

Leptospirosis:

Leptospirosis:

A public health problem which deserves special attention

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Leptospirosis which started as an isolated public health problem of some of the waterlogged areas of Alappuzha and Kottayam districts in the 1990 has become a public health problem of all districts of Kerala during the last decade. This communicable disease is causing the highest number of deaths consistently for the last few years in the state. Although it showed a little decline during the last year, leptospirosis caused more than 100 deaths every year during the past few years. The young male adults especially of the labour class getting affected is an area of serious concern

A broader analysis of the available statistics shows that the disease mainly reported during the monsoon season is now being

reported throughout the year. Yet, the morbidity and mortality levels are high in the monsoon season extending from June to September.

The links of the disease with certain occupational groups especially of those who work in the paddy fields, pineapple farms and engage in pond and canal cleaning were observed in Kerala. During the recent years, unused ponds utilized as dumping area of various household/public wastes were extensively cleaned as part of the NREG scheme. There were occasions of outbreaks following such cleaning drives in some areas.

Favourable ecological and environmental scenario of Kerala

The presence of a wide range of rodent and non-rodent reservoir hosts along with a favorable environment makes most parts of Kerala vulnerable to leptospirosis. In India leptospirosis is predominant in South India. The ecological and environmental factors including heavy monsoon seasons, intermittent rains, and water logging create a favourable environment for the spread

of leptospirosis in Kerala. The water logged areas force the rodent population to abandon their burrows and contaminate the stagnant water by their urine. Although rats are mainly noted as the carrier host, worldwide, other non-rodent reservoir hosts including cattles, rabbits and other various domestic animals are reported as the carriers of the organism. Epidemiological research studies for identifying the major carrier hosts and common mode of spread is warranted in Kerala settings. This will enable us to design relevant and appropriate control and preventive strategies more effectively.

Need for strengthening early diagnosis and definitive treatment

The preliminary analysis of the leptospirosis death cases shows that delay in definitive diagnosis and effective treatment (including the administration of Doxycycline/ Crystalline Penicillin) is a cause for high case fatality. We hope that the systematic training programmes on diagnostic criteria and clinical management of leptospirosis which already initiated for the doctors and other staff at the state and district level will help in early diagnosis and effective case management in the coming years. We are in the process of printing and distribution of "treatment protocol chart and the treatment guideline based on the NCDC (NICD- Delhi)" to the districts for further improvement of case management and reduction of mortality.

For strengthening the early diagnosis 'rapid test kit' is getting purchased and will be made available to all district/ taluk hospitals this year itself. It is proposed to make available this kit to the major community health centers (CHC) in the coming years. This would facilitate the early diagnosis of leptospirosis at the CHC level.

Community level awareness programmes focusing the special occupational groups

As a part of the IEC activities, we strengthened the general awareness generation programmes on mode of spread and the control measures at the community level. The strategy of special focus to IEC and awareness campaigns among the high risk occupational groups are yielding some good results in recent years.

Doxycycline prophylaxis programme which started a few years back among the NREG workers, and those who engaged in the canal / pond cleaning and agricultural works in the affected areas is also helping in reducing the morbidity and mortality of leptospirosis.

NCDC pilot project on leptospirosis

In the absence of a special National programme, district pilot projects of Zoonosis division of NCDC implemented in Kottayam and Alappuzha districts, through the infectious diseases department of Medical college Kottayam. There is a scope for further strengthening the implementation of this programme in these districts and expansion of the programme to other districts.

It is expected that the epidemiological study which is being conducted by the department through the Community medicine department of medical college Trivandrum in coordination with the Animal Husbandry department would provide some insight for the effective implementation of the control measures.

Hopefully, with the effective community level preventive activities and special focused prophylactic intervention along with early diagnosis and effective case management, it would be possible for us to reduce the morbidity and mortality due to leptospirosis in the coming years. ●

The H1N1 Pandemic in Kerala, 2009-2011

Control and Management- An Interim Review

Dr. Amar. S. Fettle

State Nodal Officer-H1N1

(Consultant Pediatrician, General Hospital, Trivandrum, and DSO, IDSP-TVM)

- The Pandemic Alert about H1N1 was received in the State in April 2009, soon after the press and Net reports about the new/ emerging infection labeled Swine Flu, attracted Global attention. Govt. of India then alerted the states, through the Ministry of Health and Family Welfare. A special Division of the MoHFW- The EMR Division (Emergency Medical Relief) was also activated to oversee all activities related to the new threat.
- A 24 x 7 State Control Room was set up at the Directorate of Health Services, using space, equipment and mobility support provided by NRHM -Surveillance, analysis, and reporting upwards, laterally, and downwards, liaison with supporting offices, and coordination between State and districts, as well as State and Govt, were the main functions of this unit headed by the State Nodal Officer-H1N1. New reporting formats were created, for Daily Consolidated report, Death report, Media Report, Daily EMR Report, and SARI & School Surveillance
- As a first step, Airport screening and surveillance was established at the three international airports of Kerala, as the disease had to come through these portals if it had to enter the state. Comprehensive staffs including doctors, HIs/JHIs were posted on 24 hr duty at these centres, equipped with Personal Protection Equipment, and Flash Thermometers to measure temperature instantaneously. The arrangements were supervised by the Directorate of Health Services, The District Medical Officers, DSOs, The Regional Directorate of Health Services, of the Govt. Airport Authority of India, once advised of their gravity of the situation, offered full cooperation. Travellers found to have Influenza like illness, and a temperature of more than 1000F, were picked up, for quarantine.
- District level testing, treatment, and quarantine facilities were established immediately in the districts of Trivandrum, Ernakulam, Kozhikode, and

- Malappuram, at the respective DH/ GH. Tertiary care arrangements were established in the Medical Colleges, both Govt. and private sector. Private corporate hospitals also were roped in for this venture.
- Once suspect, probable and confirmed cases started to be identified, and managed in the State, the issue of managing community spread acquired a new dimension. This ranged from tracing, testing and treatment of contacts of the confirmed international travelers, to massive school and community prevention activities all associated with significant public apprehension and panic. Good results in this area were achieved through on site health education, DMO meetings with AEOs, DEOs, etc. School guidelines of MoHFW were widely distributed to all schools, and compliance of school authorities as well as guardians ensured by tight monitoring of the situation, and even dictated by the respective District Collectors when indicated.
- Initial sample testing of the throat swabs collected was done at NCDC, Delhi- Samples packed in cold chain and transported to Delhi by flights from Tvm, Kochi and Kozhikkode. Cooperation of Indian Airlines, and Kingfisher Airlines, and also the AAI was obtained after a great deal of effort.
- Later, the lab at Centre for Molecular Diagnostics at RGCB was made functional, under the initiative, leadership, and spirit of Public Service, of its Director, and the lab scientists. The training of staff was done at NCDC Delhi, and inspection of lab conducted by a Central team, prior to certification.
- Discussion was held with authorities of KMC Manipal, and with the cooperation of the GoI, this centre too was recognized as a Virology lab for testing Kerala's samples.
- In the meantime large stocks of Oseltamivir, testing medium (VTM), and PPE kits were airlifted to the state from Delhi, by the EMR Division. Supplies management of these was undertaken on a war footing by the GMS at State Level, and the District Medical Stores personnel at district level. RoHFW and NRHM too chipped in with additional supplements of locally procured equipment.
- The Mass Media Wing of the Directorate of Health Services took up the massive task of pushing forward Advocacy and IEC, release of information brochures, posters, advertisements, District specific master copies in order to equip all categories of health staff, as well as the general public, with the information back-up needed to fight the pandemic.
- The threat posed to the health of the state, as well as to the crores of interstate pilgrims arriving for the two successive Sabarimala Pilgrimage seasons, was dealt with by a set of special initiatives- the cold season, high influx of pilgrims coming from affected states, all under stressful conditions, poor attention to personal needs like proper food, rest, etc, crowded travel methods, were the special issues. A massive management strategy in collaboration with NRHM was undertaken- this included facility and infrastructure enhancement, scores of mobile equipped helpdesks, 6-language inter-state and local IEC and Communication strategy, dedicated helplines by the health dept, and also the IT Mission call centre, and a fleet of emergency Advanced Life Support type ambulances on 24x7 duty.
- A single spokesman approach was decided on, and scrupulously followed. This had a very positive fallout, in the form of extreme transparency, promptness, and accuracy in data dissemination to l

