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Global Outbreak Alert and Response. Report of a WHO meeting

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World Health Organization
Department of Communicable Disease
Surveillance and Response

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Executive Summary

At the beginning of the 21st century, the world is still confronted with:

- the emergence of new or newly recognized pathogens
- the recurrence of well-characterized epidemic-prone diseases
- the potential for accidental or deliberate release of biological agents

Contributing factors are poverty, widening development gaps, collapse of public health infrastructure, urbanization, civil strife, new use and development of biological products, environmental change and degradation, and globalization of travel and trade. Whereas traditional approaches to containing outbreaks were defensive, trying to secure borders from the entry of infectious diseases, modern solutions, in addition to the development of new anti-infective drugs and vaccines, are built on a combination of early warning surveillance systems, epidemic preparedness plans, stockpiles of essential materials, speedy communications and information sharing through networks to rapidly contain epidemic threats.

WHO, with its international mandate, including the International Health Regulations, and with its unique experience with and privileged access to countries, is in a unique position to coordinate global outbreak alert and response. The success of these endeavours will be guaranteed through WHO's partners - national (ministries of health, scientific institutes) and international (networks, other organizations, NGOs) with WHO support and coordination.

The Department of Communicable Disease Surveillance and Response (CSR), organized a major international meeting on "Global Outbreak Alert and Response" in Geneva, April 26-28, 2000. This meeting brought together 121 representatives from 67 key partner institutions in global epidemic surveillance and response to discuss the challenge of epidemic-prone and emerging diseases faced by the world as we enter the 21st century and the need to build a global network on existing partnerships to deal with these threats. The participants addressed:

- current and potential epidemic threats with risk for international spread, humanitarian repercussions or significant impact on travel and trade
- existing initiatives in global outbreak alert and response
- the establishment of a global outbreak alert and response network

The participants expressed the need for the establishment of a "Global Outbreak Alert and Response Network" and agreed on a series of principles and functions for the network.

General principles:

- The Network will focus on maintaining global public health security by ensuring coordinated mechanisms for outbreak alert and response
- It will consist of a technical partnership between existing institutions and networks
- It will complement and strengthen existing networks

Functions:

- The network will work to combat the international spread of outbreaks by rapid identification, verification and communication of threats leading to coordinated response
- It will ensure that the appropriate technical assistance reaches affected states rapidly and leads to reduced morbidity and mortality and prevention of further disease spread
- It will contribute to long-term outbreak preparedness and capacity building by ensuring that acute responses lead to longer-term technical assistance
- It will constantly evaluate international efforts to contain outbreaks

Structure:

- The network will consist of a global alliance of technical partner institutions and networks which will be supported by:
 - a "Steering Committee" consisting of network partners
 - an operational support team (OST) based in WHO
- The "Steering Committee" will have an oversight and planning function for the network and will have wide geopolitical and organizational representation
- The OST will consist of a minimum of 5-6 WHO full-time equivalent staff from Headquarters (HQ), WHO Regional Office staff, and will be supplemented with secondments from partners
- Task forces/working groups will be established to deal with specific issues (e.g. drafting a code of practice for international outbreak response)
- In the start up process, the "Steering Committee" should consist of a small interim committee, with WHO deciding on the initial membership (not more than 12 months) and based on complementary skills and experience

Financing of the Network:

- The proposed activities of the network represent WHO core business, and this should be recognized through support with an investment from WHO funds, supplemented by extra-budgetary sponsorship
- The network partners should support the network through activity support and staff secondments where possible
- A budget proposal for Network activities will be developed by WHO

Next Steps in creating a functional global alert and response network:

- Finalization of the framework document for a Global Outbreak Alert and Response Network (May/June 2000)
- Establishment of a small "interim committee" based on complementary skills and experience (June/July 2000)
- Establishment of an event management system with real time information exchange (October 2000)
- Inventory of the partners' capacities in an interactive global database of experts (December 2000)
- Establishment of a Code of Practice for Network operations, for field operations and for conflict resolution. The drafts of the Code of Practice will be coordinated by WHO and approved by all partners (October 2000).

1. Introduction

1.1 Opening ceremony

Dr DL Heymann, Executive Director of the Cluster of Communicable Diseases, welcomed the participants and opened the meeting on behalf of the Director-General of WHO, Dr GH Brundtland.

The objectives of the meeting were outlined as follows:

- To review current outbreak threats and international efforts in alert and response.
- To advise the World Health Organization on the need for and functions of a global outbreak alert and response network.
- To agree on a framework for action leading to a functional outbreak alert and response network.

Recent years have seen an increase in the number of outbreaks (cholera, Ebola, plague, meningitis), the pathogens involved and an increase in the importance of outbreaks, due to the globalization in travel and trade.

Various types of networks for surveillance of communicable diseases (geographical or disease-specific), both formal and informal, exist currently. In these networks, WHO has a role in outbreak verification and response, and a mandate embodied in the International Health Regulations.

As globalization creates a common concern for health worldwide, strengthened national and global surveillance for prevention and control is needed. Therefore, a global network of networks for outbreak alert and response is required.

1.2 Participants and agenda

Seventy-three participants from sixty-eight institutions, seven representatives from the six WHO Regional Offices and twenty-eight from WHO Headquarters participated in the meeting.

Chairman of the meeting was Prof. R. Waldman and Dr R. St. John was rapporteur. The agenda and the list of participants are attached as Annexes 1 and 3 respectively.

1.3 Global overview

Dr LJ Martinez, Director of the Department of Communicable Disease Surveillance and Response, outlined the challenges in global outbreak alert and response.

Epidemic diseases are not new to mankind, yet outbreaks continue to pose a threat. Widening development gaps, collapse of public health infrastructure, poverty, urbanization, civil strife, environmental change and degradation, and globalization of travel and trade are factors contributing to the new challenges posed by epidemic-prone and emerging infectious diseases.

Outbreaks can cause significant economic losses as was seen in the cholera outbreak in Peru in 1991 (770 million US\$), plague in India in 1994 (1,7 billion US\$) and BSE in the UK (38 billion US\$).

At the beginning of the 21st century, the world is still confronted with:

- The emergence of new or newly recognized pathogens (Nipah, Ebola, Marburg)
- The recurrence of well-characterized outbreak-prone diseases (cholera, dengue, influenza, measles, meningitis, shigellosis, yellow fever)
- The accidental or deliberate release of biological agents (e.g. BSE, vCJD, anthrax, prions)

Whereas longstanding, traditional approaches to contain outbreaks were defensive (“brick wall”), trying to secure borders from the entry of emerging infectious diseases, innovative approaches have been established consisting of early warning surveillance systems, epidemic preparedness plans, stockpiles of essential materials and communication and information sharing through networks, providing information for action.

The challenges posed by epidemic-prone infectious diseases are how to contain the international spread of outbreaks, how to assist countries at risk from being overwhelmed by outbreaks and how to coordinate and focus global resources as no one institution has all the capacity.

WHO, with its international mandate from 191 Member States has a unique position to coordinate infectious disease surveillance and response. Partnerships with national (institutes and ministries of health) and international partners (networks, organizations and NGOs) will maximize the benefit of strengthening surveillance and response.

2. Proceedings

2.1 Outline of daily sessions

Six sessions were conducted during the meeting. Sessions 1-3 were plenary sessions and consisted of reports of regional or country experiences, or presentations by WHO. At the end of the session, the moderator opened the session for discussion.

On the first day, two sessions were held: "Outbreak Alert Systems" and "Coordination of Outbreak Response", both moderated by Prof. A. Plant. On the second day, the topic of the plenary session was "From Response to Preparedness", moderated by Dr M. Lewis. During the fourth session the meeting participants divided into four working groups, each of which considered a framework document for action.

Sessions 5-6 were plenary sessions and consisted of collecting feedback and recommendations from the working groups, and discussing and presenting the meeting consensus.

2.2 Session 1: Outbreak Alert Systems

Moderator: Dr A. Plant, Curtin University of Technology, Australia

2.2.1 Outbreak Alert and Specialized Surveillance Networks

Essential features of early warning and surveillance networks are: technical expertise support, clear terms of reference, dedicated staff for coordination, generation of useful information for public health action, regular meetings of clients, common data standards, scientific rigour and problem/data/solution sharing. Trade-offs between general information and useful information need to be made, and certainty (accuracy and specificity) needs to be balanced versus timeliness and relevance.

The European Union has set up an Early Warning and Response System, linking the designated authorities in member states and the European Commission and allowing for immediate information on events which could be a European Union health threat.

In addition, multiple disease-specific surveillance networks (e.g. EWGLI for legionellosis) have been established in the European Union.

2.2.2 Global Public Health Intelligence Network (GPHIN)

The Global Public Health Intelligence Network (GPHIN), developed by Health Canada with assistance from WHO, is an Internet-based, time-sensitive warning system for global, public health events (from outbreaks over environmental disasters to bio-terrorism), continuously scanning electronic sources for information.

2.2.3 FluNet

WHO's influenza surveillance network is a network of national centres, WHO Collaborating Centres and laboratories, operational in 83 countries and using standard case definitions and laboratory diagnostic tests. The network uses the FluNet database for

standardized data entry and data output, including summarized data on the extent of epidemiological influenza activity and on virological results by geographical location over different time periods. FluNet also provides influenza reports and recent news. All FluNet's output data are available on the web without access restriction.

2.2.4 PACNET

PACNET is the Pacific Public Health Surveillance Network, linking the core members of the 22 Pacific Islands Departments and Ministries of Public Health and allied members such as partner agencies, networks and institutions. PACNET aims to harmonize surveillance data and to development surveillance systems in its region; PACNET also aims to provide training in field epidemiology and public health surveillance, to extend its electronic communication network and to disseminate timely, accurate and relevant information.

2.2.5 Centers for Disease Prevention and Control Alert Systems

Centers for Disease Prevention and Control (CDC) Alert Systems include both domestic and international networks. Pulsenet, developed by CDC and the Association of Public Health Laboratories, is a national molecular subtyping network for foodborne disease surveillance, using DNA fingerprinting to identify foodborne outbreaks in a timely manner. CDC is also developing Epi-X, a 24/7 data network prototype for tracking outbreak investigations that are underway. Epi-Aid provides outbreak assistance nationally and internationally and both in non-infectious and infectious outbreaks.

