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Community Health & Disease Surveillance Newsletter

Sultanate of Oman Ministry of Health

Inside this issue:

Severe Acute Respiratory Infections Surveillance

(Influenza Surveillance)

Rationale

The Ministry of Health has developed and implemented a preparedness plan to deal with emergence of pandemic influenza. It is presumed that before the human cases are observed the outbreak in birds either wild or domestic poultry will be evident. However, relying only on this indicator may lead to late detection of pandemic flu in the population. A mechanism needs to be evolved to observe the incidence of severe acute respiratory illness in the community. Monitoring trend of such severe acute respiratory infections over a period will identify a rise over the baseline incidence that may be attributed to the seasonal influenza activity. Similarly the unsuspected cases of avian influenza may also come to the attention of the public health authorities through this monitoring system. Thus a credible and dependable surveillance network at the key sentinel sites in the country will certainly serve as an early warning system for potential avian influenza outbreaks and/or pandemic flu.

Introduction

Surveillance of acute respiratory diseases supplemented with viral and bacteriological surveillance is fundamental for early detection of either avian influenza outbreaks or pandemic flu. Hence the present study aims at establishing a surveillance mechanism for severe acute respiratory infections (SARI) at a regional hospital in the Sultanate. The Ministry of Health has already established a laboratory-based influenza surveillance network at six primary healthcare settings. Throat swabs are obtained from patients attending these clinics with flu-like symptoms and respiratory viruses are isolated and typed. Thus Oman has been contributing to the pooled global data on prevalent seasonal influenza strains and subsequent development of seasonal flu vaccine. However the scope of this surveillance is limited due to the elaborate system of virus isolation. Alternative methods for viral diagnosis of influenza like illnesses will greatly improve the capacity of laboratory-based surveillance.

In addition the proportion of severe acute respiratory infections (SARI) due to bacteria in children less than 5 years of age will also be determined at the site. Understanding the bacteriological causes leading to severe acute respiratory infections will improve existing treatment regimens to treat these diseases as well as to determine whether the currently available bacterial conjugate vaccines (i.e. *Haemophilus influenzae* type b and 7-valent pneumococcal conjugate vaccines) would be useful in preventing severe respiratory illness in

children. Although capability to diagnose bacterial causes of severe respiratory illnesses currently exists in the Ministry of Health institutions the approach needs to be more systematic and the system should be able to generate adequate and relevant information.

Objectives

- The severe acute respiratory illness (SARI) surveillance aims to implement a surveillance network in the Sultanate of Oman and to describe the epidemiology of respiratory pathogens (viral and bacterial) causing the severe illness.
- The study will evaluate whether the surveillance network will effectively serve as an early warning system for potential avian influenza outbreaks and/or pandemic flu.
- In addition the study will determine proportion of SARI due to bacteria in children less than 5 years of age.

"The severe acute respiratory illness (SARI) surveillance aims to implement a surveillance network in Oman & to describe the epidemiology of respiratory pathogens (viral & bacterial) causing the severe illness."

Study Design

Surveillance Organization: The Principle Investigator will select the sentinel sites and oversee all surveillance related activities. The National Co-investigators will monitor implementation of the surveillance, data management, analysis and integration of laboratory results and preparation of reports as well as for training of field study staff. The National laboratory co-ordinators will be responsible for training of laboratory personnel in sample handling, storage and transport to the Central Public Health Laboratory. They will also ensure quality control in laboratory procedures and related issues. The field coordinators will be responsible for functioning of all surveillance related activities at the site. They will also ensure processing, analyzing and reporting of the data at the local level, supervising collection of clinical samples and ensuring proper samples transport.

The Regional Epidemiologist will be the surveillance coordinator and the focal point for the study. The Executive Director of the hospital will be the site coordinator who will ensure that all the surveillance activities are conducted according to the protocol guidelines and the field team members are trained and well versed in all the critical procedures and the SOPs.

The local team will be composed of the focal points from Paediatric, Internal Medicine and Laboratory to carry out the activities in their respective departments.

Study Site: Surveillance for SARI will be launched at one sentinel site viz. the "Sohar Regional Hospital". It is a general hospital with 400 beds located in the North Batinah region providing secondary care and some elements of tertiary care. It is located 250 km away from Muscat and admits both adults and children. Sohar Regional Hospital is a referral hospital serving around 111,000 population of the North Batinah region. The patients with severe respiratory illness are either referred from primary health care or are admitted directly to either the internal medicine or the paediatric wards in the hospital.

Study Period: The proposed study period is from 1st January to 31st December 2008.

Informed Consent: The eligible subjects will be recruited only after obtaining verbal informed consent. A consent information form including information on study will be provided to the eligible patients. In children the information will be provided to either of the parents (mother or father).

The study is of minimal risk and involves no procedure for which a written signed informed consent is required. This waiver will remove significant unnecessary burden associated with obtaining participants' signature.