- the mass media. The excellent reciprocation by the electronic and print media of the state, as well as national networks was in the form of the very professional, calm, educative, supportive, and pro-people coverage of the pandemic in the State.

Special Activity for Pandemic Control

- All DMO/DSO were informed about anticipated increase in immediate post monsoon period. The link with general ARI/VF peaks was stressed and surge capacity readiness was ensured. DMOs were urged not to be in false sense

- of security due to fall in Jan-April period 2010.
- Vaccination of health workers phase I and phase II campaigns were a big success in the State, achieving 100% utilisation of the GoI provided 79600 doses. A meticulous State action plan, trainings, and intense sensitization of all stakeholders resulted in this success.
- Special training/ sensitization of Obstetricians and also Paediatricians through the channels of the Addl. DHS-FW, FOGSI, QPMPA, KGMOA and IAP and IMA, contributed to controlling the rise of dealt in pregnancy associated H1N1 influenza. .
- Video conferencing with districts, by Health Minister, Secretary to Health, Director of Health Services, Addl. Director of Health Services (PH) on several occasions was found to be a very effective tool. IT mission, and Keltron provided studio and technical support.

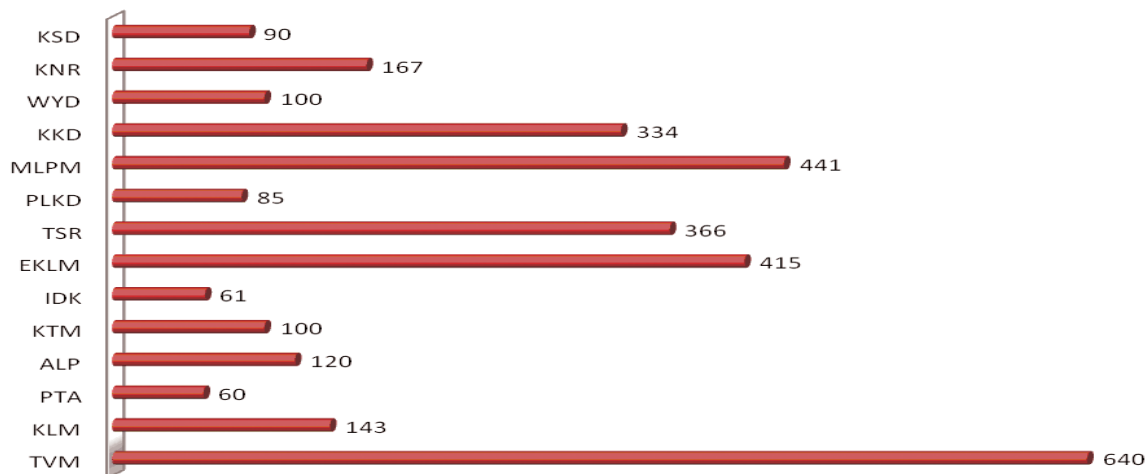
H1 N1 Control Room Statistics As on 10.03.2011

Sl	Item	No.
1	Passengers screened at the 3 Airports	1568432
2	Passengers reporting for advice at airport helpdesk	2658
3	Patients screened at hospitals	79593+
4	Patients quarantined in hospitals	4563+
5	Patients treated in ICUs	262+
6	Patients treated in home quarantine	35981+
7	Swabs taken for testing	10225
8	Positives	
	from Aug 09 to 10.03.11	3122
	from 1.1.10 to 10.03.11	1544
	from 1.5.10 to 10.03.11	1504
9	Deaths	
	1. 5. 09 to 10.03.11	121/(32preg)
	1. 1.10 to 10.03.11	90/ (24 preg)
	Monsoon Season 1. 5. 10 to 10.03.11	84/ (24 preg)

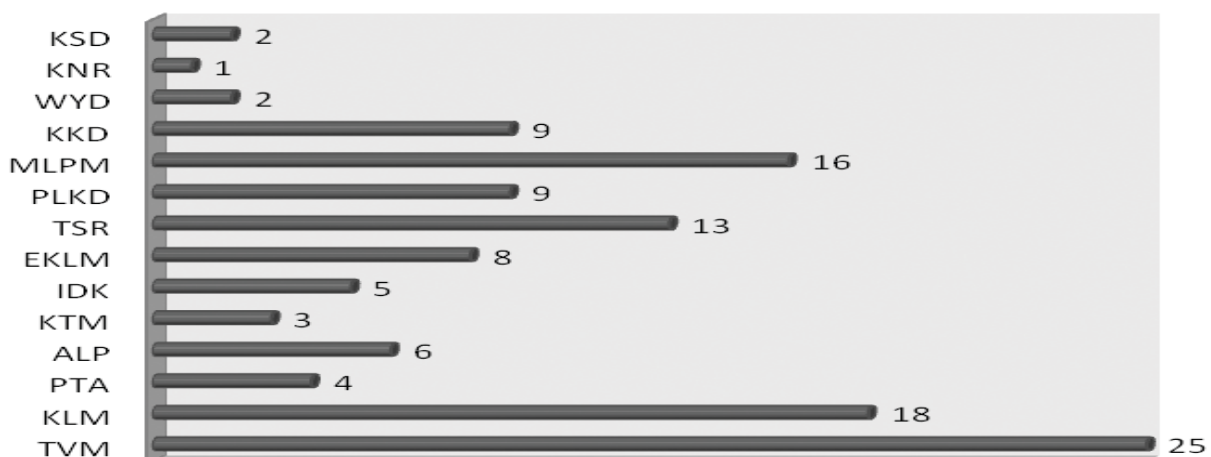
*see page no 30 & 31 for H1N1- Month Wise and District Wise data