2.2.6 Outbreak Alert and Response at WHO

Outbreak alert and response at WHO consists first of all of the active gathering of epidemic intelligence information from different sources and partners. Epidemic intelligence information is then processed and analyzed at WHO HQ, and subsequently shared through the weekly WHO Outbreak Verification List (OVL) with over 900 institutions and professionals in the field of public health. In the meantime, a verification process is started up to verify reported outbreaks. Upon confirmation, information is widely distributed through the WHO/CSR website and the *Weekly Epidemiological Record*.

The role of WHO in global outbreak response is to assist Member States on request: by mobilizing international response teams, coordinating response, facilitating access to countries, providing technical guidelines, facilitating research activities and supporting national epidemic preparedness.

2.2.7 IHR: A Mechanism for International Reporting

The present International Health Regulations (IHR) were endorsed in 1969 by the World Health Assembly in order to ensure the maximum security against the international spread of diseases with a minimum interference with worldwide traffic. The International Health Regulations are currently under revision in order to respond to the challenge of increasing travel and trade in a globalizing world and the still existing threat of outbreaks of emerging and re-emerging diseases. Several key changes are proposed for the new Regulations, in order to institute a new notification and response process that will blend with the OVL/CSR systems.

Key points from discussion

- There are a wide range of initiatives and networks to improve communication of information related to outbreaks.
- The verification of outbreaks is essential and WHO needs to play a pivotal role in confirming the initial report of outbreak information.
- There should be efforts to minimize the negative consequences of reporting outbreaks. WHO is aware of this problem and is working on it; moreover, the new International Health Regulations will deal with events that pose real international health threats and support countries in mitigating adverse political and economic consequences.
- The non-governmental (e.g. academic) sector plays a pivotal role in some countries for the identification of epidemics of international importance.
- In the past, inappropriate responses by members of the international community to national events have been blown out of proportion by domestic politics and media.
- A few cases of an unusual disease in a developed country can overshadow the occurrence of large numbers of cases in endemic areas. Often, the magnitude of the response to this unusual disease far exceeds the reaction to ongoing occurrences of the same illness in endemic areas.

2.3 Session 2: Coordination of Outbreak Response

Moderator: Prof. A. Plant, Curtin University of Technology, Australia

2.3.1 Existing mechanisms for cooperation in outbreak response

The response to communicable disease events consists of intervention activities to control the outbreak event. These intervention activities can be preceded by an investigation and research phase if little or nothing is known about the aetiology and the impact of the event.

WHO's role in outbreak response is to:

- provide immediate expertise from permanent staff, in addition to technical expertise from WHO Collaborating Centres (laboratory support)
- mobilize and facilitate an international response.

WHO is also the source for accurate and timely information for the press and the general public. Response mechanisms can be bilateral, multilateral, or UN-coordinated. This WHO coordinated response mechanism has several advantages as WHO has an international mandate, WHO provides an element of neutrality and has international networks. WHO also has the capacity to balance the representation of partners and WHO has the financial resources to catalyze the process and fill the gaps.

2.3.2 Outbreak alert and response in emergencies

Over 65% of outbreaks of international importance occur in emergency situations. In emergencies, the risk and duration of epidemics are increased.

Several constraints impede an efficient response to outbreaks in emergency situations: breakdown of health services, lack of governance, limited access, multiple agencies, logistic difficulties. As such, outbreaks in emergencies are difficult to contain and have the potential to spread internationally. Outbreaks in emergencies where there is no internationally recognized government also pose problems for reporting under the International Health Regulations.

The challenges for the partners to ensure the response to outbreaks in emergencies include: the need for rapid assessment of main epidemic threats, for putting early warning systems in place, for emergency laboratory support, for trained international and local staff, and for coordination of international teams of experts.

2.3.3 Rift Valley fever outbreak - Kenya/Somalia - 1997/8

Following heavy rainfall in late October 1997 in north-east Kenya and adjacent Somalia, humans and livestock started succumbing to an unknown disease in the last week of November. At the end of December, the diagnostic of Rift Valley Fever was laboratory-confirmed. Upon laboratory confirmation, some 20 organizations (UN, NGOs and (inter)national institutes) started operating in response to the outbreak.

A Haemorrhagic Fever Task Force was established. The Task Force coordinated the epidemiological field investigation, coordinated the activities of the partners involved in the outbreak response, provided guidelines to control the outbreak, prepared and coordinated the release of information to the news media and mobilized resources to investigate and control the outbreak.

Many lessons were learnt from this outbreak, and this on both national level (how to improve epidemic response, preparedness and surveillance) and on the international level (how to mobilize and coordinate all partners involved, and how to cooperate with the media).

2.3.4 Nipah virus outbreak - Malaysia/Singapore 1999

Malaysia has been the epicentre of outbreaks of various emerging diseases during the last 3 years. The outbreak of viral encephalitis in 1999 identified the new Nipah virus as the causative agent. Nipah encephalitis was seen mainly in adult pig handlers in association with disease of pigs. The demonstration of seroconversion to IgM antibody to Japanese encephalitis virus in a single Nipah encephalitis patient (now thought to be due to vaccination), initially caused confusion in the diagnosis of the novel Nipah encephalitis.

This outbreak stressed the need for a better coordination between the agencies providing assistance. In addition, it was felt that the terms of reference and the chain of command of experts should be established from the beginning and the experts should be sensitive to cultural practices and beliefs within ethnic groups in Malaysia. Press releases, public relations and research priorities should also be addressed in advance in order to avoid conflicts of interest and good response management.

2.3.5 Experience with Amazonia and Southern Cone Surveillance Networks

A laboratory network for emerging and re-emerging infectious diseases was established in nine South American countries. Standard case definitions have been set for a number of syndromes. For each syndrome, a prescribed range of microbiological investigations,

with different tests performed at different levels of laboratories, is carried out to cover the most likely differential diagnoses.

2.3.6 International outbreak response – Afghanistan: a country perspective

Geopolitical conditions (war, frontlines in remote areas) and natural disasters (drought, earthquakes) in recent years were conducive to epidemics in parts of Afghanistan. The existing health sector coordination and management mechanisms had to cope with epidemics such as cholera, measles, malaria, typhoid. Because of the national and regional coordination of the response to cholera and the establishment of cholera task forces, case-fatality rates dropped sharply. Surveillance and preparedness activities were improved, as these were seen as the best basis for an effective response in the case of an outbreak.

Key points from discussion

- It was noted that everybody wishes to become involved in response to high profile diseases like Marburg, but few are prepared to respond to outbreaks of diseases such as cholera.
- Concern was raised about the quality assurance, the uniformity of actions and the recommendations of response efforts.
- Coordinating international responses is difficult and requires a very systematic approach.
- The importance of sharing information derived from outbreak responses must be stressed.
- The influence of politicians in outbreak responses should be borne in mind.
- It should also be borne in mind that in many outbreaks, the WHO and international partners do not become involved, and on many occasions governments will deal with an outbreak on its own. The role of WHO may be to provide technical advice and follow-up.
- Many outbreak situations are complex, not simply involving an infectious disease (e.g. toxic event), and hence responses need the capabilities of a variety of partners.
- The multiplicity of NGOs operating in the Rift Valley fever outbreak stemmed from the fact that they had been involved in drought relief in the same area during the preceding two years. Lessons learned from the outbreak included the possibility of predicting outbreaks from satellite acquired climatic data.

2.4 Session 3: From Response to Preparedness

Moderator: Dr M. Lewis - Caribbean Epidemiology Centre

2.4.1 From response to preparedness: how can better international coordination lead to better epidemic preparedness at regional and national levels?

Africa is confronted with a high burden of epidemic diseases: meningitis, cholera, dysentery, malaria, measles, viral haemorrhagic fevers and plague. Recent assessments of African countries' capacity to deal with epidemic diseases have shown that their lack of epidemic response capacity is due to lack of preparedness. Therefore, national disease surveillance, national laboratory capacity and equipment, and communication should be strengthened, prevention should be prioritized, epidemic management, information

sharing and international technical cooperation should be improved. As such, better epidemic preparedness will lead to rapid and better response.

2.4.2 International Coordinating Group (ICG) on vaccine provision for epidemic meningitis

Several major meningitis epidemics have occurred in recent years (1996-9), and in response the International Coordinating Group on Vaccine Provision for Epidemic Meningitis Control (ICG) was established. The ICG's members are NGOs, international organizations, the pharmaceutical industry, and bilateral and technical partners. The ICG's objective is to be prepared for epidemics by ensuring adequate provision and rational use of vaccine, drugs and injection material.

2.4.3 Sub-regional approaches - West Africa

Recent rates epidemic problems including measles, cholera and meningitis with high case-fatality rates led to the signing of an agreement of cooperation within the West African WHO Epidemiological Block. As such, the 18 countries in the Block cooperate in the prevention and control of epidemic-prone diseases and are supported by the WHO Epidemiological Support Team in Abidjan, Côte d'Ivoire. The Block also improves capacity building by providing laboratory and field epidemiology training, and enhances information exchange with news bulletins and meetings.

Looking towards the future, further support from WHO and other partners will eventually improve epidemic preparedness and response at all levels.

2.4.4 Sub-regional approaches - the Mekong Delta Project

In February 1999 6 countries of the Mekong River Basin (*Myanmar, Thailand, Laos, Cambodia, Viet Nam and Yunnan province of China*) independently initiated a disease surveillance programme to improve: outbreak investigation and response, local training in field epidemiology and the inter-country surveillance network. Initial support came from the Rockefeller Foundation, WHO/HQ, South East Asia Regional Office (SEARO) and Western Pacific Regional Office (WPRO), and the ministries of health in each country.

In the first year the project set up contact offices in each country and established a temporary unit in the Thai Ministry of Health.

The Mekong Delta project plans to have a meeting in Cambodia, July 11-14, 2000 to share experience of the past year and to review and improve strategies.

2.4.5 Epidemiology Training Programmes - a resource for preparedness and response (TEPHINET)

The network for epidemiological training programme on outbreak alert and response in the context of public health systems aims to transform ineffective national health departments from within by using epidemiology as a tool to enhance delivery of public health services. Trainees within health departments are put through a flexible two-year competency based curriculum with the guidance of an external consultant, to form a core of highly motivated individuals that can transform the department from within. The

epidemiological training programmes provide the foundation for sustainable outbreak alert, response and preparedness.

2.4.6 Early Warning and Response Network - (EWARN), Southern Sudan

From September 1998 onwards rumours of disease outbreaks were received from 86 locations in southern Sudan, including one of a mysterious disease which had killed 2600 people by January 1999. Viral haemorrhagic fever was suspected and blood samples were obtained for laboratory investigation in March 1999. Louse-borne relapsing fever due to *Borrelia recurrentis* was diagnosed, and a WHO-CDC coordinated team visited the affected areas to implement control measures through the use insecticides to combat louse infestation, and broad-spectrum antibiotics to cure borreliosis. Subsequent to this outbreak the WHO office responsible for southern Sudan instituted an early warning system for disease outbreaks (EWARN) through facilitating cooperation between NGOs and southern Sudanese medical authorities operating in the affected area.

