed) who advised him to get admitted in a hospital with better facilities. The patient gets admitted in City hospital (name changed) on 16th Jan 2011. On admission, patient had leucopaenia, thrombocytopenia, deranged LFT and based on clinical grounds was put on oral Ribavirin from 17.01.2011. Patient was administered one gram loading dose followed by 1.2 gm qid for 3 days and 600 mg qid from 21st Jan 2011. Patient became a febrile on 19th Jan 2011. Patient was asymptomatic with improvement in blood parameters. The laboratory confirmation for CCHF positivity was received on 21st Jan 2011. On 23rd Jan, patient was recovering and stable with the platelet count at 75000.

B. Details of laboratory confirmed contact-

I. Jignesh (name changed), contact of Anju (Male Nurse working in BS Hospital and had treated Anju) was declared positive for CCHF by RT – PCR on 21-01-2011. He is asymptomatic and stable. He is under observation in isolation facility at BS hospital.

C. Details of cases who died due to suspected CCHF-

I. Beena: 32 years: On December 23rd 2010 developed fever, joint pain, headache and was treated at local PHC Sanand. She did not improve and was referred to Dheeraj hospital where she was admitted on 27th December, 2010. The investigation revealed mild ascites, progressive fall in platelet count (1000000-5000) and her condition deteriorated. She was referred to BS hospital on 31st December 2010 with fever, abdominal pain, disorientation, and moderate ascites. On 13th Jan, 2011 patient had shortness of breath, severe body aches, and hypotension and was shifted to City hospital. The patient was given supportive therapy and was incubated and put on ventilator support but could not revived and died at 7.45 pm on 13th Jan 2011.

II. Dr Anand Dubey (name changed), 42 years male resident doctor at BS hospital, who had treated Beena, developed high grade fever, vomiting , diarrhoea on 6th January 2011 and was treated at home. On 9th Jan, 2011 his condition worsened so he was admitted in Sheetal hospital (name changed). On 9th Jan, 2011 patient had shortness of breath, severe body aches, hypotension and was shifted to City hospital. The patient was given supportive therapy and was incubated and put on ventilator support but could not be revived and died at 7:45 pm and 13th Jan 2011.

Field Visit-

1. Kolat Village (20-1-2011)

- The village is located at a distance of 20 kms from the city of Ahmadabad. The total population of village Kolat is 4081 with 777 houses. Main occupations of villagers are agriculture and some of them work as daily wagers in the city of Ahmadabad. Most of the houses are pucca houses with open drainage system.
- Majority of the families have domestic animals (predominantly buffaloes, followed by cows, goats and sheep). The dung disposal of animals is near the houses and on the road side (without proper compositing)
- There is no history of villagers visiting outside the country (except Haj Pilgrimage) or any outsiders visiting the village from abroad.
- There is no slaughter house in the vicinity of the village.
- No control measures against ticks and other vector were found to be undertaken in the recent past.

2. Visit to the house of the index case-

- There are 7 members comprising of 5 adults and 2 children in the family. (excluding index case who died)
- The male members are working as drivers and the family is engaged in agriculture activities.
- At present, there are no animals in their house as the buffalo possessed was sold off four months ago.
- The mother- on- law, father-in –law , brother-in –law and sister-in-law of the index case visited Mecca for Haj Pilgrimage from 10th November to 21st Dec, 2010.
- The family members who visited Mecca did not give any history of contact with any suspected case of viral Hemorrhagic fever or animals during Haj Pilgrimage
- After Haj Pilgrimage, relatives only from nearby villages visited the family.
- Movement of index case was limited to within the village.
- Husband of the index case was presently admitted to the City hospital in Ahmadabad.
- During the recent past, no other member of the family including the children of the index case gave history of fever or related illness.
- The samples from five family members (excluding one child) were found to be negative for CCHF.

3. Visit to PHC Sanathal (20-1-2011)

- Regular fever survey is being carried out around five km of the affected house, a population of 38570 was surveyed between 17-19 January, 2011 and 0.2 % of the surveyed population had fever.
- The ASHAs of the PHC are carrying out continuous fever surveillance and educating the community on preventive measures.
- Review of the weekly report did not show any unusual increase or clustering of fever cases since 15th November, 2010.