Healthcare staff will provide participants with the standard consent information verbally and written in Arabic language. Participants will be offered enough time to consider their choice before enrolment. In addition a field is added in the data collection form used for the study indicating that the interviewer provided the patient with the consent information. To facilitate the process, a consent summary form will be attached with each data collection form and will be detached and offered to the patient before the start of the interview. In case the participant is illiterate the information summary will be read to him.

No consent will be required for blood collection from the recruited subjects since the blood collection for culture is a standard routine procedure adopted for all admitted cases with a clinical presentation of severe acute respiratory infections which includes fever above 38^0 C.

Sample Collection

Nasopharyngeal swab: Designated clinicians either in the internal medicine ward or the paediatric ward in Sohar Regional Hospital will be responsible to obtain the nasopharyngeal swab from all hospitalized patients for laboratory testing and who are eligible to participate. It will be ensured that samples from SARI cases will be obtained only by well-trained physicians in the hospital in accordance with the established procedures.

Blood Culture: It is a Ministry of Health policy that blood cultures are carried out as part of the routine standard procedure performed for all hospitalized patients with acute respiratory infections and fever over 38°C, which is one of the major inclusion criteria in the present study. Therefore no additional sample of blood will be collected for study purpose. The results of blood culture will be noted for all recruited subjects.

Laboratory procedures

Training: All the staff involved in the surveillance will be trained on protocol, SOP, filling CRF, taking samples etc. before launching the study. In Sohar hospital laboratory currently facilities for Direct Immunofluorescence Antibody (DFA) test are not available. The required facilities for the study will be installed and the laboratory staff at the sentinel site will be trained on handling and storage of samples, cell purification and concentration and the DFA assay.

Procedures: The hospital laboratory technician will be responsible to put the swab into 2 cryovials containing 2 ml of isotonic virus transport medium. Cryovials will be centrifuged for 30 seconds to free cells from the swab tip. Two, 500 µl aliquots will be dispensed into pre-labelled sterile cryovials and stored in liquid nitrogen tanks. Cells from the remainder of the original sample will be fixed, according to standard procedures, on immunofloures-cent glass slides at the hospital's laboratory. Slides will be examined by Direct Fluorescent Antibody assay (DFA) using *Light Diagnostics respiratory Panel 1* kit inside the hospital laboratory.

Benefits and Risks

There is no risk either to the participant or to the community. Only a slight discomfort to the participant is anticipated while taking the nasopharyngeal swab.

There are no direct benefits to participants or community. Indirect benefits include identification of the respiratory pathogens which may help the clinician for better understanding the disease and its subsequent management. Early identification of epidemic influenza may help the community through preventive public health interventions.

Subject inclusion criteria

"Indirect benefits include identification of the respiratory pathogens which may help the clinician for better understanding the disease & its subsequent management. ".

All admitted children (above 2 years) and adults suffering from acute severe respiratory infections (SARI) and admitted in the sentinel site hospital during the study period will be included.

The selection criteria include:

- Informed consent
- Hospitalized adult cases (> 12 years) and paediatric cases (5 to 12 years) with acute lower respiratory tract illness with
  1. Fever above 38^0 C AND
  2. Cough or sore throat AND
  3. Shortness of breath/difficulty breathing
- Hospitalized paediatric cases aged 2 months to 5 years (as defined in the IMCI guidelines) presenting with:
  1. Fever above 38^0 C AND
  2. Tachypnoea defined as:
     - Respiratory rate > 50/minute for infant 2 months to < 1 year
     - Respiratory rate > 40/minute for infant 1 year to < 5 years

  AND

  3. One of the following:
     - Unable to drink or breastfeed
     - Lethargic or unconscious
     - Vomits everything
     - Convulsions
     - Nasal flaring
     - Grunting
     - Oxygen saturation < 90%
     - Chest indrawing

All admitted children with SARI below 2 months of age will not be included in the study. A diagnosis of an immunodeficiency disorder in the subject would automatically lead to exclusion from the study.

Subjects may withdraw from the study at any point. The data collected for withdrawn subjects, in addition to standard questionnaire data, will include the reason for withdrawal. Subjects will not be replaced. No additional follow-up is envisioned for withdrawn subjects.

There will be no restrictions in using medications/treatments. As soon as the throat swab is taken and blood sample collected the subject participation is terminated.

All interventions will be conducted by study personnel; the only subject compliance required is for collection of nasopharyngeal swab.

All participants will be monitored for 30 minutes after taking nasopharyngeal swab. No adverse events are anticipated after a properly conducted procedure.

Data Handling

The questionnaire data will be entered into an electronic data file by the SARI Surveillance Coordinator at the Regional Directorate and transferred on a weekly basis to the Department of Communicable Disease Surveillance and Control.

The laboratory data will also be provided in electronic format to the Data Manager which will then be merged based on a common identifier.

The original questionnaires will be stored with the MoH, Oman.