2.4.7 Global Salm-Surv (GSS) - building capacity through surveillance networks

Global Salm-Surv is a global network of laboratories and individuals involved in isolation, identification and antimicrobial testing of *Salmonella* and surveillance of Salmonellosis.

The aims of Global Salm-Surv are to facilitate data sharing and communication between laboratories via e-mail, world wide web and/or facsimile and to make an international, online accessible database available that contains contact information of national or regional salmonellosis laboratories, descriptions of laboratory responsibilities, laboratory methods and types of samples received and annual summary results, including most common serotypes.

Therefore, Global Salm-Surv's objective is to strengthen national and regional laboratories in the surveillance of Salmonellosis and antimicrobial resistance surveillance in *Salmonella* from humans, food and animals through external quality assurance programmes on *Salmonella* typing and antimicrobial susceptibility testing, regional and national training courses and provision of technical information and methodological support.

Key points from discussion

- There is a need for bottom-up thinking in designing preparedness and response systems, from local/municipal level upward to provincial, country, regional and global level, in the field of epidemiology and laboratories.
- Attempts to forecast meningitis outbreaks may be difficult but clinicians can recognize the disease and "user-friendly" antigen detection kits can be used to confirm diagnoses.
- Global stocks of meningitis vaccine are now greater than before and easier to access, providing scope for greater flexibility.
- The importance of obtaining political support and commitment to the proposed network cannot be overstated.
- Regional network response structures should be based on pre-existing structures, e.g. WHO AFRO Regional Epidemiological Blocks.

- Because data gathered from certain laboratories with different priorities are not compatible with Salm-Surv, part of the process of expanding the Salm-Surv-system involves capacity building.
- Canada has contingency plans for only four situations: a) viral haemorrhagic fever, b) biosafety in transport of pathogens, c) pandemic influenza, and d) intentional use of biological agents. The rest of preparedness planning is based on capacity building since potential scenarios are so unpredictable.
- The value of capacity building in the course of an outbreak response (Relapsing fever, Sudan) was illustrated in the speed with which a second outbreak was recognized and controlled.

2.5 Reports from the Working Groups

During the fourth session, the meeting participants were divided into 4 working groups, each of which considered a framework document for action.

Each group:

- Considered the need and feasibility of establishing a Global Outbreak Alert and Response Network.
- Reviewed the draft framework document for a Global Outbreak Alert and Response Network and made specific recommendations on the establishment of a global network in the following areas:
 - network objectives
 - structure of the network
 - network development, oversight and evaluation
 - funding for the network
- Reviewed the activities presented in the activity matrix and proposed revisions and additions as appropriate.

2.5.1 Working Group 1

The group agreed that a global network is needed to provide coordination between existing networks as lack of coordination results in waste of time and effort. The global network should have two objectives:

- to bring together key institutional and human resources so that outbreaks of public health importance are detected, verified and responded to efficiently by the national and international community.
- to increase the level of preparedness of individual states and the international community.

The global network should also function by coordinating the best available resources and playing a facilitating role, by providing the ability to pre-plan responsibilities and ascertain commitment of partners. The network will have a function in alert, control and preparedness. The World Health Organization should not deal with emergency situations alone but should raise awareness of the resources for a global network.

No individual institution should be excluded from the structure of the network and it should be open to anyone who wants to participate. The role of the “Steering Committee”

of the network should be to share information, to coordinate and to evaluate activities of the response by the network, and this with regular input from the partners.

Resources for a network are required for technical assistance and coordination of supplies as well as for databases. The collaborating centres should be better used and standby arrangements should be made for readily available staff. Finally, it will also be necessary to have staff designated at headquarters and regional level to run the global network.

2.5.2 Working Group 2

The group agreed that the global network should be considered as “the network of networks”. It should fill gaps in operation of existing groups, especially with respect to early detection, surveillance and emergency response activities. The global network should:

- improve coordination and feed back actions, and restore specificity and identity of current networks and NGOs (sub-regionally, disease-specific).
- monitor and evaluate responses, to avoid irrational international responses.

Recognizing the role and importance of local mechanisms of response, the proposed network should be able to:

- coordinate, develop and upgrade institutional and human capacities for surveillance and response to outbreaks of international importance.
- improve response to such events (time, space, and nature).
- upgrade preparedness to prevent future occurrences of similar outbreaks.

Therefore, the global network should carry out the following functions:

- planning, evaluating and re-planning activities.
- catalyzing activities of participating (new and existing) networks.
- sharing information rapidly and effectively.
- supporting outbreak response and capacity building.
- filling existing gaps in the operation of existing local groups, including standard approaches.
- monitoring and evaluating responses.
- providing support for preventing future recurrence (preparedness).

There was agreement upon inclusion of following members in the structure of the global network: currently recognized networks; ministries of health of WHO Member States; international NGOs; governmentally accredited institutions or groups.

However, there was no agreement on the eligibility criteria for individuals or agencies other than those mentioned above, especially groups which work in nations where there are no existing governmental structures. The members of the network should commit themselves to share information. All of this should benefit better forecasting, early detection, better response and preparedness.

2.5.3 Working Group 3

The group identified various problems in outbreak alert and response and these are a high priority for WHO. Although countries' problems differ, all have needs for information and policy makers' support. Presently, there is a little capacity to identify and to have access to experts (epidemiology / laboratory), poor knowledge about which specimens to collect and how to ship specimens, there is a shortage of epidemiologists and laboratory capacity is poor. Other problems include: difficulties with shipment facilitation/clearance, coordination of multiple experts, fear of sharing information, involvement of the private sector, slow feedback of findings and countries facing unjust economic reprisals.

A global network can link complementary strengths and expertise of institutions, can allow rapid, informal contacts, can permit nearby experts/laboratories to be used. The global network can build trust in advance, can widen knowledge and access to resources and must share responsibility for good functioning.

The group agreed mainly on the principles of the network as stated in the draft framework document and added:

- that the network should also rapidly and efficiently mobilize technical support to identify outbreaks next to containing and assisting the affected states.
- that improved preparedness must include leadership development and other capacity building.
- that collaboration is necessary in the development of appropriate standards of response.

There was also general agreement on the functions of the network as stated in the draft framework document. The following comments were made:

- the outbreak support team should serve as global 24/7 contact point regarding suspected outbreaks and provide evidence-based guidelines for appropriate response.
- the network will seek to ensure that states also request assistance.
- the network will ensure that all key people (national – not just Ministries of Health - and international) get together to agree on policies regarding particular situations.
- the network will advocate for both logistic and financial assistance to affected states if necessary to contain outbreak threats and prevent recurrence.
- the network will ensure timely feedback to interested countries.
- the network will also provide technical support in addition to manpower and logistic support.
- the network will assist countries in evaluation of preparedness level and needs, as measured against minimal standards of preparedness.
- the network will also encourage internal – in addition to external – quality assurance schemes.
- the network will encourage training in epidemic preparedness, including epidemiologists, laboratorians and clinicians.
- the network will provide timely feedback.
- the network will consider in time adding acute non-infectious outbreaks and disasters.

The group agreed on the structure of the network (as stated in the draft framework document) and commented that the network operational support team should also include staff from outside WHO.

The group found that the time frame for making an inventory of capacities of network members for global outbreak alert and response, for making a database of experts available for international response and for developing standard operating procedures for all aspects of placing an international team in the field to assist affected states, was tight. Assembling the network operational support team should also be included as one of the activities of the network. The inventory of capacities and the database of experts available should not just be an inventory of experts but of people who will be available and whose institutions support their participation.

2.5.4 Working Group 4

The group agreed that the network should concentrate on response with the host country in the lead, with support of all partners.

The following issues needed clarification:

- who will manage the network?
- who will pay?
- who will assign resources?
- what will the core budget be?

It was concluded that the network should be part of the core function of WHO.

There is a need to move from an ad hoc to a planned approach. Networks need to improve the response by need, not by high profile outbreaks (e.g. Marburg and Ebola).

Access to better, wider resources must be shared and a better interaction between laboratory and field is required. A global network will indirectly benefit humanitarian need and reduce harm to travel and trade. A global network must ensure a rapid and appropriate response as well as quality.

Among the objectives suggested to the network were:

- Rapid intervention to reduce mortality and morbidity, and prevent recurrence.
- Improve WHO's ability to respond in a planned fashion.
- Increase countries' capacity to respond.
- Develop outbreak preparedness plans in each country.
- Include an international component in all countries' planning for surveillance.
- Identification, reporting and verification of outbreaks of public health importance.
- Response, preparedness.
- Advocacy for outbreak alert and response.

The group decided that the structure of the network should be organized regionally – close to action and in development with the partners. The relationship between regional office and network needs to be defined. The network needs to reinforce current practice and identify new paths. There needs to be clarity over the role of the regional offices and their ability to respond needs to be strengthened.

Partners of the network should be:

- WHO Member States (one contact point = national focal point responsible for surveillance)
- International organizations
- NGOs as nodes

Members should commit themselves:

- to establish a code of practice (e.g. about feed-back of results)
- to maintain the independence and responsibility of the network of networks
- to establish an inventory of facilities and capacities
- to the expectations of partners
- to link up to the International Health Regulations in the long-term

Coordination should be executed at the regional/subregional office level. Mechanisms and criteria for deciding about issues of public health importance and when to respond, should be established. The criteria for involvement will be developed by the global "Steering Committee", with local decision and with evaluation/review built into the system.

It was suggested that the functions of the network would be threefold:

- Alert, profiting from political and media interest
- Response
- Preparedness: planning, capacity building, promoting long-term support, sharing approaches to surveillance, training external trainees and local personnel (questions: where, in what, and for how long, as people were needed now)

3. Recommendations

The participants expressed the need for the establishment of a "Global Outbreak Alert and Response Network" and agreed on a series of principles and functions for the network.

General principles:

- The Network will focus on maintaining global public health security by ensuring coordinated mechanisms for outbreak alert and response.
- It will consist of a technical partnership between existing institutions and networks.
- It will complement and strengthen existing networks.