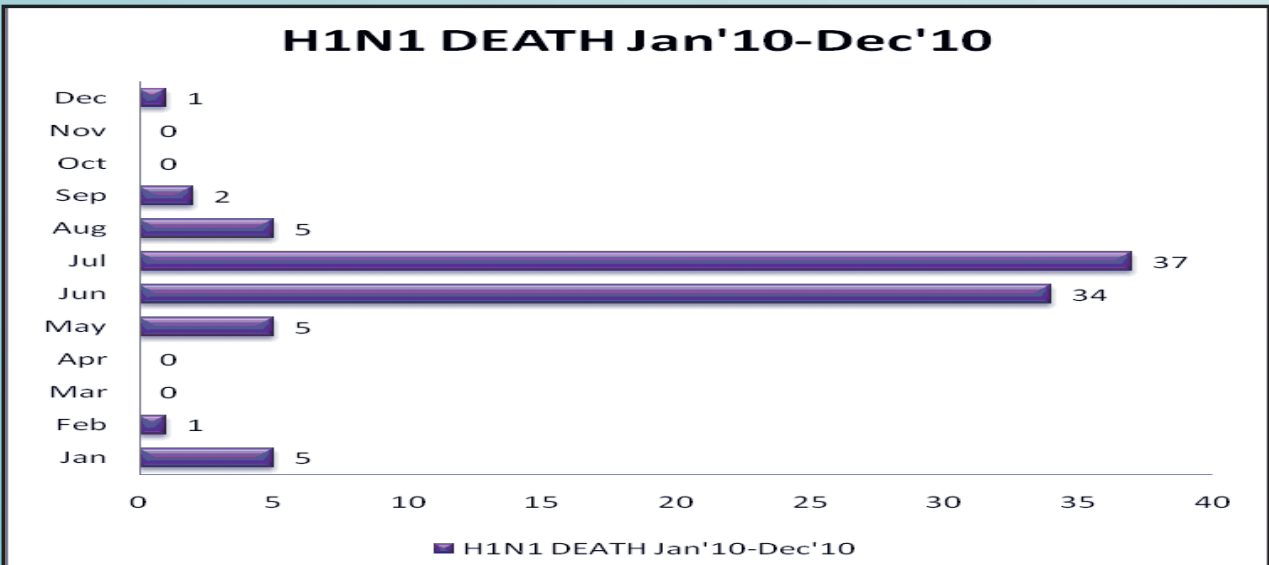
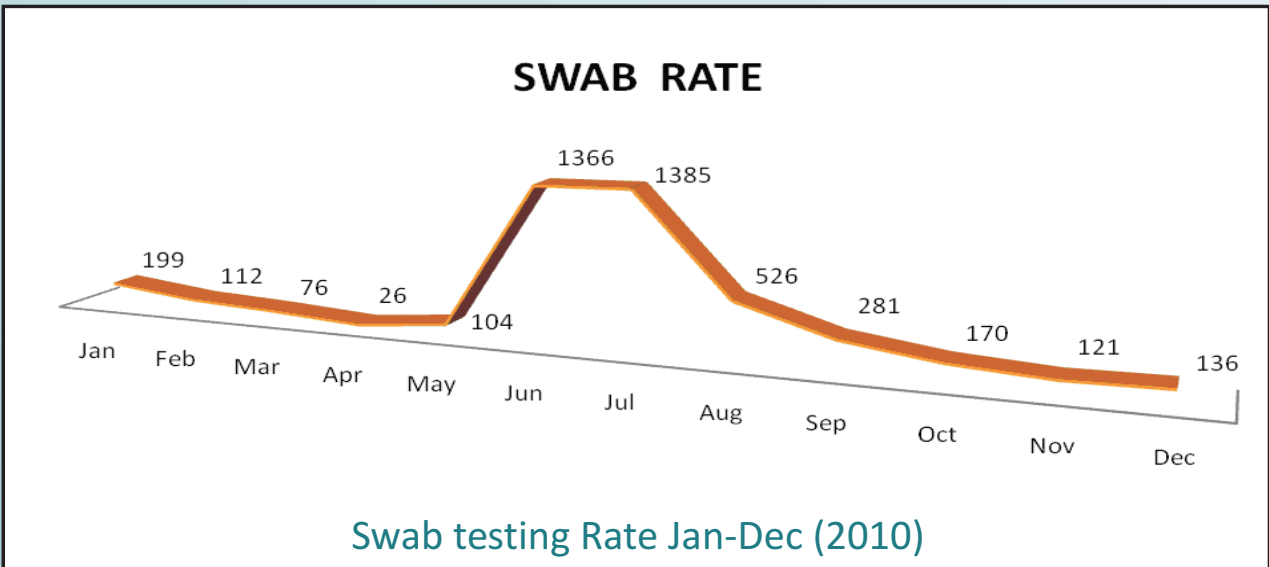
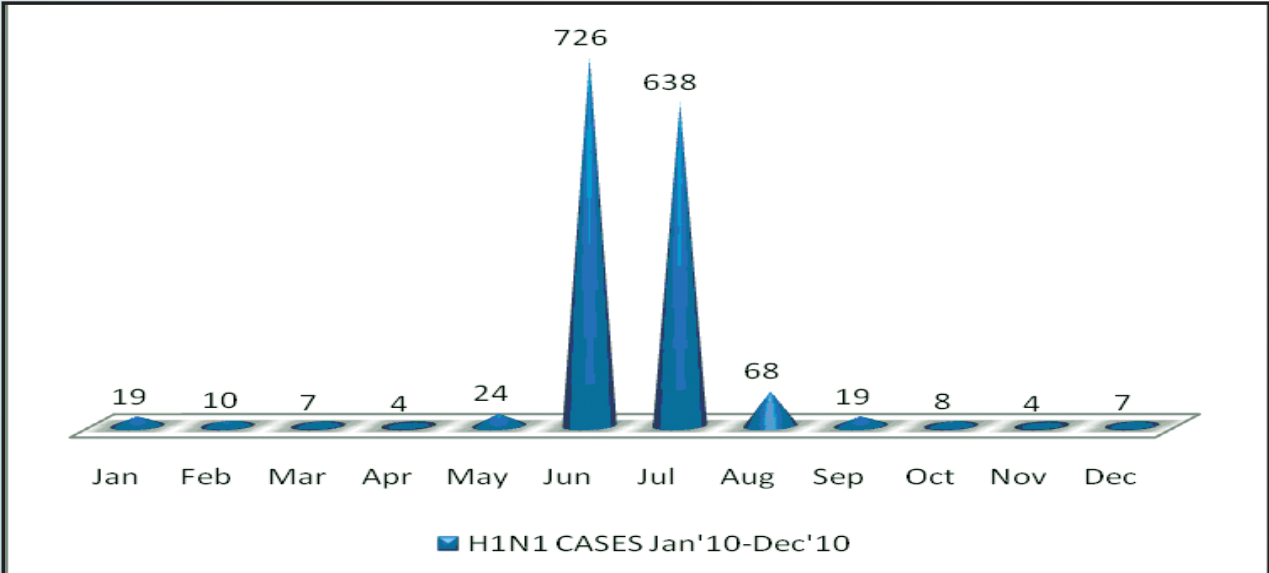
- The distribution of Oseltamivir on a wide unprecedented scale right down to PHC level, and also selected private hospitals was the measure which turned the tide, and stopped the spiking increase of cases in the monsoon
- A Central team of specialists was invited to Kerala by Secretary (Health). The team extensively toured the most affected areas, had interviews, took samples, and finally complimented the State Health Department on the excellent and professional way in which the situation was being managed.
- State Nodal Officer-H1N1 was invited to share Kerala's experience of controlling H1N1, and its vaccination campaign success, with representatives from Maharashtra Govt. as panelists in an H1N1 Seminar at Nairs Hospital, Mumbai on 1/08/10.
- A telephonic survey was started in Thrissur, Kozhikode and Pathanmthitta districts to assess information level of Medical Officers working in various hospitals about H1N1 under the direct leadership of Dr. Rakhi Vijayan, of the Control Room, and Dr. Rani.K.R of NRHM.