The names and identity of the parents and their children will be kept private by the investigators. Information will not be given outside of the MoH without the parents' permission except as required by law. Other information without names and identities will be shared with study investigators.

Data management

"All admitted children (above 2 years) & adults suffering from acute severe respiratory infections (SARI) & admitted in the sentinel site hospital during the study period will be included."

Case Report Forms will be printed as a single original and will be available in the Internal Medicine and Paediatric wards of the sentinel hospital. The form will be filled by the designated staff in the hospital wards after patient interview followed by collection of samples. Appropriately labelled samples will be sent to the hospital laboratory with entries in the "Study-Samples Logbook". All the filled forms will be collected by the Infection Control Nurse on the following morning. He/she will enter requisite information in the "SARI Hospital Registry".

The forms will be collected on weekly basis by the SARI Surveillance Coordinator (Epidemiologist in the Regional Directorate) for data entry. He will be responsible for developing the data base. He will maintain a file of all the records. A data entry person will be assigned and trained to enter the epidemiological and laboratory data and will be supervised by the regional epidemiologist. The central Public Health Laboratory will also maintain an independent database of laboratory results.

In addition the SARI Surveillance Coordinator will analyze weekly data on SARI admissions and deaths to monitor the trend.

Only subjects who complete all study requirements with adequate samples will be included in the final analysis.

Quality Assurance Procedures

Laboratory: Samples testing positive for Influenza A by DFA test at the hospital will be further tested and confirmed using PCR technique at the Central Public Health Laboratory. Therefore all positive samples and 20% of samples that are negative by DFA will be transferred to the Central Public Health Laboratory on a weekly basis for further testing by PCR using specific primers.

The Central Public Health laboratory will be responsible for sending regular feedback on a weekly basis to Sohar Regional Hospital Laboratory, Regional Epidemiologist in the Directorate, Data Manager in DCDSC as well as to International Collaborator (NAMRU-3) to share the findings of all the samples processed.

All positive nasopharyngeal samples from the Central Public Health laboratory will be sent to NAMRU-3 for verification and QC.

Conduction of Study: After appropriate ethical approval an initiation site visit will be conducted before the first subject is enrolled in the study. During this site visit the requirements of Good Clinical Practices (GCP), protocol procedures and all logistical issues will be discussed at length. The training of study investigators will also be documented.

After the study is initiated the national study monitor will be in regular contact with the sites to obtain information on the performance of the study. These contacts will be scheduled to take place at regular intervals. Subsequent to start of recruitment routine monitoring visits would occur approximately every 4-8 weeks after prior appointment with the site investigators.

The investigator and his/her staff will be obliged to devote a suitable amount of time and an appropriate place for the monitoring visits. During each visit, the monitor will review the Case Report Forms (CRF) of each subject in the study with regard to its completeness, thoroughness and compliance with the protocol. In addition, at a minimum, the original subject data will be reviewed to ensure that:

- subject informed consent is obtained
- inclusion/exclusion criteria are followed

(Continued on page 6)

"During each visit, the monitor will review the Case Report Forms (CRF) of each subject in the study with regard to its completeness, thoroughness & compliance with the protocol."

Pertussis: Surveillance & Diagnosis

Background

Pertussis is an important cause of infant death worldwide and continues to be a public health concern even in countries with high vaccination coverage.

Before vaccines became widely available, pertussis was among the most common childhood diseases. Pertussis vaccine (DTP) has been part of the Expanded Programme on Immunization since 1974.

Despite the vaccine's efficient prevention of clinical disease, it has limited impact on the circulation of *Bordetella pertussis*. Remaining non-immunized children and older individuals with waning immunity may serve as reservoirs for the infection.

The clinical outcome of pertussis depends on factors such as age and vaccination status. Although most cases of clinically recognizable pertussis occur in children aged 1–5 years, severe disease and death are reported mainly in non-immune, very young infants. In older children, adolescents and adults, pertussis is often unrecognized because of its frequent atypical course. However, older age groups represent an important source of infection for susceptible infants.

During the 1990s, a significant epidemiological shift towards higher incidences of pertussis among schoolchildren previously vaccinated, adolescents and adults has been observed in many industrialized countries.

The Pathogen

Bordetella pertussis, the causative agent of pertussis, is a small, fastidious Gram-negative coccobacillus with exclusive affinity for the mucosal layers of the human respiratory tract. Occasionally, other infectious agents, in particular *B. parapertussis*, may cause pertussis-like disease. Hence,

"Despite the vaccine's efficient prevention of clinical disease, it has limited impact on the circulation of Bordetella pertussis."