Functions:

- The network will work to combat the international spread of outbreaks by rapid identification, verification and communication of threats leading to coordinated response.
- It will ensure that the appropriate technical assistance reaches affected states rapidly and leads to reduced morbidity and mortality and prevention of further disease spread.
- It will contribute to long-term outbreak preparedness and capacity building by ensuring that acute responses lead to longer-term technical assistance.
- It will constantly evaluate international efforts to contain outbreaks.

Structure:

- The network will consist of a global alliance of technical partner institutions and networks and will be supported by:
 - a "Steering Committee" consisting of network partners
 - an operational support team (OST) based in WHO
- The "Steering Committee" will have an oversight and planning function for the network and will have wide geopolitical and organizational representation
- The OST will consist of a minimum of 5-6 WHO full-time equivalent staff and will be supplemented with secondments from partners. The OST should include Regional office staff.
- Task forces/working groups will be established to deal with specific issues (e.g. drafting a code of practice for international outbreak response).
- In the start up process, the "Steering Committee" should consist of a small interim committee, with WHO deciding on the initial membership (not more than 12 months) and based on complementary skills and experience.

Financing of the Network:

- The proposed activities of the network represent WHO core business, and this should be recognized through support with an investment from WHO funds, supplemented by extra-budgetary sponsorship.

- The network partners should support the network through activity support and staff secondments where possible.
- A budget proposal for Network activities will be developed by WHO.

Next Steps in creating a functional global alert and response network

- Finalization of the framework document for a Global Outbreak Alert and Response Network (June 2000).
- Establishment of a small "interim committee" based on complementary skills and experience (August/September 2000).
- Establishment of an event management system with real time information exchange (October 2000).
- Inventory of the partners' capacities in an interactive global database of experts (December 2000).
- Establishment of a Code of Practice for Network operations, for field operations and for conflict resolution. The drafts of the Code of Practice will be coordinated by WHO and approved by all partners (December 2000).

Annex 1: Agenda

Global Outbreak Alert and Response Meeting

April 26-28, 2000

World Health Organization, Geneva

Chairperson: Professor R. Waldman, Columbia University, USA
Rapporteur: Dr R. St. John, Health Canada

April 26: Wednesday

Session 1: Morning (Outbreak Alert Systems)

Moderator: Prof. A. Plant, Curtin University of Technology, Australia

08:30 - 09:00 Registration
 09:00 - 09:10 Opening: (Dr D. Heymann, Executive Director, WHO/CDS)
 09:10 - 09:30 The Challenge of Global Outbreak Alert and Response (Dr L. Martinez, Director, CSR)
 09:30 - 09:50 Outbreak Intelligence and Specialised Surveillance Networks (Prof. J. Weinberg, PHLS, UK)
 09:50 - 10:00 GPHIN (Dr R. Nowak, Health Canada)
 10:00 - 10:10 FLU-NET (Dr D. Lavanchy, CSR/EDC)
 10:10 - 10:20 PAC-NET (Dr Y. Souarés, PACNET)
 10:20 - 10:30 CDC Alert systems (Dr R. Khabbaz, CDC)

10:30 - 11:00 COFFEE

11:00 - 11:15 Outbreak Alert and Response at WHO (Dr G. Rodier, CDS/CSR)
 11:15 - 11:30 IHR: A mechanism for international reporting (Dr J. Giesecke, CDS)

11:30 - 12:30 Discussion

Session 2: Afternoon (Coordination of Outbreak Response)

Moderator: Prof. A. Plant, Curtin University of Technology, Australia

2:00 - 2:25 Existing mechanisms for cooperation in epidemic response (Dr R. Arthur, CDS/CSR)
 2:25 - 2:45 Outbreak alert and response in Complex Emergency Situations (Dr M. Connolly, EHA)
 2:45 - 3:00 Rift Valley fever - Kenya/Somalia - 1998
 Dr N. Agata - Sub-Regional epidemiologist, Horn/East Africa -AFRO)
 3:00 - 3:15 Nipah Virus - Malaysia/Singapore - 1999 (Dr K. Lam, University of Malaysia)
 3:15 - 3:30 Experience with Amazonia and Southern Cone Surveillance Networks
 Dr P. Vasconcelos, Instituto Evandro Chagas, Belém Brazil)

3:30 - 4:00 COFFEE

4:00 - 4:15 International response - Afghanistan: a country perspective
 Dr F. Kakar, National Institute of Health, Pakistan)
 4:15 - 4:30 NGOs and International Outbreak Alert and Response (Dr T. Nierle, MSF-Suisse)
 4:30 -5:30 Discussion

April 27: Thursday

Session 3: Morning (From Response to Preparedness):

Moderator: Dr M. Lewis, CAREC

09:00 - 09:30 From response to preparedness: How can better international coordination lead to better epidemic preparedness at regional and national levels (Dr A. Ndikuyeze- WR Liberia)
 09:30 - 09:45 International Coordinating Group (ICG) (Dr M. Hardiman, CDS/CSR)
 09:45 - 10:00 Sub-regional approaches - West Africa (Dr P. Lusamba, AFRO)
 10:00 - 10:15 Sub-regional approaches – The Mekong Delta Project (Dr P. Tharmaphornpilas, MoH Thailand)
 10:15 - 10:30 Epidemiology Training Programmes – a resource for preparedness and response
 (Dr M. Patel, Australia - TEPHINET)

10:30 - 11:00 COFFEE

11:00 - 11:15	Early Warning and Response Network - EWARN, Southern Sudan (Dr R. Shoo, WHO Liaison)
11:15 - 11:30	Global Salm Surv – Building capacity through surveillance networks (Dr K. Stöhr, CDS/APH)
11:00-11:45	Discussion
11:45-12:30	<i>Presentation:</i> A framework for a global outbreak alert and response network. (Based on a framework document, distributed before the meeting, which will outline the operational and coordination aspects of this network). Dr M. Ryan (CDS/CSR)

Session 4: Afternoon (Draft Framework)

(Working groups sessions on the draft framework)

The framework document will set out the justification and principles for a global network. It will then indicate the components required for a functioning network. A series of activities leading to a functional network will be outlined.

All working groups will consider the overall framework document and report in plenary on the document. national and regional capacity for outbreak preparedness and response)

**Rapporteurs to work on reports overnight*

April 28: Friday

Session 5: Morning (Draft Framework)

Plenary Session: Feedback from working group facilitators (4 x 45 minutes)

Session 6: Afternoon (Draft Framework)

Plenary Session: Meeting consensus and draft recommendations:

Annex 2: Abstracts

Session 1: Outbreak Alert Systems

The Challenge of Global Outbreak Alert and Response – Dr L. Martinez

Epidemic diseases are not new to mankind, yet outbreaks continue to pose a threat. Widening development gaps, collapse of public health infrastructure, poverty, urbanization, civil strife, environmental change and degradation, and globalization of travel and trade are factors contributing to the new challenges posed by epidemic-prone and emerging infectious diseases.

Outbreaks can cause significant economic losses as was seen in the cholera outbreak in Peru in 1991 (770 million US\$), plague in India in 1994 (1,7 billion US\$) and BSE in the UK (38 billion US\$).

At the beginning of the 21st century, the world is still confronted with:

- The emergence of new or newly recognized pathogens (Nipah, Ebola, Marburg,...)
- The recurrence of well-characterized outbreak-prone diseases (cholera, dengue, influenza, measles, meningitis, shigellosis, yellow fever)
- The accidental or deliberate release of biological agent (e.g. BSE, vCJD, anthrax, prions)

Whereas longstanding, traditional approaches to contain outbreaks were defensive (“brick wall”), trying to secure borders from the entry of emerging infectious diseases, innovative approaches have been established consisting of early warning surveillance systems, epidemic preparedness plans, stockpiles of essential materials and communication and information sharing through networks, providing information for action.

The challenges posed by epidemic-prone infectious diseases are how to contain the international spread of outbreaks, how to assist countries at risk from being overwhelmed by outbreaks and how to coordinate and focus global resources as no institution has all the capacity.

WHO, with its international mandate from 191 Member States and the International Health Regulations, has a unique position to coordinate infectious disease surveillance and response. Partnerships with national (institutes and ministries of health) and international partners (networks, organizations and NGOs) will maximize the benefit of strengthening surveillance and response.

Outbreak Alert and Specialised Surveillance Networks – Prof. J. Weinberg

This talk addressed issues around developing international communicable disease networks, drawing upon the experienced gained within the European Community (EC).

The development of surveillance at international level within the EC has largely been based upon the development of disease related and infrastructure related networks. These networks have largely been successful in providing information which has been able to underpin public health action. The reasons for the development of decentralized networks and the general principles of networking including the features associated with effective networks are discussed; as are some of the problems associated with networks.

Surveillance networks had to be clearly focussed upon delivering information which was of use in practical terms - "information for action", data useful for decision-making. Although research might, and should flow from it this was not the primary purpose.

As markets have become international the population at risk of communicable disease events has become international; surveillance needs to respond to the changing population at risk.

The appearance of new, and reappearance of old threats to health, increased mobility of populations, breakdown in public health measures, open markets in food and other goods, increasing expectations of populations and the need to ensure good advice to policy makers has led to a need for the effective exchange of scientifically valid information relevant to public health action at international level.

However, there is an information gap:

- The information you have is not the information you want
- The information you want is not the information you need
- The information you need is not available, will cost too much to acquire and will not arrive in time

People were flooded with information: what was needed was high quality appropriate information of various types. Early warnings would arise from systems that were sensitive, but would have a greater number of false positive reports and noise; therefore there would also need to be specific systems for validation. There was concern that there were structures in place, but it was uncertain that they delivered the right information for action. Systems were under stress and had been pauperized. If international surveillance systems were to be built there was a need to prioritize, and to develop surveillance driven by public health objectives.

International systems could only be built upon strong national systems. A number of successful networks which had developed within the European Union (EU) are described, both disease related networks in the areas of enteric disease and legionellosis, and infrastructure building networks in training and informatics. The benefits shown by these networks included:

- early warning of threats to health from other countries
- early recognition of threats through the pooling of data and resources
- recognition of threats which require international coordinated action
- increased collaboration in research and development
- technology transfer

Networks were distributed organizations, involving microbiologists and epidemiologists. The networks seem to be most effective when they have clear terms of reference and operating procedures and dedicated coordination. Some of the issues of concern which can cause problems such as the ownership of data, the costs of participation and potential conflicts between surveillance and research were discussed. These have largely been resolved through regular discussion and debate, and undertaking consensus exercises.

Operating networks required resources, dedication and a communication infrastructure. Ultimately they could only work when there was a sense of ownership, commitment and trust between the participants. Within the European Community the development of networks has been assisted by the political and financial framework that is in place as a result of the treaties establishing the European Union.