4. Visit to Dheeraj Hospital , Bhopal (20-01-11)

- Dheeraj hospital is a local nursing home
- Beena was admitted in the hospital on 28th Dec and her condition deteriorated progressively, subsequently, she was referred to a hospital with better facilities in Ahmadabad on 31st Dec 2010.
- Dr Prisha (name changed), the treating Doctor informed that no other such cases were reported / admitted in the hospital.
- The samples of the all the doctors including the treating doctor (2) and paramedical staff (3) in the hospital were collected and tested by NIV Pune and were found to be negative for CCHF.

5. Visit to BS Hospital, Ahmadabad(20-01-11)

- It is a 170 bedded multispecialty hospital having 925 staff with expertise in joint replacement
- Every year, lot of patients from abroad visit the hospital especially for joint replacement.
- Discussions were held with medical superintendent, Physician and nursing superintendent, who informed that Beena was admitted in ICCU on 31st Dec, 2010.
- Dr Anand Dubey, ICCU registrar and Anju treated the index case
- Dr Anand Dubey developed fever with joint pain on 5th Jan, 2011 and admitted at Sheetal Hospital where the condition deteriorated and subsequently shifted to City hospital on 13th Jan, 2011 where he died.
- Sister Anju developed fever with joint pain and was treated in BS hospital.
- Her condition also deteriorated and blood samples were sent to NIV, Pune on 15th Jan, 2011.
- She died on 18th January, 2011 (8;45 am) due to multi organ failure.
- The laboratory report from NIV, Pune confirming it to be CCHF was received on 18th Jan , 2011 in the evening

- As per the information given by the hospital authorities all the facilities of the hospital were contaminated as per the standard laid down procedures following the expiry of the suspected and the laboratory confirmed cases.
- The list of patients admitted at ICU from 1st Dec 2010 to 10th Jan 2011` was reviewed. Most of the patients were from African Countries.
- The list of hospital staff during the period of treatment of suspected/confirmed cases could not be obtained despite repeated requests.

6. Visit to Civil Hospital (21-1-2011)

- The civil hospital has 24 bedded isolation unit with 12 ventilators and dedicated staff to run the isolation unit on rotation basis.
- The isolation unit which was created exclusively during pandemic HINI and is now earmarked for isolation and treatment of cases due to CCHF.

7. Visit to City Hospital , Ahmadabad (21-01-11)

- It is a tertiary care hospital where the husband (Laboratory confirmed case) of the index case is admitted.
- Discussions were held with the treating physicians and microbiologists regarding the treatment protocol followed isolation facilities, infection control practices and bio-medical waste management being followed in the hospital.
- The team visited the isolation unit and interacted with the admitted laboratory confirmed patient.
- The patient was found to be stable and recovering.

8. Visit to the house of Anju, Ahmadabad (21-01-11)

- Anju was staying with one of her cousins
- The cousin was admitted with fever, cough and lower lobe consolidation. Her sample tested at NIV, Pune was found to be negative for CCHF.
- The samples of close contacts of Anju (family members and friends were sent to NIV, Pune and the report is awaited.

<u>Entomological investigation and sample collection:</u>

- On 19th Jan, 2011, telephonic discussions were held with Deputy Director, Epidemic cell, Dept. of Health, Government of Gujarat to invite the Plague Surveillance unit team from Surat to assist in the rodent

trapping and collection of samples. The team from Plague Surveillance unit, Surat along with equipment, reached village Kolat on 20-01-2011.

- The entomological investigations and trapping of rodents was undertaken on 20th and 21st January 2011. The Entomological teams from Ahmadabad and state Surveillance unit, IDSP also assisted in the investigations.
- Following biological material were collected from villages Kolat, Shela and Telav, Block Sanand, Ahmadabad.
  - Ticks from buffalo, cattle, goat and sheep
  - Rodent tappings, collection of serum samples, ticks and others Ectoparasites, tissue smears and tissue organs
  - Aedes (Vector of Dengue / Chikangunya) Surveillance