(Continued from page 5)

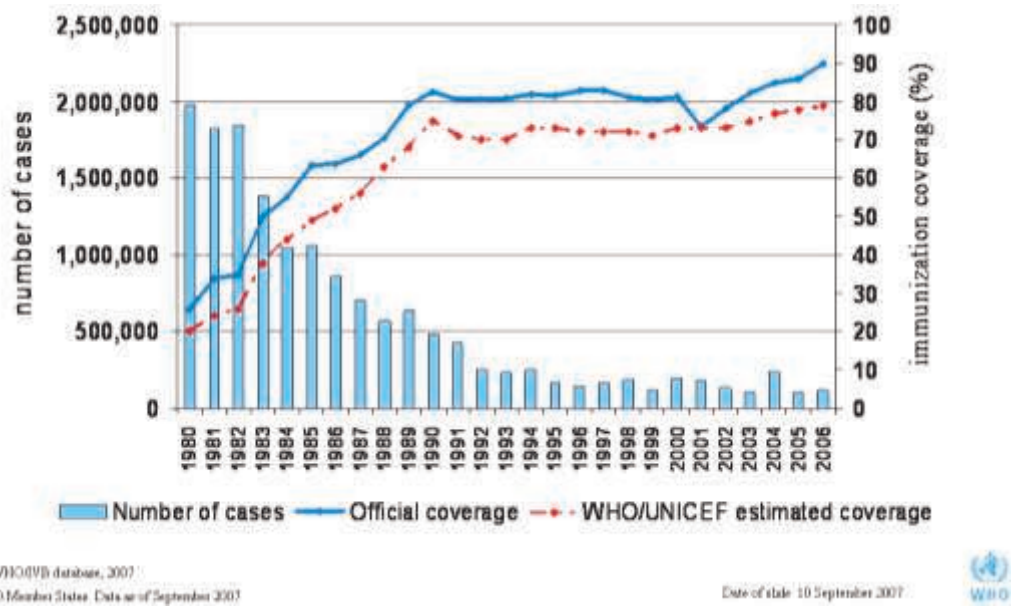
- the CRF data are consistent with the physician's original records
- all relevant clinical and laboratory findings are documented and recorded in the appropriate place in the CRFs
- incorrect or illegible entries in the CRFs would be submitted to the investigator for correction.

The Co-investigators will retrieve completed CRFs during the regularly held monitoring visits.

In addition to the above-outlined monitoring visits, the participating institutions will be audited anytime during the study period and at the completion. This audit may be carried out by the representatives of the sponsors or by the responsible regulatory authority. Such an audit would be done to review whether the data has been properly recorded in the interim or final report and whether the performance of the study is in accordance with the protocol, the standard operating procedures (SOPs) developed for the study, and other relevant guidelines. Subject confidentiality will be maintained at all times.

Analysis of one year data will be done to assess the usefulness of this surveillance tool to monitor influenza activity. If proven it is then proposed that the model will be applied in all regional hospitals in the country.

Fig. 1
Pertussis Global Annual Reported Incidence & DTP3 Coverage: 1980-2006



laboratory confirmation of clinically suspected cases is important, particularly for the diagnosis of index cases.

Bordetella species may alter their phenotypic state depending upon environmental conditions, and may show different expression of virulence factors. The knowledge of the pathogenesis of pertussis is still incompletely understood. Concerns that the efficacy of the current pertussis vaccines may be gradually lost because of antigenic drift and continuous selection of the least vaccine-sensitive clones have not been so far substantiated. Also, development of increased resistance to antimicrobial drugs seems to be very slow with this pathogen.

Maternal antibodies do not seem to protect neonates from severe pertussis.

Transmission & Clinical Presentation

B. pertussis is transmitted from infected to susceptible individuals through droplets. Following an incubation period of 7–10 days, patients develop catarrhal symptoms including cough. In the course of 1–2 weeks, coughing paroxysms ending in the classical whoop may occur. In typical cases, cough is particularly severe at night and frequently followed by vomiting. In young infants, pertussis may cause only apnoea and cyanosis, whereas in adolescents and adults, uncharacteristic, persistent cough may be the only manifestation of the disease. The catarrhal, paroxysmal and convalescent stages of the disease may last for a total of 1 to several months. Complications occur in 5–6% of pertussis cases, most frequently in infants aged <6 months. Bronchopneumonia (5.2%) is the most prominent complication with relatively high mortality.

Macrolide antibiotics such as erythromycin may prevent or moderate clinical pertussis when given during the incubation period or in the early catarrhal stage. During the paroxysmal phase of the disease, antimicrobial drugs will not change the clinical course but may eliminate the bacterium from the nasopharynx and thus reduce transmission.

"Concerns that the efficacy of the current pertussis vaccines may be gradually lost because of antigenic drift & continuous selection of the least vaccine-sensitive clones have not been so far substantiated."

Clinical case definition

A case diagnosed as pertussis by a physician, OR a person with a cough lasting at least 2 weeks with at least one of the following symptoms:

- paroxysms (i.e. fits) of coughing
- inspiratory "whooping"
- post-tussive vomiting (i.e. vomiting immediately after coughing) without other apparent cause

Criteria for laboratory confirmation:

- Isolation of Bordetella pertussis, OR
- Detection of genomic sequences by PCR, OR
- Positive paired serology

Case classification:

- *Clinical case:* A case that meets the clinical case definition, but is not laboratory confirmed
- *Laboratory confirmed case:* A case that meets the clinical case definition and is laboratory confirmed.