Although the networks developed to date have delivered considerable benefit, the organization of international surveillance is still evolving. Some areas, such as the surveillance of rare imported infection do not fit easily into the network structure. The development of the infrastructure, particular the Information Technology infrastructure, to support the networks has been slow. There is some move towards developing an overall coordination of the networks to ensure their quality and focus.

It is likely that the networks and the systems for their coordination will develop further in Europe and become an increasingly valuable component of the public health infrastructure.

Global Public Health Intelligence Network – GPHIN – Dr R. Nowak

Epidemic Intelligence

WHO aims to strengthen national and international capacity in surveillance and control of communicable diseases, including timely detection and containment of outbreaks. An integral part of global epidemic surveillance, epidemic intelligence (accurate and timely information) about important disease outbreaks which may have international implications should be delivered systematically and rapidly to key professionals in international public health. This is being achieved through two mechanisms: Global Monitoring Networks and Outbreak Verification.

Global Monitoring Networks

The World Health Organization (WHO) has collaborated with a number of international networks for specific disease threats. Examples of such international networks are FluNet, a geographical information system to monitor influenza activity, RABNET a database which provides global information on rabies

prevalence in humans and animals, Network of Collaborating Laboratory Centres, Non-governmental Organizations Networks (ICRC, IFRC, MSF, MERLIN).

Unconfirmed reports of rumours of infectious disease events around the world are regularly received through normal WHO channels as well as from other sources including non-governmental organizations, the media or electronic discussion groups. Health Canada developed the Global Public Health Intelligence Network (GPHIN) in collaboration with WHO to identify potentially high impact, new and unusual outbreaks. GPHIN is a web-based (Internet) electronic system which systematically scans the web, particularly news media networks, news wires and newspapers for outbreak related information. These are being flagged, sometimes within hours of their occurrence, and forwarded electronically through secure channels to provide early warning to WHO. GPHIN provides information on a real-time basis, which is used to analyse and assess the health risk of international events. In its simplest form, the GPHIN system utilizes an Internet technology platform, which includes various applications and hardware to gather content about public health risks and disseminate this content to end-users.

Outbreak Verification (OV)

Its aim is to improve epidemic disease control by actively collecting and verifying information on reported outbreaks and informing key public health professionals of confirmed and unconfirmed outbreaks. This work is performed in close collaboration with other divisions in WHO Headquarters, WHO Regional Offices, Ministries of Health through WHO Representatives Offices (WRs), WHO Collaborating Centres as well as non-governmental organizations and other partners in the field.

Outbreaks are assessed for their importance to international public health (an outbreak with potential for international spread, a need for international response, or a potential impact on international travel or trade). Reports of current outbreaks are included in the weekly **WHO Outbreak Verification List (OVL)**. Some 900 institutions and individuals in 153 countries worldwide receive OVL. Its readership includes WHO personnel at headquarters, regional and country level (150 WRs and country liaison officers), non-governmental organizations (e.g. IFRC, MSF), National Institutes of Health, WHO collaborating centres and Field Epidemiology Training Programmes. Information on confirmed outbreaks is made available to the public on WHO/CSR web pages and on the *Weekly Epidemiological Record (WER)*. Epidemic response at the request of, and in conjunction with, National Health Authorities and the international community is coordinated and facilitated as needed.

As of January 2000, 512 outbreaks reports have been investigated, verified and disseminated if found to be of potential international public health importance. Cholera, viral haemorrhagic fevers and meningococcal meningitis represented half of the published events, other outbreaks include plague, anthrax, viral encephalitides, dysentery and influenza. Virtually all countries have experienced at least one outbreak.

Outbreak verification is a new approach to global disease surveillance. Currently, these *activities* are confined to WHO headquarters. For the future it is planned that WHO regional offices will apply this concept directly at regional level. However, its concept of using an extensive network of information sources to provide accurate and timely information about important disease events has been proven right and well accepted by the public health community.

FluNet – Dr D. Lavanchy

WHO has developed an electronic global influenza surveillance system (FluNet) in collaboration with the Institut National de la Santé et de la Recherche Médicale (INSERM) to provide international and national authorities, the public, and the media with an early-alert information system for the global monitoring of influenza.

Only designated users can undertake remote electronic submission of influenza data, but the results, a dynamic and updated atlas of maps, tables and graphics of reported global influenza activity, are accessible to the general public without restriction through the Internet (<http://oms2.b3e.jussieu.fr/flunet/>). Animations of maps that illustrate the dynamics of the influenza epidemics throughout the world are also available.

Evaluating epidemiological information on influenza is fraught with difficulties. Related deaths or notifications do not capture the true impact of the disease and probably are prone to underreporting. Sentinel systems based on less specific information drawn either from mortality data (as done in the United States) or from morbidity data (as done in several European countries) are efficient early-alert tools for outbreak detection at the local or national levels. However, these systems do not exist in all countries and are not linked to each other using harmonized formats.

FluNet uses the data collection to study the temporal and spatial dynamics of influenza viral infections. This tool is available for the first time on a global scale giving real-time feedback of patterns of influenza. In addition to serving as an early warning system it may provide researchers with clues to the mechanisms of outbreaks occurrence by linking FluNet records with other databases (e.g. remote sensing data that identify major shifts in weather patterns).

The system also facilitates the collection of standardized information needed to assist the WHO network of national influenza centres and collaborating centres in determining the annual recommendations for influenza vaccine composition. This information system also makes influenza epidemiological data available to health professionals, the general public, and the media on a global scale. In addition, FluNet will allow WHO and national public health authorities to monitor the pandemic threat that may emerge through the antigenic shift in influenza virus A.

PACNET – Dr Y. Souarés

International Coordination in Outbreak Alert & Response: "PACNET, a Pacific-based Experience"

The Pacific Public Health Surveillance Network (PPHSN) was established in December 1996, under the joint auspices of the Secretariat of the Pacific Community (SPC) and the World Health Organization (WHO). It comprises the 22 SPC Pacific Island countries and territories—most of which are also WHO members—and national and international agencies, networks and institutions involved in health development activities. The aim of the PPHSN is to improve surveillance in the Pacific Islands in a way that will enable informed decision-making and appropriate public health action in an efficient and sustainable manner. Outbreak alert and response is currently our priority.

In April 1997, to help achieve this goal, the SPC launched PACNET, an e-mail and fax-based outbreak alert system, the first of the PPHSN communication (and potentially coordination) media. PACNET works like a discussion group and, at present, counts almost 300 public health professionals, with 98% of them being e-mail connected. More than half of PACNET's members (55%) form the core part of the net linking the Pacific Islands. By spreading towards Australia and New-Zealand, the Philippines, Hawaii and the United States of America, PACNET has nowadays recruited 90% of its members within the rims of the great Pacific Islands basin. That is an essential requirement for an effectiveness that has been recognized on several occasions.

PACNET particularly focuses on six diseases: measles, dengue, leptospirosis, influenza, cholera and typhoid. In order to improve the mostly syndromic data that PACNET disseminates, the PPHSN has recently developed a public health laboratory network. This essential technical step forward was further strengthened with a framework allowing legal and ethical matters to be carefully considered, with a view to avoiding potential legal (quarantine and airline transportation) and ethical problems. These most recent developments are complementing an existing applied epidemiology training programme which PPHSN members endeavour to gear towards a real field epidemiology training programme. The next pressing challenge for PPHSN is to enhance the Pacific Islands' outbreak response capacity. In that regard, the use of PACNET as a coordination instrument is a significant asset.

In our view, the improvement of international coordination in outbreak alert and response activities depends on how the existing networks expand and interact, with regard to three major determining factors: a structural conception that takes geo-cultural realities into consideration—especially for communication and training—harmonized technical content, and complementarity in resources.

In other words, the populations the epidemiologist describes as exposed to an identified biological risk must be able to feel part of a community sharing the same regional and international environment and, whenever necessary, must also be able, through partnership mechanisms, to mobilize a whole range of resources matching not only their needs, but also their assets.

CDC Alert Systems – Dr R. Khabbaz

CDC Alert Systems include both domestic and international networks. Domestically, a number of recently developed approaches for addressing emerging diseases, including physician-based networks and molecular subtyping networks, such as Pulsenet, now complement CDC's more traditional public health surveillance systems. Pulsenet, developed by CDC and the Association of Public Health Laboratories, is a national molecular subtyping network for foodborne disease surveillance, using DNA fingerprinting to identify foodborne disease outbreaks in a timely manner. CDC is also developing Epi-X, a 24/7 secure data network prototype for timely tracking of outbreak investigations and other public health events. Internationally, CDC's WHO collaborating centres assist WHO in identifying and responding to outbreaks; these centres include 37 reference laboratories housed in CDC's National Center for Infectious Diseases that provide laboratory confirmation of infectious disease diagnoses. In addition, CDC has a large number of overseas assignees seconded to national and international organizations, as well as collaborations through the Field Epidemiology Training Programmes in over 20 countries, modelled after CDC's Epidemic Intelligence Service for applied epidemiology training. CDC's most intensive mechanism for outbreak assistance, used domestically and internationally, is the Epi-Aid, which consists of rapid deployment, upon invitation, of epidemiologic and other professional staff to assist in outbreak investigation and control. CDC also provides technical assistance in outbreak response, including laboratory support, epidemiologic assistance in study methods and design, analysis, data management, and control measures. Of 97 Epi-Aids conducted in FY99, 84% were domestic, and 80% were investigations of infectious diseases. In the context of emerging diseases, keeping an open mind for the unexpected is essential. Recognition of infectious disease outbreaks and the expedient seeking, as needed, of appropriate laboratory testing through existing reference laboratories are paramount. A coordinated multidisciplinary approach, including complementary laboratory and epidemiologic expertise, global partnerships, and the inclusion of non-traditional public health partners, is key to early recognition and successful responses.

Outbreak Alert and Response at WHO – Dr G. Rodier

Outbreak alert and response at WHO consists first of all of the active gathering of epidemic intelligence information from different sources and partners. Epidemic intelligence information is then processed and analyzed at WHO HQ, and subsequently shared through the weekly WHO Outbreak Verification List (OVL) with over 900 institutions and professionals in the field of public health. In the meantime, a verification process is started up to verify reported outbreaks. Upon confirmation, information is widely distributed through the WHO/CSR website and the *Weekly Epidemiological Record*. This epidemic intelligence information can also be used for mapping and spatial analysis of outbreaks (HealthMap). The role of WHO in global outbreak response is to assist Member States on request: by mobilizing international response teams, coordinating response, facilitating access to countries, providing technical guidelines, facilitating research activities and supporting national epidemic preparedness.