H1N1 CASES Aug-09 to Feb-11



H1N1 DEATHS-Aug'09-Feb'11





Acknowledgement.

- No Review of H1N1 Control in Kerala State will be complete, without placing on record in golden letters, the acknowledgement due to various people, who worked smilingly and untiringly to support me and enable the Health Services Department to help and save the people of Kerala.
- In the H1N1 State Control Room, the 24 Hr. untiring work of my Medical Officers Dr.Rakhi Vijayan, Dr.Arun Sasi, Dr.Nibin Krishna, and Sri. Manoj Kumar and Sri. Amarnath (JHIs) kept the place humming like a turbine all these months. Their cheerful exuberance in times of immense stress, and selfless dedication has been my sustaining force all these months.
- We were supported from above by our ever so friendly and boldly encouraging Hon'ble Health Minister P K Srimathi Teacher, Secretaries Sri Manoj Joshi, IAS, Dr Usha Titus, IAS, Sri K.S.Srinivas, IAS, the State Mission Directors Dr Dinesh Arora, IAS, Dr. Ratan Kelkar, IAS, and Sri Saurabh Jain, IAS, Directors of Health Services, Dr K. Shylaja, Dr M.K.Jeevan, and Dr K.T. Remani, Addl. Directors of Health Services (PH) Dr Anil Kumar KS, Dr D. Radhakrishnan, Dr PP Aravindan and Dr Uma Maheshwari Thankachi, and Addl. Director of Health Services (FW) Dr P.K., Jameela, and also Addl Secy, Health Department, Sri Suresh Kumar.
- Dr. Ravindran, Head, EMR Division, MoHFW, Delhi, Dr Shashi Khare, of NCDC, Dr Swasthi Charan, CMO, EMR Division, and Dr. Das have been immensely helpful and positive in guiding the efforts of the state, and providing all manner of logistics support all the time. The RoHFW, Tvm team has stood by us similarly, all the time.
- Dr. C. K. Jadeeshan, Asst. Director of Health Services (PH) deserves a very special acknowledgement for being my friend, philosopher and guide, in addition to constantly educating me on the finer nuances of administration and programme implementation.
- The support of Dr.A.S.Pradeep Kumar, Dy. Director of Health Services (NVBDCP), Dr Satyajith Thyagu, Dr Bipin Gopal, and Dr Shoba and Prof. Umarul Farook of the SSU-IDSP are sincerely acknowledged. Their supporting staff, Sri K.V.Sasi Kumar, Sri Sanjayan Sri Asokan and Sri Rajesh, Sri Jayan undertook a lot of additional responsibilities at the time.
- The lab support of Dr.Arun Kumar, Head Virology Division, MCVR Manipal, Dr Radhakrishna Pillai, Director, and the Scientists especially Dr. Sanjai, of RGCBT, Trivandrum, Dr Sunija, Head of PH Lab
- Tvm, (whose team at PH Lab Tvm developed and produced VTM for the whole state Indigenously) was instrumental in keeping our self-competence at high levels.
- The 14 District Administrations, headed by the Collectors, and the vital teams of the DMO, DSO, DPM, and the district Nodal Medical Officer, the doctors, nurses, the lab technicians, pharmacists, nursing assistants, and supporting hospital staff of every single Screening centre, Testing and treatment centre, and health units right up to PHC level, are sincerely acknowledged as the implementing arms of the massive efforts we initiated. This acknowledgement is extended whole heartedly to the entire management and staff of numerous private sector Hospitals and Medical Colleges, who stood by the Health Services Department, hand in hand, to combat the H1N1 threat.
- The entire team of IDSP Tvm, where this management effort for the whole State started in April 2009- Especially Dr.N.Sridhar District Medical Officer(H), Dr Meyma, District Medical Officer(H), Dr. Anil Kumar, former DSO, Sri Abhayan, TA Gr- I, Sri. Abdul Kahar-Data Manager, Sri Binoy-Data Entry Operator, Smt. Annie-Accountant, Sri Padmarajan, Sri. Adarsh, Sri. Jayashankar, Sri. Juju and Sri Subramaniam, (JHIs) put in a creditably brilliant launching effort, and then sustained the momentum gained.
- The invaluable services of the Staff of the Mass Media Wing of the DHS-especially Sri.C.Gopakumar, Sri.T.Rajkumar, Sri.R.Austin, Sri.Hari Kumar.V, Smt. Shoba Ganesh, Smt. Kaladevi., Sri.S.Pushparajan and Sri.Dalayi in the offices of the Director of Health Services (PH), and the Public Health Section, The GMS, the District IDSPs, the NRHM HQ, are all acknowledged with gratitude.
- The Stores Department personnel of the GMS, and especially Smt Baby S (Technical assistant to the store officer, GMS) who maintained the constant liaison with the State Control Room, are to be commended for the vital managerial role they played in the management of the large stocks of Oseltamivir and logistics throughout the state.
- The Divisional Railway Manager Sri Titus Koshy IRS, Senior Divisional Commercial Manager, Station Managers, senior officials, and guards of the Southern Railways, and Konkan Railway, Airport Managers, Airport Medical Officers, Airline Staff of Indian and Kingfisher and supporting staff provided vital help throughout the campaign.
- Though every single person in the Health Services, and Medical Colleges did their duties in H1N1 control with commitment, the State Control Room team would never have achieved "control" of the situation, if not for the very special role during the uncertain tension ridden early days, played by immensely supportive colleagues / friends like Dr Sudhakaran, DMOH Ekm, Dr Sribiju and Dr Sakeena, (MPLM), Dr Michael (Kozhikkod), Dr Abhilash, (KNR), Dr Alosius, (TCR), Dr Jayakumar (KTM), Dr Laila Divakar (PTA) Dr Ajayan (WYD) Dr Gopinath, (KSR) Dr Sivasuthan (KLM) Dr Aswini Kumar, Dr Sibi, Dr Selvaraj, Dr Indu PS, Dr Nirmala and Dr Asok Kumar GM, of MC Tvm, Dr Anoop (KIMS Hospital), and Dr Thomas Mathew (SDCMC)...
- My family, as well as my colleagues in DH Peroorkada and later, General Hospital Tvm, who bore with my absence from their midst for prolonged periods of time with the minimum of grumbling (!), merit my deep indebtedness and gratitude...

COLLECTION, STORAGE & TRANSPORTATION OF CLINICAL SPECIMENS

(for the diagnosis of communicable diseases)

Dr. S. Sunija MD

(State Public Health and Clinical Laboratory Thiruvananthapuram)

A proper Laboratory Diagnosis is based on

- A properly collected
- Properly labeled
- Properly Stored and Properly transported clinical specimen, which is properly processed and tested

Blood Specimen

- Blood and separated serum are the most common specimens taken to investigate outbreaks of communicable diseases.
- Venous Blood can be used for isolation and identification of Pathogen in culture.
- Separated serum can be used for detection of specific antibodies, antigens (by ELISA) and genetic material (by PCR)
- When specific antibodies are assayed, paired samples will be beneficial. (Acute phase as well as convalescent phase samples)
Finger prick sample - Slides for microscopy and absorption to Filter paper discs.