"WHO considers bacterial culture the "gold standard" of laboratory confirmation. Bacterial culture is very specific but not very sensitive (<60%) & requires selective culture media."

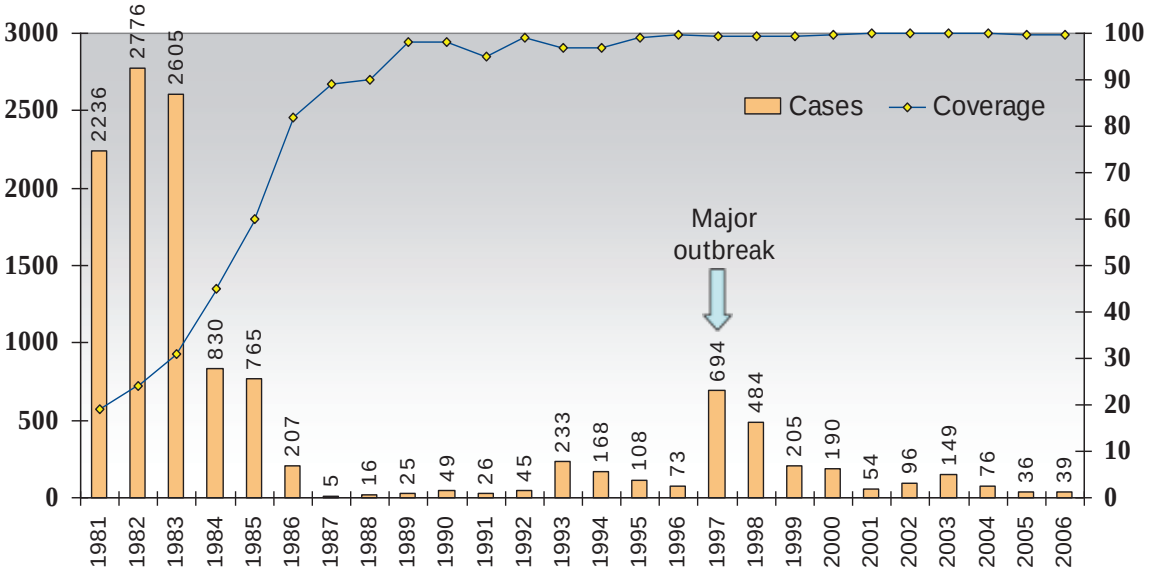
Laboratory Diagnosis

Culture: Etiological diagnosis is based on recovery of B. pertussis from nasopharyngeal specimens obtained during the catarrhal and early paroxysmal stages. WHO considers bacterial culture the "gold standard" of laboratory confirmation. Bacterial culture is very specific but not very sensitive (<60%) and requires selective culture media.

Polymerase chain reaction (PCR) is more sensitive and can be performed on the same biological samples as cultures. However, it requires expensive equipment and is used mainly in specialized laboratory settings.

Serological diagnosis is ideally based on detection of a significant increase in the level of specific antibodies in paired sera of infected individuals. The sera should be collected in the early catarrhal stage (acute serum) and about one month later (convalescent serum). High antibody levels in sera from non-vaccinated individuals suggest recent infection. During

Fig. 2
Pertussis Annual Reported Incidence & DTP3 Coverage in Oman: 1981-2006



the period 18 months following vaccination, serology based on single serum sample cannot be used for diagnosis as it may not differentiate between antibodies following natural infection and antibodies resulting from vaccination.

Pertussis in Oman

Oman is a good example of a country where surveillance is being used to inform and guide vaccination policy based on the changing epidemiology of pertussis.

The estimated population of Oman is 2.6 million of which approximately 10% of the population is under the age of five years.

Since the launch of EPI in 1981, DTP has been administered at 3, 5, 7 and a booster at 18 months of age. The DTP3 coverage attained was over 95% since 1989 (Fig.2).

Pertussis was included in the Group B of notifiable communicable diseases and is required to be reported within seven days of detection. A standard clinical and laboratory case definition was provided for pertussis in the SOP manual (1st edition, 1992). The epidemic threshold was defined as five or more suspect cases clustering in time or place.

There were two major outbreaks reported in Oman despite high coverage with DTP3. One in 1993 and other in 1997. In the 1997-98 outbreak in Batinah region 90% of the cases were infants 0–3 months and 34% of cases were over 4 years of age. Only three out of 200 clinically reported cases could be laboratory confirmed by culture.

Based on data on age specific incidence, the primary immunization schedule was changed to 6 weeks, 3 and 5 months and booster doses were added to the EPI schedule at 15 months and at 4–6 years of age.