- A total of 351 live ticks were collected belonging to genus Hyalomma mainly from buffalo, cattle, goat and sheep. The tick samples were sent to National Institute of High Security Animal Diseases (NIHSAD), Bhopal for further investigation.
- Recent tapping was done at village Kolat (Village of Index case), Shela (adjoining village of Kolat) and Ahmadabad. A total of 29 rodents (28 Rattus rattus and 01 Musculus) were collected. From these rodents, a total of 19 serum samples; 28 tissue smears; 28 organs samples and 05 live ticks were collected and sent to NIHSAD, Bhopal for further testing.
- Aedes survey undertaken in village Kolat revealed very low mosquito vector density. The House index 3.57, container index (CI) 1.89 and Breateau Index (BI0 5.35 for vector of Dengue which was well below the critical limit.

Collection of blood samples from animals:

On 19th January, 2011, telephonic discussions were held with Joint Director, NIHSAD Bhopal regarding the occurrence of CCHF in Gujarat. To identify the role of animals as reservoir in the present episode, NIHSAD Bhopal was requested to undertake the investigation in the area. Accordingly a team headed by Dr DD Kulkarni, Principal Scientist reached Ahmadabad, on 20th Jan 2011 evening.

The Department of Animal Husbandry, Govt. of Gujarat along with HSADL, Bhopal collected 251 animal sera predominantly from the buffaloes followed by cattle, goat and sheep on 21-1-2011. In addition, 20 pools of tick samples were also collected from buffaloes, goat and sheep. The sera and tick samples were handed over to the team from HSADL.

This case summary is the ideal example of inter-sectoral coordination between departments of human health and animal health in control of an outbreak situation.

Annexure 1

Form S
Reporting Format for Syndromic Surveillance

(To be filled by Health Worker, Village Volunteer, Non-formal Practitioners)

State_____District_____Block_____Year_____

Name of the Health Worker/Volunteer/Practitioner	Name of the Supervisor	Name of the Reporting Unit
ID No./Unique Identifier (To be filled by DSU)	Reporting week From dd mm yy To	

	a	b	c	d	e	f	g	h	i	j	k	l	m	n
	Cases							Deaths						
	Male			Female			Total	Male			Female			Total
	< 5 yr	≥ 5 yr	Total	< 5 yr	≥ 5 yr	Total		< 5 yr	≥ 5 yr	Total	< 5 yr	≥ 5 yr	Total	
1. Fever														
Fever < 7 days														
1 Only Fever														
2 With Rash														
3 With Bleeding														
4 With Daze/Semiconsciousness/ Unconsciousness														
Fever > 7 days														
2. Cough with or without fever														
< 3 weeks														
> 3 weeks														
3. Loose Watery Stools of Less Than 2 Weeks Duration														
With Some/Much Dehydration														
With no Dehydration														
With Blood in Stool														
4. Jaundice cases of Less Than 4 Weeks Duration														
Cases of acute Jaundice														
5. Acute Flacid Paralysis Cases in Less Than 15 Years of Age														
Cases of Acute Flacid Paralysis														
6. Unusual Symptoms Leading to Death or Hospitalization that do not fit into the above.														

Date: ***Signature***

Annexure 2

FORM P
(Weekly Reporting Format –IDSP)

Name of Reporting Institution:		I.D. No.:	
State:	District:	Block/Town/City:	
Officer-in-Charge	Name:	Signature:	
IDSP Reporting Week:-	Start Date:-	End Date:-	Date of Reporting:-
	___/___/_____	___/___/_____	___/___/_____

S.no	Diseases/Syndromes	No. of cases
1	Acute Diarrhoeal Disease (including acute gastroenteritis)	
2	Bacillary Dysentery	
3	Viral Hepatitis	
4	Enteric Fever	
5	Malaria	
6	Dengue / DHF / DSS	
7	Chikungunya	
8	Acute Encephalitis Syndrome	
9	Meningitis	
10	Measles	
11	Diphtheria	
12	Pertussis	
13	Chicken Pox	
14	Fever of Unknown Origin (PUO)	
15	Acute Respiratory Infection (ARI) / Influenza Like Illness (ILI)	
16	Pneumonia	
17	Leptospirosis	
18	Acute Flaccid Paralysis < 15 Years of Age	
19	Dog bite	
20	Snake bite	
21	Any other State Specific Disease (Specify)	
22	Unusual Syndromes NOT Captured Above (Specify clinical diagnosis)	
	Total New OPD attendance (Not to be filled up when data collected for indoor cases)	
	Action taken in brief if unusual increase noticed in cases/deaths for any of the above diseases	