Blood Collection

- Follow the general biosafety measures (Disposable Gloves, Lab

- coats, masks, gown, protective eye shield etc, whenever applicable)
- Disinfect the venepuncture site with 70% isopropyl alcohol/10% povidone iodine. (swabbing concentrically from centre of venepuncture site to outwards. Do not repalpate the vein)
- Collect the required quantity (2-5 ml) of blood and transfer to the sterile collection bottles/vials.
- Label the tubes with patient ID and Date of collection using a permanent marker pen. The same ID number should be noted on the Lab request form.
- Keep the blood sample bottles upright and undisturbed at room temperature for 30-45 minutes to avoid haemolysis.

Storage of Blood Samples

- Blood sample can be stored at 4-80C up to 48 hrs.
- Separated Serum can be stored in Screw capped vials at 4-80C for 7-10 days.
- If serum has to be stored for weeks store at -200C freezers & for months in -700C.
Do not freeze whole blood, to avoid haemolysis.

Transportation of blood sample

- The sample should be taken in a properly labeled screw capped vial. Plastic tape/ sealant should be applied around the cap to avoid leakage of specimen.
- Ideally it should be transported with tripple layer packing & cold chain maintenance.

- Lab request form with all the relevant data should be enclosed.
- Label the box/ container (thermocool box, vaccine carrier/suitable container) 'Pathological sample handle with care'

Inform the referral lab in advance and keep a rapport with the lab incharge

Stool sample

Collection of sample

- Stool samples are most useful for microbiological diagnosis if collected soon after the onset of diarrhoea.
- Rectal swabs may also be used in case of infants, debilitated patients etc.
- In general rectal swabs are not recommended for isolation of virus.
- As far as possible do not collect stool sample from a bed pan

Sample collection and transportation

- Collect the voided sample in a sterile disposable container transport to the lab within 2-3 hrs.
- In case of delay transport media like V-R media/ Cary Blair medium, Alkaline peptone water should be used. (1-2 gm of stool specimen in 10 ml of medium)
- If cholera is suspected, keep the sample at room temperature till it is transported.
- From infants and children rectal swabs are taken and send to the lab in transport medium
- Store at room temperature, if cholera is suspected.

Keep it at 4°C if Salmonella/ Shigella is suspected.

Respiratory tract specimen

- Upper respiratory-Throat & Nasopharyngeal swab
- Lower respiratory-Usually Sputum

Materials Required

- Transport media-bacterial and viral.
- Throat swabs (Dacron and cotton swabs).
- Tongue depressor
- Nasal speculum
- 20-50 ml syringe
- Sterile screw-cap test tubes and wide-mouthed clean sterile containers (minimum volume 25 ml.)

Method of collecting throat swab

- Hold the tongue down with the tongue depressor.
- Use a strong light source to locate areas of inflammation and exudate. (Posterior pharynx and the tonsillar region of the throat behind the uvula).
- Rub the area back and forth with a sterile dacron swab.
- Sample the posterior pharyngeal wall at the end to avoid gagging by the patient.
- Collect pseudo membrane if present
- Withdraw the swab without touching cheeks, teeth or gums and insert into a sterile screw-cap test tube containing appropriate transport medium required.

Method of collecting Nasal swab

- Seat the patient comfortably, tilt the head back and insert the nasal speculum.
- Insert a flexible cotton swab through the speculum parallel to the floor of nose.
- Alternately, bend the wire and insert it into the throat and move the swab upwards into the nasopharyngeal space.
- Rotate the swab on the nasopharyngeal membrane a few times, remove it carefully and insert it into a screw-cap tube containing transport medium.
- Break off the top part of the stick without touching the tube and tighten the screw cap firmly.

- Label the specimen tube.

Handling and transportation

- Transport the sample as quickly as possible to reduce over growth by normal flora.
- All respiratory specimens except sputum are transported in viral transport media for diagnosis of viral infection.

For transit period upto 24 hours transport specimen for bacterial isolation at ambient temperature at viruses at 4-8°C

CSF Specimen

- Should be collected by an experienced Physician.
- CSF is used for the diagnosis of Viral, Bacterial and fungal infections.
- About 1-2 ml of CSF is collected in 3 tubes 1 for culture, 1 for biochemical analysis and 1 for cytology.
- Haemorrhagic CSF is not recommended for Serological test.

Handling and Transportation

- In general send the specimen to the laboratory and process as soon as possible.
- Transport CSF specimen for Bacteriology at ambient temperature (Many of the bacteria do not survive under low temperature).

CSF for virology do not need transport media. (transport at 4-8°C)

Post mortem Specimen

- Need to be collected during outbreak situations when causative agent is not known.

- Collect the specimen preferably within 24 hours. (Viral titre decline and bacteria over grow)
- Use a separate sterile instrument for each tissue specimen from affected sites
- Place different tissues in separate sterile containers containing relevant medium. Fixative for Histopathology, Sterile Saline for Immuno fluorescence, Transport media for Bacterial/Viral)
- Blood may be collected from heart cavities.
- If cerebral malaria is suspected take several smears from the cerebral cortex

Handling and Transportation

- Fixed specimen can be stored and transported at ambient temperature.
- Transport tissue specimen for isolation of Viral Pathogen in VTM or Sterile Saline at 4 - 8°C for 24 - 48 hours. For longer periods freeze and store -70°C.
- For isolation of Bacterial Pathogen transport at ambient temperature in Transport media

Mosquito Vectors of Kerala

Dr. T. Dilip Kumar

Assistant Director (Entomology) Directorate of Health Services

Ever since the mosquitoes were incriminated as the vectors of some human diseases, they have been studied in detail across the world. These studies have generated immense literature dealing with biology, ecology, taxonomy etc. of mosquitoes which constitute the integral part of the epidemiology and control of vector borne diseases.

Malaria and filariasis were the two major vector-borne diseases prevalent in Kerala in the past. Malaria was rampant in the hills and foothills while filariasis was endemic in the coastal belt and a few inland pockets. In Kerala, several investigators have carried out tremendous studies on the epidemiology of these diseases. Milton and Horne carried out some preliminary investigations in Wayanad in 1914. But, detailed scientific studies on malaria and filariasis were done by M.O.T. Iyengar in the erstwhile Travancore in 1930s. Subsequently, Covell and Harbhagvan carried out in-depth investigations on malaria in Wayanad in 1939. As a result of these studies the

vectors of malaria and lymphatic filariasis in Kerala could be incriminated. The studies done by Centre for Research in Medical Entomology (CRME), Madurai, Tamil Nadu and Vector Control Research Centre (VCRC), Pondicherry led to the incrimination of vectors of Japanese encephalitis, dengue fever and chikungunya in Kerala. The entomological surveys carried out by the entomology wing of the Health Services Department revealed the presence of different mosquito vectors in different geographical areas in the state. The surveys also revealed the presence of some vectors which were not reported in the past.

A brief narrative of the mosquito vectors of Kerala

1. Malaria Vectors

Anopheles fluviatilis

It is considered as the principal vector in Kerala. It is mainly prevalent in the hills and foot hills where slow moving streams are the major breeding source. It is a highly anthropophilic (preferring human blood) mosquito. It has caused massive epidemics of malaria in several areas in the past. The recent entomological survey done in Wayanad exposed the presence of this vector.

Anopheles stephensi

This species was first reported from Kochi in 1992. Subsequently, it was reported from

Thiruvananthapuram, Kollam, Thrissur, Valancherry (Malappuram), Kasaragod and Thodupuzha (Idukki). This vector has been implicated in the recent malaria outbreaks in different areas in the state. It was found to breed in wells, overhead tanks, ground level cement tanks, roof gutter, and seepage water collections etc. Cattle sheds and human dwellings were found to be the resting places of this species. The man-hour density (MHD) in different areas varied from 0.4 to 3.