No major outbreaks of pertussis were noted after 1997-98. Pertussis incidence continued to decline. However cases were being reported in the following years.

Serological Diagnosis

Recently the serological diagnostic test has been introduced as an aid to the case-based surveillance.

From the mid-2007 all clinically cases of pertussis were required to be laboratory confirmed bearing in mind that a single serological positive sample during acute illness should not be interpreted as diagnostic for pertussis. The immunization history should be elicited and positive results obtained within 18 months following the last dose of DTP should be carefully assessed and interpreted. In such cases second serum sample obtained during convalescence should be tested for rising titre.

Strengthening Surveillance

From January 2008 the clinical cases of pertussis will no longer be included in the national surveillance data. All clinically suspect cases based on the case definition (SOP manual, 2nd edition, 2005) will be subjected to serological test. Negative cases will be excluded and sero-positive results will be interpreted on the background of the immunization history with DTP vaccine .

"During the period of 18 months following vaccination, serology based on single serum sample can not be relied for diagnosis as it may not differentiate between antibodies following natural infection & antibodies resulting from vaccination."

References

- WHO position paper on Pertussis; **WER No. 4**, **2005**, **80**, 29–40, 28 JANUARY 2005 **http://www.who.int/wer**
- Pertussis Surveillance: WHO report of the global meeting, Geneva, Oct. 2000, WHO/V&B/01.19

Evaluating Public Health Surveillance Systems (Part-1)

Recently an "In-depth Review of National Surveillance and Response System for Communicable Diseases" was conducted in Oman by a mission from WHO HQ and WHO EMRO office from 17 to 26 September 2007. In addition the team also conducted "Assessment of National Core Capacities for Implementation of International Health Regulations (IHR) 2005".

In the next issue of this Newsletter the team's findings and recommendations will be published for the benefit of the readers.

This article outlines the purpose and method of evaluating the public health surveillance system.

Introduction

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data on a health-related event for use in public health action to reduce morbidity and mortality and to improve health. Its uses include:

- Guides immediate response to public health emergencies
- Measures burden of disease (or other health-related event) including identifying populations at risk and emerging health concerns
- Monitor trends in the burden of a disease including detection of epidemics
- Guide planning, implementation, and evaluation of programs of prevention and control
- Evaluate public health policy
- Detect changes in health practices and the effects of these changes
- Prioritize allocation of health resources
- Describe clinical course of disease
- Basis for epidemiological research

In summary data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses.

"Public health surveillance systems should be evaluated periodically & should include recommendations for improving its quality, efficiency, & usefulness."

Purpose & Rationale

The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively. Public health surveillance systems should be evaluated periodically and should include recommendations for improving its quality, efficiency, and usefulness.

The evaluation should also conduct an assessment of system attributes. Because public health surveillance systems vary in methods, scope, purpose, and objectives, these attributes may differ from one system to another.

The Process of Evaluation

A. The Stakeholders are those persons or organizations who use data for the promotion of healthy lifestyles and the prevention and control of disease, injury, or adverse exposure. Those are public health practitioners; health-care providers; data providers and users; representatives of affected communities; governments at the local, state and central levels; and professional and private organizations.

B. Description of Surveillance System

1. Health-related events under surveillance: Health-related events that affect many persons or that require large expenditures of resources are of public health importance. However, health-related events that affect few persons might also be important, especially if the events cluster in time and place. Diseases that are rare because of successful control might gain importance due to their potential to re-emerge

Measures include: Indicators of frequency (e.g. incidence, prevalence, mortality rates) and summary measures of (e.g. quality-adjusted life years [QALYS]); indicators of severity (e.g. case-fatality ratio, hospitalization rates); disparities or inequities; as-

sociated costs; preventability (e.g. reducing the secondary attack rate); potential clinical course without an intervention (e.g. vaccinations) and community concern.

2. Purpose and operation of the system:

The purpose of the system indicates why the system exists, whereas its objectives relate to how the data are used for public health action. A public health surveillance system is dependent on a clear case definition for the health-related events under surveillance. Case definitions might exist for a variety of health-related events under surveillance, including diseases, injuries, adverse exposures, and risk factors. The evaluation should also assess how well the public health surveillance system is integrated with other surveillance and health information systems.

The architecture and data flow of the system can also be depicted in the chart. The data analysis description indicates who analyzes the data, how they are analyzed, and how often. The system should operate in a manner that allows effective dissemination of health data to decision makers at all levels. Options for disseminating data include electronic data interchange; the Internet; press releases; newsletters; bulletins; annual and other types of reports; publication in scientific, peer-reviewed journals; and poster and oral presentations, including those at individual, community, and professional meetings.

The protection of patient privacy, data confidentiality, and system security is essential to maintain the credibility of any surveillance system.

3. Resources to operate the system: Assessing resources should cover only those resources directly required to operate a public health surveillance system. These resources are referred to as "direct costs" and include personnel and financial resources expended in operating the system. These include the source of budget, cost of personnel and the infrastructure.