Annexure 3

FORM L
(Weekly Reporting Format – IDSP)

Name of the Laboratory:		Institution:	
State:	District:	Block/Town/City:	
Officer-in-Charge:	Name:	Signature:	
IDSP Reporting Week:-	Start Date:-	End Date:-	Date of Reporting:-
	___/___/_____	___/___/_____	___/___/_____

Diseases	No. Samples Tested	No. found Positive	
Dengue / DHF / DSS			
Chikungunya			
JE			
Meningococcal Meningitis			
Typhoid Fever			
Diphtheria			
Cholera			
Shigella Dysentery			
Viral Hepatitis A			
Viral Hepatitis E			
Leptospirosis			
Malaria		PV:	PF:
Other (Specify)			
Other (Specify)			

Line List of Positive Cases (Except Malaria cases):

Name	Age (Yrs)	Sex (M/F)	Address: Village/Town	Name of Test Done	Diagnosis (Lab confirmed)

ANNEXURE 4

List of Laboratories for diagnosis of zoonotic diseases (as on 30.09.2015)

Sl. No	Disease	Address of Labs
1	Anthrax	National Centre For Disease Control , Delhi Indian Veterinary Research Institute , Izatnagar Christian Medical College, Vellore Behrampore Medical College , Orrisa Defense Research & Development Establishment, Gwalior Rajendra Institute of Medical Sciences,Ranchi Institute of Animal Health & Production, Kanke, Ranchi
2	Rabies	National Centre For Disease Control , Delhi Central Research Institute , Kasauli Indian Veterinary Research Institute, Izatnagar, College Of Veterinary Sciences, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana National Institute of Mental Health & Neurosciences, Bangalore Pasteur Institute of India , Coonoor Indian Immunological Limited, Hyderabad COVAS Anand, Madras Veterinary college, Chennai, Institute of Animal Health and Veterinary Biologicals, Bangalore
3	Plague	National Centre For Disease Control , Delhi Plague Surveillance Unit, National Centre For Disease Control, Bangalore

4	Glanders	Central Military Veterinary Laboratory, Meerut National research Centre on Equines , Hissar
5	Brucellosis	Indian Veterinary Research Institute, Izatnagar National Centre For Disease Control , Delhi
6	Trypanosomiasis	Indian Veterinary Research Institute, Izatnagar National Research Centre on Equines ,Hissar
7	Leptospirosis	National Centre For Disease Control , Delhi Indian Veterinary Research Institute, Izatnagar Regional Medical Research Centre, Port Blair. Institute of Zoonoses , Hosur , Tamil Nadu Government Medical College, Kottayam, Kerala T. D. Medical College , Alappuzha, Kerala Madras Medical College and Government General Hospital, Chennai Government Medical College , Gujarat BJ Medical College, Pune
8	Crimean Congo Hemorrhagic Fever	National Institute of Virology , Pune National Centre For Disease Control , Delhi National Institute of High Security Animal Diseases, Bhopal
9	Rickettsia	Indian Veterinary Research Institute, Izatnagar National Centre For Disease Control , Delhi Indira Gandhi Medical College, Shimla Choudhary Charan Singh Haryana Agricultural University , Hissar Christian Medical College, Vellore

		Institute of Animal Health and Veterinary Biologicals, Bangalore
10	Japanese Encephalitis	National Centre For Disease Control, Delhi All India Institute Of Medical Sciences, Delhi Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow National Institute of Mental Health And Neurosciences, Bangalore National Institute of Virology, Pune School of Tropical Medicine, Kolkata Regional Medical Research Centre, Dibrugarh Rajendra Instititue of Medical Sciences,Ranchi Mahatma Gandhi Memorial Medical College & Hospital,Jamshedpur
11	Exotic viruses	National Institute of Virology, Pune National Institute of High Security Animal Diseases, Bhopal National Centre for Disease Control, Delhi
12	Cysticercosis	Deen Dayal Upadhyaya hospital, Delhi PGIMER, Chandigarh National Centre for Disease Control, Delhi
13	Toxoplasmosis	PGIMER, Chandigarh National Centre for Disease Control, Delhi
14	Leishmaniasis	Deen Dayal Upadhyaya hospital, Delhi National Centre for Disease Control, Delhi