IHR: A Mechanism for International Reporting – Dr J. Giesecke

Global Public Health in the New Millennium: Dealing with Diseases and Trade

The International Health Regulations

The International Health Regulations (IHR) were developed fifty years ago to prevent the spread of four deadly diseases – cholera, plague, yellow fever and smallpox. Adopted by the World Health Organization's Member States in 1951 and revised in 1969, in their present form they no longer meet the complex and ever-growing challenges of international disease spread. In particular, they now only cover three diseases, and are ineffective in preventing the disruption of traffic and trade that can occur as a result of a major public health threat. The 1995 World Health Assembly called for a revision of the IHR.

Guiding international response

The fundamental principle of the International Health Regulations is *maximum protection against the international spread of disease with minimal interference with world traffic*. The revised IHR keep this principle and build on the present Regulations, extending and strengthening key areas. Most importantly, the new Regulations will provide a process for decision-making, notification and action, to guide and guarantee international response. This will be done through the introduction of a “tailored”, consistent process for outbreak notification and response to urgent international events of public health importance. Current routine public health measures such as requirements for aircraft and ship disinfection will continue in the revised Regulations.

Improving detection, reporting and response

Building global capacity to detect, evaluate and respond to international events of public health importance involves measures at both national and international levels.

At the national level, it requires good surveillance systems to be able to implement the IHR process:

- to detect public health threats on time
- to address public health emergencies
- to evaluate and report national disease events that could have international significance.

At the international level, it will require coordination and cooperation, and will obligate Member States and WHO to respond in an agreed-upon manner. By working towards a global solution,

- countries will have ready access to a global network for assistance and sharing of information during public health emergencies and
- economic and trade loss due to public health emergencies will be minimized.

Countries will have access to an international network for receiving rapid and appropriate levels of protection. There will be an option to make confidential, provisional notifications to WHO, and work together with WHO to assess the extent and potential impact of the event.

Specific benefits to countries for adopting the new IHR

The revised Regulations aim to prevent and minimize the impact of public health emergencies on the nation. The health, trade, tourism, transport and agriculture sectors will acquire added capacity and receive support to deal with public health emergencies.

- How can a revised IHR add value to health, trade, tourism, transport and agriculture sectors of Member States?
 - IHR will enhance the capacity of the health sector to respond to urgent events of public health importance.
 - IHR will minimize public-health-related, potentially negative impacts on trade and thus minimize economic loss.
 - IHR will reduce or eliminate damage to tourism from unfounded rumours of public health threats.
 - IHR will enhance the free movement of persons and conveyances by introducing transparent and uniform regulations.
 - IHR will provide information and assistance to the agriculture sector on evolving food contamination issues.
- Why is the IHR important in the present global context?
 - Public health as a key international value needs reinforcement in the present global context.
 - At present, no tool exists which facilitates national and international public health interdependence.
 - A global legal strategy to deal with urgent and international public health events is presently absent.
 - There is a need for a health driven multi-sectoral approach to urgent international public health events.

The work on the revision of the IHR is still only in its concept stage, and no new draft exists.

Session 2: Coordination of Outbreak Response

Existing Mechanisms for Cooperation in Outbreak Response – Dr R. Arthur

An effective response to communicable disease events must be timely, reduce morbidity and mortality, and improve preparedness for future outbreaks. The response can involve implementation of prescribed control activities, or in situations where the aetiology or epidemiology is unclear, be preceded by an investigation and research phase before control measures are carried out. The components of the response consist of building a team, obtaining access and travelling to the affected area with the appropriate equipment and supplies, having support for logistics and accommodations while the team is on-site, and recommending and implementing control measures. WHO's role in outbreak response is to mobilize and facilitate international response when required by providing immediate technical expertise from permanent staff and other technical specialists, and laboratory support from WHO Collaborating Centres and other partner institutions. WHO also provides accurate and timely information for the press and the general public.

There are three general models for international response to communicable disease events: bilateral (request from a national authority to one institution to respond), multilateral (request to multiple institutions to respond), and UN-coordinated (request from Member State to WHO and multiple partners to respond with WHO as coordinating agency). In comparing the advantages of each of the models with respect to providing the appropriate resources and coordination of the response, the bilateral response is well coordinated since a single institution is involved, but the available expertise and resources are depend on the strength the institution. The multilateral response may result in mobilizing more resources, but coordination may be more complicated because the institutions may be using different work methods and leadership roles have to be defined, often on-site after the teams arrive. The WHO coordinated response mechanism can mobilize the appropriate resources that are necessary to contain the outbreak and the coordination role is defined and actively engaged in the early stages of the response, often in advance of the teams' arrival. In addition, WHO has an international mandate, provides an element of neutrality, has international networks from which assistance can be requested, has the capacity to balance the representation of partners and has financial resources to catalyze the response process and fill the gaps. The comparative advantages of WHO when combined with the resources of its partners assure the most effective and efficient action to contain disease outbreaks.

Outbreak Alert and Response in Emergencies – Dr M. Connolly

There has been a marked rise in the incidence of both complex emergencies and natural disasters in recent years and a concomitant rise in the numbers of refugees, displaced persons and stricken communities. Outbreaks pose a major threat to emergency affected populations. In 1999, over 65% of outbreaks of international importance occurred in emergency situations.

The greatest threat of outbreaks is in complex emergency situations where there is large scale population displacement, temporary settlements, overcrowding, malnutrition and poor sanitation. Complex emergencies may be defined as situations affecting large civilian populations with war or civil strife and population displacement resulting in excess mortality and morbidity. At present, there are an estimated 40 million refugees/displaced persons worldwide, but over 120 million people are affected by complex emergencies (e.g. Democratic Republic of Congo, Afghanistan).

The context of emergencies has changed over the past 10 years - camp scenarios are no longer the norm, populations are often dispersed, many emergencies consist of ongoing conflicts leading to "chronic" emergencies with long rehabilitation phases, increasing number of agencies are providing health care and there is a greater involvement of the military in humanitarian response.

There are multiple constraints to outbreak control in emergencies: breakdown of health services or existing services overwhelmed, unstable governments or no governance, limited access because of ongoing conflict, multiple agencies providing health care, logistic and transport difficulties, limited laboratory facilities and lack of reliable population estimates. In addition, the duration of epidemics is often increased because of delays in detection, poor access to health care, lack of drugs and vaccines and lack of expertise. Emerging diseases may pose an even greater threat in emergency situations because of risk of widespread transmission before an outbreak is detected and controlled.

Outbreaks in emergencies have a number of important international implications:

- containment is often difficult because of the breakdown of public health services
- an increased risk for international spread because of the high mobility of refugees, displaced persons, relief workers and animals
- potential use of biological weapons: risk of an unstable country with stockpiles of biological agents using these as weapons in a conflict situation
- under the International Health Regulations (IHR), in states with no internationally recognized government, who is obliged to report an outbreak and take responsibility for action/control measures in such situations?
- in UN administered territories e.g. Kosovo, East Timor, will the UN be required to report?
- should NGOs as main health care providers in many emergency situations be obliged to report to IHR?

The partners involved in outbreak response in emergencies are faced by many challenges:

- the main epidemic threats need to be rapidly assessed in the acute phase of an emergency
- early warning mechanisms for outbreaks need to be in place as part of the emergency surveillance system e.g. WHO surveillance system in South Sudan, Kosovo and East Timor
- basic capacity for outbreak investigation and response must be in place in all emergency situations (availability of epidemic investigation/response kits), and emergency laboratory support for confirmation must be available
- all agencies in emergency situations should implement standard protocols using WHO technical guidelines, expertise of the Roll Back Malaria networks for epidemics and complex emergencies should be used
- there is a need for NGO and other implementing agency staff with training in outbreak preparedness and response
- local health staff need to be trained to rebuild outbreak alert and response capacity
- there is a need for access to international expert teams for outbreak response and to international reference laboratories for confirmation
- there is a need for coordination between local/national authorities, UN agencies and NGOs for outbreak response

Rift Valley Fever Outbreak – Kenya/Somalia 1997-1998 – Dr N. Agata

Following reports on increased morbidity and mortality among humans and livestock in the north-eastern Province and southern Somalia in late November and early December 1997, WHO in collaboration with the Kenya Ministry of Health, a number of international agencies and NGOs working both in Kenya and Somalia organized teams and resources to investigate these reports. Case finding activities demonstrated the presence of Rift Valley fever. Necessary control measures were put in place. In order to further clarify other factors that may have been involved in this outbreak a team consisting of representatives of the MOH, CDC, NIV, EPIET, EPICENTRE and SDR under the overall coordination of WHO planned and conducted field studies on human and livestock populations as well as entomological studies. This effort required strong coordination in resource mobilisation, implementation of activities and sharing of information with all the critical stakeholders. A number of lessons were learnt which are useful for strengthening future international epidemic response.

Nipah Virus Outbreak – Malaysia/Singapore – 1999 – Prof. K. Lam

Investigation of Nipah Virus Outbreak: Lessons Learned

Malaysia was hit by two outbreaks of viral encephalitis in recent years, the first in 1997 which was responsible for the death of over 40 young children and the 1999 Nipah virus outbreak causing the death of over 100 pig farmers. Various problems were encountered, including the lack of coordination at the local level, the delay in mounting a rapid response, and the lack of technical expertise.

In the Nipah virus outbreak, international assistance was sought by different government agencies without prior consultation with each other, leading to some confusion initially. The respective functions of international groups need to be spelt out clearly and they should work closely with the local experts. Religious and cultural sensitivities should be respected to prevent any misunderstanding. There should be an

agreed common source of accurate information throughout the outbreak to prevent confusion and panic. Foreign experts should not allow themselves to be dragged into political controversy. In addition, early agreement should be reached about priority problems to be solved and local interests should be taken into account. There should be no acrimony over research materials or research directions even after the outbreak.

Developing countries have different levels of local technical expertise in the investigation of outbreaks and the response from international agencies has to be tailored based on this.

Appropriate capacity building for disease recognition and management should be initiated early by WHO to allow member countries to be better prepared when faced with future outbreaks.

Experience with Amazonia and Southern Cone Surveillance Networks – Dr P. Vasconcelos

The idea of establishing a surveillance network for emerging and re-emerging infectious diseases (EID) in Amazonia and the southern cone of South America was originally developed by a select group of experts from PAHO, CDC, UTMB, IEC and other institutions in the region. Several objectives were identified in this continental effort to monitor and respond to EID. These were: to strengthen regional surveillance networks for EID in the Americas; to establish national and regional infrastructures for early recognition, warning and response to EID threats by enhancing laboratory capabilities and training programs; to promote further development of applied research in the area of rapid diagnosis; and to strengthen the regional capacity for effective implementation of prevention and control strategies.