C. Evaluation Design

The evaluation design must ensure that time and resources are used efficiently. The evaluation must assess what the system must accomplish to be considered successful in meeting its objectives.

D. Evidence on System Performance

Evidence is collected on the actions taken as a result of analysis and interpretation of the data as well as on system attributes that include simplicity, flexibility, data quality, acceptability, sensitivity, predictive value positive (PVP), representativeness, timeliness & stability of the system.

E. Conclusions & Recommendations

Conclusions should be drawn through appropriate analysis, synthesis, interpretation, and judgement of the gathered evidence on the performance.

The conclusions should state whether the surveillance system is addressing all important public health problems and is meeting its objectives. It is also important that the stakeholders must agree with the conclusions. Recommendations should address the required modification and/or continuation of the surveillance system.

In Summary...

To promote the best use of public health resources, all public health surveillance systems should be evaluated periodically. However NO perfect system exists; and tradeoffs must always be made. Each system is unique and must balance benefit versus personnel, resources, and cost allocated to each of its components if the system is to achieve its intended objectives.

Reference:

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5013a1.htm

"To promote the best use of public health resources, all public health surveillance systems should be evaluated periodically. However NO perfect system exists; & tradeoffs must always be made."

Communicable Diseases Quarterly Report

Third Quarter (July to September 2007)

ICD Code	Priority Communicable Diseases	2007 Third Quarter Jul	Aug	Sep	Total	2006 Q3 Jul-Sep	Q4 Oct-Dec	2007 Q1 Jan-Mar	Q2 Apr-Jun
Group 'A' Diseases									
A00	Cholera	-	3 (i)	-	**3 (i)**	1 (i)	-	-	-
A20	Plague	*Never reported*							
A95.9	Yellow Fever	*Never reported*							
A39, 39.0, 39.2-39.4	Meningococcal Infection	1	-	-	1	-	-	-	-
G00.0	H. influenzae type b, meningitis *(Hib)*	-	-	-	0	-	-	-	-
A82	Rabies	-	-	-	0	-	-	-	-
B50-54	Malaria (*Imported Cases*)	66	90	89	245	141	104	62	213
A-15	Pulmonary Tuberculosis (*Sputum Positive*)	15	7	15	37	27	29	37	25
	Group 'A' Syndromes								
-	Acute Flaccid Paralysis (*AFP*)	-	1	2	3	4	4	7	5
-	Fever & Rash-Illness	50	41	42	133	149	184	175	276
-	Clinical	-	1	2	3	-	4	4	-
B05	Measles (*IgM +*)	1	-	-	1	-	1	1	2
B06	Rubella (*IgM +*)	-	-	-	0	3	-	-	-
P35.0	Congenital Rubella Syndrome (*CRS*)	-	-	-	0	-	-	-	-
U04, 04.9	Severe Acute Respiratory Syndrome *(SARS)*	*Never reported*							
A99	Acute Haemorrhagic Fever Syndrome	-	-	-	0	-	-	-	-
A02	Food Poisoning (*Infectious origin*)	79	74	55	208	357	77	70	124
Group 'B' Diseases									
G00.1-9	Bacterial Meningitis *(other than Hib & Nm)*	-	-	5	5	4	3	6	5
A87	Viral Meningitis	2	-	-	2	1	1	1	3
G03	Other Meningitis (*unspecified*)	2	1	-	3	10	5	15	9
	Acute Viral Hepatitis (*Total*)	51	43	49	143	224	133	158	215
B15	Acute Viral Hepatitis A	34	29	24	87	129	83	88	136
B16	Acute Viral Hepatitis B	-	2	-	2	13	8	16	14
B17.1	Acute Viral Hepatitis C	5	2	1	8	3	2	7	7
B17.0	Acute Viral Hepatitis D (*amongst B positive*)	-	-	-	0	-	-	0	0
B17.2	Acute Viral Hepatitis E	-	-	-	0	2	1	5	1
B19/B17.8	Acute Viral Hepatitis (*unspecified*)	12	10	24	46	77	39	42	57
A03.0, 01.4	Typhoid & Paratyphoid Fever	2	6	4	12	17	15	11	18
A37	Clinical Pertussis [*Sero-Confirmed*]	15 [1]	13	6	34 [1]	8	5	23	35
A71	Trachoma (*active*)	8	4	8	20	6	13	36	35
A23	Brucellosis *(human)*	13	4	8	25	21	14	25	24
B55.1	Leishmaniasis Cutaneous (CL)	1	-	-	1	1	-	3	0
B55	Leishmaniasis Visceral (VL)	-	-	-	0	-	-	1	0
B65	Schistosomiasis (*intestinal*)	-	-	-	0	-	1	0	0
A16	Pulmonary Tuberculosis (*sputum negative*)	3	2	5	10	9	7	6	7
A17-19	Extra-pulmonary Tuberculosis	14	8	11	33	28	21	29	21
A30	Leprosy	-	-	-	0	2	1	0	0
B20-24	HIV [AIDS]	3 [4]	6 [2]	1 [2]	10 [8]	-	13 [11]	15 [11]	10 [9]
Group 'C' Diseases & Syndromes									
J10-11	Influenza Like Illnesses (*ILI*)	4222	3414	3795	11431	8227	17166	12619	8673
-	aLRTI & Pneumonia *(childhood)*	732	821	1394	2947	3159	4803	5026	4237
-	Acute 'Watery' Diarrhoea *(childhood)*	1952	2591	1759	6302	8407	9478	11652	8224
B01	Chickenpox	4295	3223	2943	10461	4716	7084	12947	18637
B26	Clinical Mumps [*Sero-Confirmed*]	36 [7]	42 [1]	46 [2]	124 [10]	197	175	182	173