ANNEXURE 5

FORMAT FOR INTERIM QUARTERLY PROGRESS REPORT ON PERFORMANCE OF WORK DONE BY STATE VETERINARY CONSULTANT UNDER IDSP

Name of the Veterinary Consultant: _____

Reporting Quarter, FY: _____State: _____

Name of the Reporting Officer: _____

Phone…… Fax:…… email:…….

- Number of early warning signals of impending outbreaks of zoonotic diseases in humans detected from data analysis of animal diseases reported on NADRS & NADRES portals:

- Number of meetings of key strategic stake holders organized to assist in inter-sectoral coordination for effective IDSP implementation.

- Number of outbreaks/impending outbreaks of zoonotic diseases/other diseases in which timely and appropriate control measures were taken.

Give details

S. No.	Area involved (District/Block/ PHC/Village)	Disease	Number of cases	Number of deaths	Date of start of outbreak	Date of reporting of outbreak	Current status	Comments(suspected cause of outbreak, RRT investigation, Line list available, Lab samples tested (Name of Lab), results of lab samples tested, control measures taken)

- Number of outbreaks investigated by Veterinary Consultant.
  Mention S. No. from above Table (……)

- Number of Video conferences (VCs) done with SSU/CSU during this quarter

- How frequently does the Veterinary Consultant analyze surveillance data from the districts?

- Does the Veterinary Consultant sends regular feedback to all the Reporting Units (RUs) on disease trends of zoonotic diseases?: Yes/No

- Details of all the activities (including field visits) done during the quarter:

Observations on Field visits:

S. No.	Date	Area visited	Salient observations & action taken

- Any suggestion / Feedback:

Signature of SSO/DSO

Signature of Veterinary Consultant

Copy to

Date:

1. NPO, IDSP

Annexure 6
LIST OF CONTRIBUTORS

Members of Manual preparation committee:

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5. Dr. Mala Chhabra, Joint Director, Zoonoses Division, NCDC
6. Dr. Saurabh Goel, AD, IDSP
7. Dr. Suneet Kaur, Consultant Epidemiologist, IDSP & Member Secretary

We also acknowledge the contribution of Ms. Lipi, Livestock Officer, Department of Animal Husbandry, Dairying & Fisheries, Dr Jyoti, AD, IDSP, Dr Nishant Kumar, AD, IDSP, Dr Mangesh Patil, AD, IDSP, Dr Ganesh Lokhande, AD, IDSP, Dr Amol Patil, AD, IDSP, Dr Sanket Kulkarni, AD, IDSP, Mr. Navin Kumar Nayan, Training Manager, IDSP, Mr. Priyank Pandya, Communication Officer, IDSP & Veterinary Consultants of States Arunachal Pradesh, Assam, Chhattisgarh, Dadra & Nagar Haveli, Karnataka, Meghalaya, Nagaland & Rajasthan.


NATIONAL HEALTH MISSION
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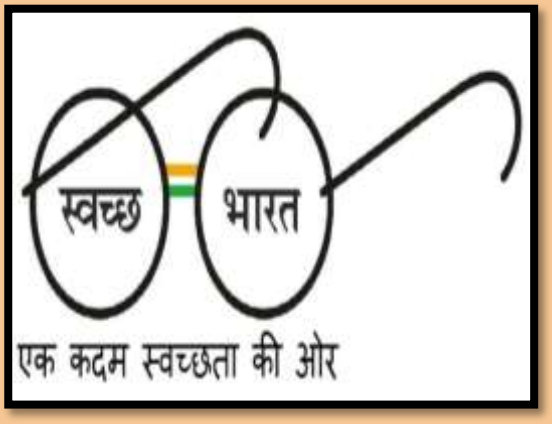
स्वच्छ
भारत
एक कदम स्वच्छता की ओर