Anopheles culicifacies

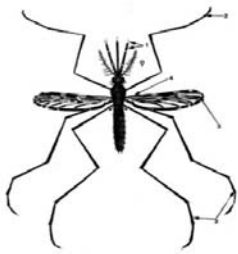
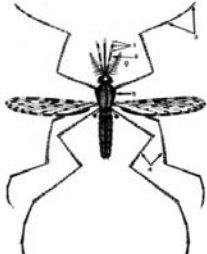
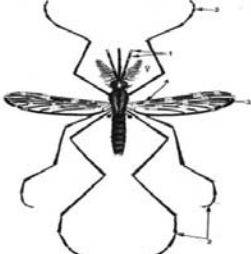
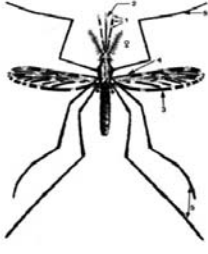
It is a major vector in rural areas. It is a

vectors. Wells, tanks, pools etc were found to support the breeding of this species. The adults are rarely collected. The density of this vector was found to be very low wherever it was collected.

2. Vectors of Lymphatic Filariasis

Culex quinquefasciatus

It is the principal vector of bancroftian filariasis which constitutes more than 95% of the filarial problem in Kerala. It is also one of the most predominant mosquitoes and breeds in a large number of habitats. Polluted water collections such as drains, cesspools, pits etc are the major breeding sites. It prefers human blood and mainly rest indoors. The density of this species, which is expressed as 10 man-hour-density, in some areas in some seasons goes beyond 200 and in such

An.fluviatilis	An.stephensi	An. culicifacies	An.varuna
			
<ul style="list-style-type: none"> ◆ Apical paleband equal to Pre-apical dark band ◆ Tarsomeres without bands. ◆ Inner costa completely dark 	<ul style="list-style-type: none"> ◆ Apical & Sub-apical pale bands equal ◆ Foreleg tarsomeres without broad bands ◆ Legs & Palpi with speckling 	<ul style="list-style-type: none"> ◆ Apical pale band equal to pre-epical dark band ◆ Tarsomeres without bands. ◆ Inner costa interrupted 	<ul style="list-style-type: none"> ◆ Apical and sub apical pale bands equal ◆ Inner costa completely dark ◆ Tarsomeres without bands

zoophilic mosquito and was mostly collected from cattle sheds. Paddy fields, ponds, pits etc. are the favored breeding sites. Its MHD varied between 1.5 to 7.

Anopheles varuna

It is a proven malaria vector in south Kerala. It was collected from several outbreak areas along with other

situations it causes severe biting nuisance especially during night time..

Mansonia uniformis, Mansonia indiana and Mansonia annulifera

These are the vectors of brugian filariasis which is predominant in Cherthala Alappuzha region. These mosquitoes breed in association with certain aquatic plants such as pistia, salvinia, eichhornia etc. Of these, Mansonia annulifera is the primary vector. It prefers

human blood and is mostly collected from human dwellings. The other two species are collected mainly from cattle sheds and outdoor vegetation. The 10 man-hour density of *Mansonia annulifera* varies between 20 and 150 in human dwellings.



Cx. quiquefasciatus



Ma. annulifera

3. Vectors of Japanese encephalitis

Culex tritaeniorhynchus

It is the principal vector of Japanese encephalitis in Kerala. It is prevalent in the entire state. The major breeding places are paddy fields, pools, canals, pits etc. The recent surveys have shown that this species has adapted to breed in wells, tins and barrels in urban areas. It is predominantly a cattle biter and prefers resting outdoors among

vegetation. The outdoor density in some areas during favorable seasons will cross 300 per man-hour. From the epidemiological point of view 'Dusk Index' (DI) of the species is taken as a vital entomological parameter.

Mansonia annulifera*, *Mansonia uniformis* and *Mansonia indiana

These mosquitoes have been incriminated as 'bridge vector' of JE in Kuttanadu area where these mosquitoes are abundant.



Cx. tritaeniorhynchus: Main Identification Characters

- Proboscis with a pale ring
- Hind femur pale with a narrow dark ring distally
- Accessory pale patches on the ventral surface of the proboscis.

4. Dengue

Dengue was reported for the first time in Kerala in 1997. Subsequently, it spread far and wide and now it has become endemic in certain areas especially in Thiruvananthapuram district. *Aedes aegypti* and *Aedes albopictus* are the vectors of dengue. The former is considered globally as the epidemic vector while the latter is recognized as the secondary vector. The presence of *Aedes aegypti* has been noticed in a few districts namely Thiruvananthapuram, Ernakulam, Kozhikode and Kannur. But, *Aedes albopictus* is widely distributed in the state.

5. Chikungunya

Chikungunya appeared in Kerala in 2006 and it ravaged the entire state in the following years causing very high morbidity among affected people.

Though *Aedes aegypti* is considered as the major vector of chikungunya, in Kerala *Aedes albopictus* was incriminated as the primary vector. *Aedes albopictus* is one of the most predominant species in Kerala and this was the reason why chikungunya assumed epidemic proportions within a short period of time and spread like a wave in the state. These species breed in a variety of habitats ranging from a spoon-full of water in the leaf axils to large water bodies such as wells and huge tanks. *Aedes aegypti* shows preference to artificial water collections such as cement tanks, bottles, fountains, tins, cans, discarded utensils, drip trays of the fridge etc. *Aedes albopictus* indiscriminately breeds in artificial as well as natural sources.

The entomological indices of *Aedes* such as House Index (HI), Breteau Index (BI) and pupal index (PI) showed marked fluctuations in different areas indifferent seasons. The indices were high during monsoon season and were low in summer. The results of a longitudinal study carried out by the entomology wing of the Health Services Department in Kerala during pre-monsoon season in 2008 are summarized below

District	HI % (Range)	BI (Range)	PI (Range)
TVM	7.69 - 83.33	11.48 - 145.83	21.43 - 87.5
KLM	5 - 24	5 - 39	2.7 - 41.7
PTA	15 - 55	20 - 91.3	15 - 155
ALP	21.95 - 44.83	31.82 - 82.76	33.33 - 109.09
KTM	30 - 56.25	40 - 90.63	16.1 - 118.2
IDK	0 - 50	0 - 73.08	21.6 - 107.7
EKM	30.95 - 59.46	50 - 248.15	17.07 - 109.52
TSR	5.56 - 58.06	10.87 - 147.83	28.95 - 143.48
PKD	31.25 - 88.8	31.25 - 131.8	9.7 - 29.7
MPM	9 - 50	10 - 115.25	11.6 - 24.5
KKD	5.56 - 60	11.11 - 104.55	20.59 - 89.47
WYD	5 - 20	5 - 22	13.3 - 16.7
KNR	0 - 13	0 - 28	16 - 26.5
KSGD	6.67 - 47.37	10 - 142.86	25 - 121.74

Outbreak Investigation & response

Prof. Umarul Farook M

State Entomologist, SSU, IDSP.