The concept of the EID network and its objectives were based on experience from previous regional networks monitoring influenza, poliomyelitis and measles in the Americas. The goal of the EID network is to strengthen reference laboratories in Argentina, Bolivia, Brazil, Chile, Colombia, Paraguay, Peru, Uruguay and Venezuela by sharing reagents and experiences, facilitating the laboratory diagnosis of specific EID, prompt response in investigating EID outbreaks, and the establishment of a laboratory based reporting system for specific disease syndromes. Five disease syndromes were initially selected by consensus for surveillance: undifferentiated febrile illnesses, febrile icteric illnesses, acute respiratory distress (non-cardiogenic), haemorrhagic fever, and sudden unexplained deaths. For each syndrome, a case definition (with inclusion and exclusion criteria) was established. Different diagnostic tests were designated for each syndrome in order to quickly define the situation and to identify the etiologic agent.

The advantages of the network are: accurate laboratory-based diagnosis; implementation of common protocols for specific diseases; prompt sharing of information; better knowledge of regional laboratory capabilities; technology transfer and improved laboratory facilities; and integration of the EID networks into national surveillance systems. A number of problems and deficiencies also were encountered: difficulty in establishing common protocols; inadequate quantities of standardized controls and high quality reagents; differing national priorities; high costs and insufficient funds to maintain the networks and to conduct the proposed epidemiological investigations; and finally, the absence of periodic, systematic evaluation.

International Outbreak Response- Afghanistan: a country perspective – Dr F. Kakar

Global outbreak alert and response activity has different meaning to different countries. For a country such as Afghanistan, where most of the government infrastructure is gone due to many years of war and conflict, it is sometimes a matter of life and death.

The geo-political situation in Afghanistan is conducive to epidemics, including such factors as an active front line, insecure areas, geographically and climatically remote areas, drought, earthquakes, and internally displaced persons. To counteract these adverse forces, WHO Afghanistan supports eight regional sub-offices with established communications systems, pre-positioned medical supplies, and trained health officers. In addition, WHO Officers facilitate the monthly meetings of the Regional Health Coordination Committees made up of representatives of the Ministry of Public Health, WHO, UNICEF, and NGOs.

Whether the epidemic is first reported by local commanders over the radio to a sub-office, announced by the BBC in an interview with an Afghan ambassador in a neighboring country, reported by the news media in Pakistan, or emailed to us from an NGO doctor in the field, the keystone of local investigation and coordination of response cannot be bypassed.

The advantages of local coordination include rapidity of response, hands on knowledge of available resources and feasible logistics, understanding of cultural milieu and involvement of local stakeholders in steps toward prevention of epidemics in the future.

In the past year, the most successful responses to cholera, measles, and rabies have been coordinated locally through the regionally located sub-offices. WHO Country Office has provided guidelines for investigation and response, but the planning and resource sharing all occurred in the field.

In some regions, however, such as Darwaz District of Badakhshan Province, the villages are remote and there are no health centres. When the sub-office in Badakhshan called for help, even the Country Support Office had minimal resources to offer, so the call was passed up the line and the coordination occurred between the different levels of WHO. WHO Geneva supported the flights, the investigation team and reference laboratory while WHO Eastern Mediterranean Regional Office (EMRO) supported the local transport and supplies. A UN helicopter arranged by WHO Office in Dushanbe Tajikistan flew the WHO investigation team from Geneva into Afghanistan. Early laboratory tests were sent to NIH Laboratory in Pakistan, other UN agencies such as the UNOCHA provided assistance and several NGOs in Tajikistan also offered their services.

Finally, the follow-up depended on the interest of local doctors who were flown to the area for a two-month stint to treat the cases and an NGO active in Tajikistan who began supporting a health clinic and regular outreach services in the area. NIDs were conducted for the first time in Darwaz by helicopter in May and June 1999 and by road, supported by the NGO FOCUS, across the border from Tajikistan, in October and November.

The groundwork for effective response, whether globally or locally, must be laid ahead of time. Through diplomatic skill of the WHO Representative, the global "network of networks" can be translated into workable country level coordinated action, with different stakeholders acknowledging their relevant roles and responsibilities before epidemics occur.

Another essential element of preparedness in Afghanistan is pre-positioning of supplies. When air transport is only available on a weekly basis to most regions, and onward distribution may require pack animals, keeping regionally based stocks of supplies can reduce the response time considerably. Sometimes even stocking the regional stores requires vigilant use of "windows" of opportunity. Politico-military action can cut off an area without warning and having stocks until the flights resume provides a buffer from disaster.

As mentioned above, the geo-political situation in Afghanistan is conducive to epidemics. There are many steps toward adequate preparedness, surveillance and response. WHO Country Office cannot fulfil them alone. Only through joint action in the field, through collaboration from Regional and Headquarters Offices and through coordinated efforts of other UN agencies and NGOs can an effective and timely response be achieved.

Session 3: From Response to Preparedness

From response to preparedness: How can better international coordination lead to better epidemic preparedness at regional and national levels? – Dr A. Ndikuyeze

Africa is confronted with a high burden of epidemic diseases: meningitis, cholera, dysentery, malaria, measles, viral haemorrhagic fevers and plague. Recently, assessments of African countries' capacity to deal with epidemics were conducted: in 1996 five West African countries were evaluated; in 1997 another 12 West African countries and 5 countries from the Great Lakes region were evaluated; in 1998 eight Central African countries were evaluated and in 1999 six southern African and Indian Ocean islands were assessed.

Many lessons were learnt from these assessments:

- The **surveillance** system for epidemic diseases is weak: there is a lack of trained personnel, standard case definitions are absent, there are no reliable laboratories and the communication system is poor. Therefore, the detection of epidemics is delayed and the epidemic response is poorly coordinated, leading to high case fatality rates and high economic losses.
- **Prevention** is weak as preventive measures are not applied: the immunization coverage is low, safe drinking water is lacking, sanitation is poor and nursing barriers and other protective materials are lacking or not used in the case of viral haemorrhagic fever infections.
- **Social mobilization** is poor in epidemics as there are no national social mobilization plans, local media are poorly used, community participation is poor, community leaders are not or poorly involved and there is a lack of well targeted health education messages based on case definitions and preventive measures.
- **Case management** is poor as standardized treatment protocols are not used or are lacking. Also, there is a lack of trained personnel or trained staff has a high turnover, and contingency stocks are lacking.
- **Epidemic management** suffers from poor coordination, lack of national plans, limited financial resources, non-functional epidemic management committees and inadequate epidemic response evaluations.

What are the solutions?

- Improvement of the national **disease surveillance** system by creating or strengthening local human capacity (training of health workers, follow up of trained health personnel, development of simple data collection tools) and by building early warning systems.
- Strengthening of **national laboratories** by technical capacity building through training and supervision of laboratory technicians, and by regular supply of laboratory equipment (supply of basic reagents, organization of national/subregional networks).
- Strengthening of **national communication** by rational utilization of private and public communication facilities, training of technicians on communication equipment maintenance and provision of communication equipment and organization of communication network at all levels.
- **Prevention** through increasing the immunization coverage, by improving sanitation and safe drinking water supply, by implementing vector control programmes and by provision of protective material and nursing barriers.
- Improved **epidemic management** requires high political commitment, national and inter-country plans of action, the establishment of effective coordination mechanisms, rapid response teams and the building of strong partnerships with donor communities.
- Strengthening of **reference laboratories** by re-training high level technicians, establishing and coordinating reference laboratories at sub-regional levels and by conducting research on the production of affordable and reliable laboratory tests.
- **Information sharing** through regular exchange of information (electronic media, fax – VHF radio, print media,...), periodic meetings to evaluate epidemic responses and transborder technical meetings.
- **International technical cooperation** for the establishment of a database of subregional and international consultants, for the coordination of experts and for the establishment of a sub-regional technical support team for rapid response.

As such, better epidemic preparedness will lead to a better and more rapid response.

International Coordinating Group (ICG) on vaccine provision for epidemic meningitis – Dr M. Hardiman

From Response to Preparedness: The International Coordinating Group on Vaccine Provision for Epidemic Meningitis Control (ICG)

The ICG provides an illustration of one type of international coordination in response to a specific and continuing epidemic threat.

The most recent meningococcal meningitis pandemic, which began in the mid-1990s, has so far resulted in approximately 350 000 cases and thousands of deaths. In 1996, almost 190 000 cases in Mali, Niger, Nigeria, Burkina Faso, Chad, and other countries paralyzed medical care systems and exhausted international vaccine suppliers. The socioeconomic implications of epidemic meningitis are alarming.

Control and prevention of the disease require a massive amount of vaccine, medicines and logistical support from the national health authorities of the affected countries. Most countries face great difficulty in responding appropriately to these needs. In addition, routine health services and other important activities are disrupted.

As very few of the affected countries in Africa are adequately prepared to cope with epidemic emergencies, the need to reinforce national capacity for preparedness, detection and control of epidemic meningitis has been recognized internationally. In response to this challenging situation and the expected spread of the disease, WHO in collaboration with its Member States, various governmental and non-governmental agencies has developed a sustainable plan of action for preparedness and control of meningococcal disease in African and Eastern Mediterranean Regions. WHO focuses **on strengthening national and regional health systems in the following key areas:**

- surveillance to monitor communicable diseases and detect outbreaks early;
- laboratory capacity to diagnose communicable diseases and confirm outbreaks promptly;
- creation of a contingency stock of vaccine, antibiotics and injection material;
- guidelines for the use of vaccine and protocols for the appropriate case management.

The International Coordinating Group on Vaccine Provision for Epidemic Meningitis Control (ICG) plays a key role in enabling an effective response to epidemics to be mounted. Originally set up in 1997 to ensure vaccine supplies, this group also focuses on preparedness for epidemics and coordination of international support, both material and technical. WHO provides the secretariat for the group whose work is overseen by a sub-group of key international agencies: IFRC, MSF, UNICEF and WHO.