Outbreak investigation and timely reporting is one of the important activities carried out by the IDSP in the state. State Surveillance Unit of the IDSP receives Disease alerts/outbreak reports from 14 districts on weekly basis. Even nil weekly reporting is mandated and

the compilation of disease outbreaks/alerts is being done in the SSU on weekly basis for sharing with the Central Surveillance Unit (CSU) Delhi and other stakeholders and programme officers coming under the Directorate of Health Services.

During the year 2010 a total of 77 outbreaks have been detected by the District Surveillance Units and reported to the SSU/CSU as shown in the table below.

Table showing number of disease alerts/outbreaks reported in 2010

Disease	No of Outbreaks	% among total outbreaks
Malaria	5	6
Dengue	9	12
Chikungunya	1	1
ADD	6	8
Typhoid	4	5
Hep-A	18	23
Chickenpox	8	10
Dysentry	1	1
Measles	2	3
Rubella	1	1
Lepto	2	3
Hep-B	1	1
Hooch Tragedy	1	1
Food Poison	18	23

From the table it is seen that a total of 77 outbreaks consisting food poisoning (23%), Hepatitis A (23%), Dengue (12%), Chickenpox (10%), ADD (8%), Malaria (6%), Typhoid (5%), Lepto (3%), Measles (3%), CG (1%) etc were detected by 14 DSUs during 2010. It is also seen that out of the total outbreaks reported, vector borne diseases constitute 19 Percent, while waterborne diseases contribute 37 percent.

Reporting an outbreak

There is an approved format for reporting the disease alert/outbreak to the higher levels in IDSP. When each outbreak is reported many vital information about the outbreak are to be provided by the reporting unit in the reporting format. One of the information is about the outbreak affected area, such as Name of affected area, PHC, Block, Sub center, Village & Panchayath. Date of start of outbreak and date of reporting to SSU/CSU is also important. Another most important information to be provided is about the epidemiological observations and necessary investigations about the outbreak. Regarding the investigation and epidemiological observation usually the information provided by the reporting units are seen incomplete or blank.

Outbreak Investigation

Each and every outbreak should be investigated to ascertain its etiology and understand why they occurred as well as to identify high risk areas and groups.

The purpose of an investigation is

- To verify the outbreak
- To recognize the magnitude and spread of the outbreak.
- To identify the etiological agent, the source and root of transmission as well as the people at risk.
- To recommend measures so that the outbreak can be controlled as well as prevented in the future.

At the PHC and CHC level the Medical Officer in Charge will be the nodal officer who will be responsible to respond to an outbreak. At the district level District RRT will have the primary responsibility to investigate **suspected/ impending/ actual outbreaks.**

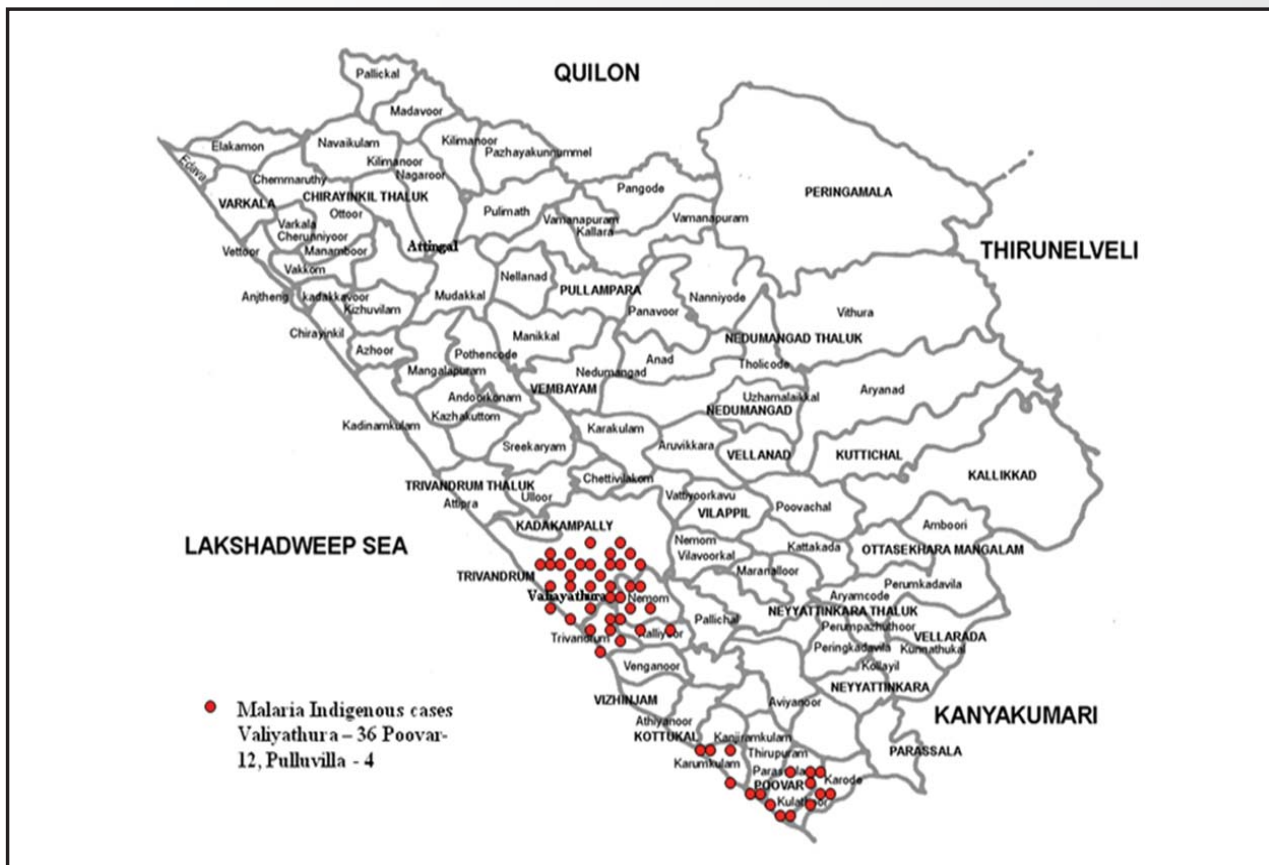
Rapid Response Team (RRT)

The RRT is a multi faceted team that looks in to the various aspects of an outbreak. It should have minimum composition of three members namely, an Epidemiologist, a Clinician and a Microbiologist. The main role of the RRT will be to investigate and confirm outbreak. It is to be noted that the RRT is not a permanent team waiting for an outbreak. They are individuals who are normally performing their usual roles, but in the event of an outbreak they come together to undertake a special function. They should work in close coordination with the local health staff in the event of an outbreak. While they will help and support the local staff in the management and control of the outbreak the prime responsibility for implementing the control measures rest with the local health staff.

Spot Maps

Spot Maps are the integral part of an outbreak investigation. Preparing a spot map will help the investigator to locate exactly the cases and also to understand the geographical distribution of the cases. A spot map prepared in connection with the indigenous Malaria outbreak at Thriuvananthapuram district during 2010 is shown below.

SPOT MAP of Indigenous Malaria Cases at Valiyathura & Poovar 2010



★ Spot Map Prepared by: District Malaria Officer, tvpm.

Role of RRT Members

Epidemiologist: The epidemiologist plays a crucial role in the epidemic investigation. She/he will carry out a detailed epidemiological investigation that will look into the epidemiological and environmental aspects of the outbreak. The basic aim of the epidemiological investigation is to identify the source of the problems and the routes of transmission. For this, the epidemiologist may ask for further tests like water analysis/entomological survey etc.

Clinician: The clinician is expected to do medical investigation. The clinician may

be a physician/pediatrician and will clinically examine the available cases (in the hospital or the community) and make a clinical diagnosis. The clinician will identify the possible source, route of transmission and contacts and also will review the case management.

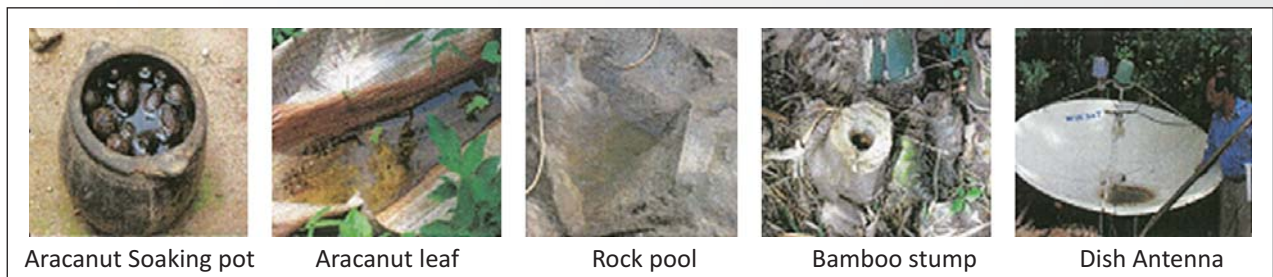
Microbiologist: He is expected to do the laboratory investigation. Laboratory help should be utilized in establishing the diagnosis of early cases only. Once the cause of the outbreak is confirmed, laboratory support should not be wasted for each and every case. The microbiologist will advise on what samples are required, mode of collection and method of transportation and also to which lab samples are also to be sent. **It is not necessary to collect specimens from all cases, just enough to confirm the diagnosis.**

Entomologist: In the case of vector borne disease

outbreaks, entomological investigation is mandatory. Entomological investigation is carried out to incriminate the vector species, to identify the breeding places and also to assess the vector density at the time of outbreak. Some of the breeding sites identified in Thrissur and Palakkad districts in connection with the dengue outbreak in 2010 is given below.

has started its investigation and should include the line list of new cases, lab results received, any new findings, any containment measures taken etc. This daily report should continue till the end of the outbreak (i.e no suspected cases during a period which is double the incubation period of the identified disease)

Interim report by RRT: The RRT will submit an interim report within one week of starting their investigation. The report should cover the verification of the outbreak, total number of affected cases/deaths with line lists,



Report preparation

Preliminary report: The Medical Officer in charge of PHC/CHC who first reports the outbreak should submit a preliminary report to the DSO as early as possible. The report should cover briefly about how the outbreak came to his attention, verification of the outbreak, total number of affected cases/deaths, time, person, place, analysis, management of the patients, likely suspected source, immediate control measures implemented etc.

Daily Situation updates: During the period of the outbreak the nodal MO should continue to give daily situation updates of the outbreak to the DSO. The DSO should transmit the information to the SSO. This should continue even when the RRT

time, person, place analysis, management of the patients, likely suspected source, immediate control measures implemented etc. Along with these the report of the physicians, microbiologist and entomologist (where applicable), the lab results received during the period should be attached. Environmental factors responsible for the outbreak should also be mentioned in the report.

Final report: Within ten days after the outbreak has ceased, a final outbreak investigation report must be submitted by the local health authorities. This report must be comprehensive and give a complete picture of the multifactorial causes of the outbreak, the precipitating factors, the evolution of the epidemic, descriptions of the persons affected, time trends, areas affected and directions of the spread of the epidemics. It should have complete details of the lab results including regional lab. Feedback: It is important that feedback from the report is shared with all the relevant stakeholders.

Crimean Congo Haemorrhagic Fever (CCHF): An inter-state emergency

Dr. Iype Joseph

Assistant Surgeon, CHC Pathanapuram

An outbreak of Crimean Congo Hemorrhagic Fever (CCHF) occurred in a private hospital in Gujarat on the first day of January 2011. It is a major hospital in that region and caters to patients all over the world. Approximately 30 Malayalis work in this hospital as nurses.

One female patient was admitted with fever, vomiting, stomach ache and joint pains on 30th Dec 2010 in the above hospital. She later developed hemorrhagic symptoms. She was treated in the MICU. Dialysis was also done. She died on 3rd Jan 2011. The doctor who treated the above patient got sick with the same symptoms later. He was initially treated in another hospital in Ahmedabad. Later he was transferred to his own hospital just before death. He died on 13th Jan 2011. (The doctor had intubated the first patient) One nurse who was involved in the care of the first patient developed fever on 10th Jan 2011 and was admitted to the same hospital on 13th Jan 2011. Her condition worsened on 15th Jan 2011. Doctors informed the family

of the unknown nature of the sickness and asked them to inform other relatives. Samples were sent to National Institute of Virology (NIV), Pune for investigation. On 18th Jan 2011, the nurse died with hemorrhagic symptoms. Diagnosis was known only on the day of death. Few nurses from Kerala were directly involved in the care of the first patient but many nurses from Kerala were directly involved in the care of the last patient.

So the last possible point of transmission of CCHF was 18th Jan 2011 (early morning).

In the ensuing panic, a number of nurses returned to Kerala by train. Dr. Pares Dave, Additional Director of Health Services, Gujarat after enquiry with the management of the private hospital made available a list of nurses who stopped reporting to duty after the outbreak. Efforts were made through the surveillance system under the Additional Director of Health Services (Public Health) to track the nurses who have already returned and who were in the

District	Risk Level		Total
	Low	High	
Ernakulam	3	3	6
Kottayam	4	3	7
Idukki	2	1	3
Palakkad	1	0	1
Pathanamthitta	1	0	1
Returned to Gujarat	4		4
Removed from tracking as incubation period is over	1		1
Total			23

Note: Risk level High: was involved in the direct clinical care of any of the three patients.
Risk level Low: Never saw the patients but shared the hostels and train with the high risk persons.

different trains to Kerala. Many were tracked with the help of other returnees. Out of 23 persons, all have been tracked, 4 of whom have returned to Gujarat. One person was outside the incubation period and was not followed-up.

On 24 Jan 2011, 4 persons complained of mild influenza like features. The symptoms decreased in the following days and most have almost become asymptomatic by 27 Jan 2011. No-body had been started on Ribavarin. Adequate drugs were stocked in the godown of the manufacturer.

Blood for investigation at NIV, Pune was collected on 27.1.11. It was collected with full protection for the staff and packed in 3 layers. Mr. Anoop, Microbiologist (IDSP Eranakulam) transported the blood samples to NIV, Pune. Many of the persons under follow-up had tested their blood in different labs on their own and as per doctors' advice. Even after repeated requests and official communication to DMOs, this practice was continued. So, in case if any one of these people was positive, then, the concerned labs had to be taken up for surveillance. Results of the blood investigations showed that all persons were negative. It was instructed that all high risk persons to stay at home till 20 days are over as an added precaution.

Thus the threat of CCHF ended for the time being.

This experience helped us to learn some important things. They were, the importance of "universal precautions" in health care settings, the benefit of investigating unusual cases to the greatest possible extent, the need for interstate cooperation for interstate problems, the possible rapid importation of diseases from far and wide and the need for reducing unnecessary investigations. ●

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