The ICG has many partners including UN agencies, NGOs, pharmaceutical manufacturers, development agencies, WHO collaborating centres and other institutions. The ICG was set up in 1997 in response to the crisis in global meningococcal vaccine availability. The partnership is an informal agreement whose functioning is dependent upon the goodwill of the agencies and individuals involved. Its terms of reference can be summarized as:

- Continually reviewing the meningococcal disease situation globally:
 - Disease occurrence
 - Case fatality
 - Experience with control measures
 - New knowledge and information
- Continually reviewing the demand for, and availability of, meningococcal vaccines and other emergency supplies and ensuring rapid access to such materials when required by maintaining an emergency stockpile
- Providing advocacy and share information related to preparedness and response to meningococcal epidemics

The severe epidemic in Sudan with 33 216 cases and 2386 deaths dominated the 1998/99 African meningitis season and the ICG was involved in providing technical and material support to the Government, including inputs to strategic planning and management as well as supplies to conduct mass immunization campaigns and for the treatment of cases.

Sub-regional Approaches – West-Africa – Dr P. Lusamba

The African continent, where several countries are facing complex emergency situations, is also confronted by recurrent and deadly outbreaks of communicable diseases. There are numerous determinants to this situation, such as climatic conditions, poverty, inadequate water supply and sanitation.

In 1995-1996, West Africa has been affected by severe epidemics of meningitis, cholera and measles. National response to these events was assessed in selected countries, providing evidence on the weakness of national surveillance, and epidemic preparedness and response (EPR) systems. The findings were used for advocacy in Ouagadougou during the Ministerial meeting of October 1996, resulting in the signature, by the Ministers of Health and Interior of 18 West African countries, including Algeria and Chad, of a protocol for cooperation in the prevention and control of epidemics. The concept of epidemiological blocks thereby materialized.

This concept implies a group of countries sharing common geographical and epidemiological characteristics and whose populations are exposed to the risk of outbreaks of the same epidemic-prone diseases. The principles guiding the establishment of epidemiological blocs are, among others, the signature of a protocol for cooperation, reaching agreement on priority areas for interventions, the establishment of an inter-country technical support team and regular monitoring of the progress achieved. Based on these principles five epidemiological blocks have been established in West Africa, Great Lakes, Horn of Africa, Central Africa and southern Africa and Indian Ocean sub-regions.

The West African epidemiological block was the first to be established in 1996. It covers 18 countries and virtually a third of African population. The priority areas for intervention include reinforcement of epidemiological surveillance, strengthening of laboratories, improvement of the management of cases in the event of an epidemic, social mobilisation, and improvement of outbreak response. WHO/AFRO has established an inter-country team based in Abidjan and composed of two epidemiologists a laboratory expert and a secretary to provide technical support to the countries of the block. The team has been instrumental in the assessment of national disease surveillance and EPR systems, outbreak investigation, evaluation of epidemic response, national capacity building and improvement of the exchange of epidemiological information. Its main constrain has been limited resources and the main challenge is sustainability.

The epidemiological block model has proved to be a useful and effective approach. It is built on a political framework provided by a protocol aimed at facilitating cooperation among countries and with partners. Increased support should be provided in order to institutionalize epidemiological blocks for strengthening disease surveillance and improving EPR at all levels of the health system.

Sub-regional Approaches – The Mekong Delta Project – Dr P. Tharmaphornpilas

Background: Mekong Basin is the home of six countries: Yunan province of China, Myanmar, Thailand, Laos, Cambodia and Viet Nam. Mekong Basin Disease Surveillance (MBDS) was initiated at the end of February 1999, after a meeting of delegates from all countries. The objective is to strengthen country and inter-country capacities in disease surveillance and response to outbreak of priority diseases, (dengue fever/dengue haemorrhagic fever, cholera, vaccine preventable diseases, mMalaria and outbreaks of unknown aetiology, etc).

Activities: Each country has assigned its contact office and persons. The Ministry of Public Health in Thailand agreed to serve as coordinator of the MBDS during the start-up process. The Thai Field Epidemiology Training Programme (FETP) conducted a two-week-training on surveillance and outbreak investigation for the contact persons and staff of the six MBDS countries. A web page was also set up to share surveillance information and outbreaks of priority diseases. Three countries, Thailand, Cambodia, Viet Nam begin to share their surveillance information although not on a routine basis. Communication to alert and discuss the progress and problem of disease surveillance among countries is still limited because of inadequate communication infrastructure and skills in network management. The first year annual review will be held in Cambodia during July 11-14, 2000.

Conclusion: The MBDS is a self-initiation programme by the Ministry of Health of the six countries. The programme has faith in learning from and helping each other country in the prevention and control of priorities diseases amidst different bureaucratic, political and culture systems. MBDS is seeking and welcoming the World Health Organization, other programmes, interested donors or institutes for future collaboration.

Epidemiology Training Programmes – a resource for preparedness and response - Dr M. Patel

Applied Epidemiology Training Programmes are more than training programmes. They are established primarily to enhance delivery of public health services and to improve in a sustainable way, the institution's capacity for disease prevention and control. While training is an important component of the Programmes, it is not the end in itself.

The typical programme is institutionalized within the Ministry of Health. Here, trainers and senior departmental staff guide fellows through a flexible two-year competency-based curriculum. Their specific tasks are determined by the day-to-day and strategic challenges of public health assessment, action, and policy development, and focus particularly on surveillance and outbreak control. In the process of acquiring competencies, they work across disciplines with their trainers, supervisors and work units to cultivate new networks essential for public health. Out of this emerges an invigorated culture characterized by a new way of thinking and behaving in public health, using data to inform actions, policies and training priorities, adapting systems for detecting and responding to outbreaks, and providing ongoing training across all levels of the health system. In June 1997, the training programmes merged their collective strengths into a South-South/South-North partnership with WHO and CDC. Twenty-four national and regional training programmes participate in TEPHINET activities, enabling it to encompass diversity in technical expertise, culture and language. Programmes use five broadly defined models of international collaboration. The Network shares training resources, and convenes training workshops and scientific conferences. Members assist countries with needs, and co-participate with WHO and CDC in training, outbreak responses and related activities.

Most programmes, however, have maintained their focus on national needs. This is understandable, but in an age of globalization, we must examine also the benefits of fostering self-sufficiency through committed inter-dependence. The next challenge is to harness our skills for moving beyond a national focus and engaging in meaningful regional and global collaborations to improve health.

Early Warning and Response Network (EWARN), southern Sudan – Dr R. Shoo

The vast area and the conflict situation in south Sudan makes emergency response particularly difficult. Between September 1998 and March 2000, twenty-one rumours from 86 locations in southern Sudan were received. One of these required an international response. The initial response marked the beginning of efforts to systematize epidemic response and investigation in south Sudan. Twenty-three out of the 46 NGOs working in south Sudan constitute the major resource in health care delivery and response network.

Following an outbreak of Relapsing fever in September 1998, technical assistance was provided to develop epidemic response capacity through a 6-person month's consultancy. The problems of epidemic response were identified as:

- Lack of clarity of roles among organizations
- Lack of skills and equipment
- Inadequate laboratory support
- Lack of an information sharing network

The above problems often led to very late response (six months in the case above) and very costly response.

A process of addressing these problems was started with an initial establishment of a response network in five counties of south Sudan. (Tambura, Rumbek, Mapel – Wau, Lankien and Waat). Between April and August 1999 consensus was reached within OLS, NGOs and the Sudanese counterparts on:

- The list of 8 conditions of epidemic potential for the EWARN network.
 - Response and investigation teams constitution and mode of operation.
- A compendium of guidelines for investigation and response based on existing WHO Global Guidelines and the SPHERE project guidelines was also produced.

A radio based surveillance system was introduced where organizations reported episodes on a weekly basis. After a trial run for four months using Five hospitals and nine Primary Health Care Units the following problems were realized:

- Providing feedback on weekly basis was problematic
- Few NGOs could keep up with the reporting

At the end of 1999 an EWARN calendar was introduced for year 2000 that would help health units and organizations analyze the health unit data at facility level and use it for action. NGO and counterpart linked this process to the supervision programme staff.

Laboratory support and a training network were started with support from EMRO in four strategic locations. Laboratory assessment was undertaken in July 1999. Establishment of laboratories is in progress in Tambura, Yambio, Mapel and Rumbek in collaboration with the African Medical Research Foundation (AMREF). This also involves training in collection, transportation and processing of specimens. The target is to ultimately strengthen 12 laboratories.

Through this system, successful responses have been mounted by CARE in Tambura in August /September 1999, Oxfam against Relapsing fever outbreak in Rumbeik (October 1999), Meningitis response by MSF Belgium in Akobo (Feb/March 2000). The need for external assistance is becoming less and the response time has been considerably reduced.

An analysis of the MSF Belgium response shows that despite the emergency and adverse security situation in Upper Nile, the epidemic threshold could be picked up on time and vaccination started at week six. Only two weeks were lost due to logistical and security constraints. Laboratory support in this case had to be provided directly by AMREF.

In order to sustain the system, three Sudanese doctors have been identified and deployed as focal points in the three Regions of Equatoria, Bahr -el-ghazal and Upper Nile. A lead epidemiologist has been identified to technically support NGOs and Sudanese professionals in the development of the system. The EWARN system is currently integrated fully with the Polio Surveillance programme and the general Health Information System.

Global Salm Surv – Building capacity through surveillance networks – Dr K. Stöhr

Global Salm-Surv is a global network of laboratories and individuals involved in isolation, identification and antimicrobial testing of *Salmonella* and surveillance of Salmonellosis.

The aims of Global Salm-Surv are to:

- facilitate data sharing and communication between laboratories via e-mail, worldwide web and/or facsimile.
- make available an international, online accessible database that contains:
 - contact information of national or regional salmonellosis laboratories
 - descriptions of laboratory responsibilities, laboratory methods and types of samples received
 - annual summary results, including most common serotypes

Therefore, Global Salm-Surv's objective is to strengthen national and regional laboratories in the surveillance of Salmonellosis and antimicrobial resistance surveillance in *Salmonella* from humans, food and animals through:

- external quality assurance programmes on *Salmonella* typing and antimicrobial susceptibility testing
- regional and national training courses
- provision of technical information and methodological support

Where is Global Salm-Surv?

- 97 laboratories electronically linked with weekly exchange of news / information
- Regional Centre in Thailand up and running (focus on antimicrobial resistance (AMR) with strong *Salmonella* surveillance component).
- 6 international laboratory training courses in 2000; 3 in 2001 (*Salmonella* and AMR surveillance)
- External Quality Assurance Programme operational:
 - ✓ 50 Global Salm-Surv members from March 2000 to May 2000
 - ✓ 30 more from June to November 2000
 - ✓ Continuation for at least two more years ensured
 - ✓ Additionally: possibility for laboratory results verification
- Web-site established with country databank (<http://www.gss.who.int>)

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