Communicable Diseases Quarterly Report by Regions

Third Quarter (July to September 2007)

ICD	Priority Communicable Diseases	Total	Muscat	Dhofar	Dakhliyah	North Sharqiyah	South Sharqiyah	North Batinah	South Batinah	Dhahira	Musan-dam	Al-Wustah
Group 'A' Diseases												
A00	Cholera	3 (i)	3 (i)	-	-	-	-	-	-	-	-	-
A20	Plague	*Never reported*										
A95.9	Yellow Fever	*Never reported*										
A39, 39.0, 39.2-39.4	Meningococcal Infection	1	1	-	-	-	-	-	-	-	-	-
G00.0	H. influenzae type b, meningitis *(Hib)*	0	-	-	-	-	-	-	-	-	-	-
A82	Rabies	0	-	-	-	-	-	-	-	-	-	-
B50-54	Malaria (*Imported Cases*)	245	90	15	24	11	5	47	17	20	2	14
A-15	Pulmonary Tuberculosis (*Sputum +ve*)	37	10	3	1	1	2	13	5	2	-	-
	Group 'A' Syndromes											
	Acute Flaccid Paralysis (*AFP*)	3	-	-	1	-	1	-	-	1	-	-
-	Fever & Rash-Illness	133	11	4	27	9	33	21	25	-	2	1
-	*Clinical*	3	1	1	-	1	-	-	-	-	-	-
B05	Measles (*IgM +*)	1	-	-	-	-	-	1	-	-	-	-
B06	Rubella (*IgM +*)	0	-	-	-	-	-	-	-	-	-	-
P35.0	Congenital Rubella Syndrome (*CRS*)	0	-	-	-	-	-	-	-	-	-	-
U04,04.9	Severe Acute Respiratory Syndrome	*Never reported*										
A99	Acute Haemorrhagic Fever Syndrome	0	-	-	-	-	-	-	-	-	-	-
A02	Food Poisoning (*Infectious origin*)	208	38	-	19	35	21	32	26	37	-	-
Group 'B' Diseases												
G00.1-9	Bacterial Meningitis *(except Hib & Nm)*	5	-	-	-	3	-	2	-	-	-	-
A87	Viral Meningitis	2	1	-	-	1	-	-	-	-	-	-
G03	Other Meningitis (*unspecified*)	3	-	-	-	1	-	2	-	-	-	-
	Acute Viral Hepatitis (*total*)	143	16	13	30	19	33	7	16	8	-	1
B15	Acute Viral Hepatitis A	87	15	-	28	11	19	1	11	2	-	-
B16	Acute Viral Hepatitis B	2	-	-	-	-	-	1	1	-	-	-
B17.1	Acute Viral Hepatitis C	8	-	1	1	-	-	2	4	-	-	-
B17.0	Acute Viral Hepatitis D (*amongst B +*)	0	-	-	-	-	-	-	-	-	-	-
B17.2	Acute Viral Hepatitis E	0	-	-	-	-	-	-	-	-	-	-
B19/B17.8	Acute Viral Hepatitis (*unspecified*)	46	1	12	1	8	14	3	-	6	-	1
A03.0,	Typhoid & Paratyphoid Fever	12	1	1	1	2	-	4	-	2	1	-
A37	Clinical Pertussis [*Sero-Confirmed*]	34 [1]	15	3	2	1 [1]	-	8	3	2	-	-
A71	Trachoma (*active*)	20	6	-	1	11	-	-	2	-	-	-
A23	Brucellosis *(human)*	25	-	21	-	-	-	1	2	-	1	-
B55.1	Leishmaniasis Cutaneous (*CL*)	1	-	-	1	-	-	-	-	-	-	-
B55	Leishmaniasis Visceral (*VL*)	0	-	-	-	-	-	-	-	-	-	-
B65	Schistosomiasis (*intestinal*)	0	-	-	-	-	-	-	-	-	-	-
A16	Pulmonary Tuberculosis (*sputum neg.*)	10	3	3	-	-	1	3	-	-	-	-
A17-19	Extra-pulmonary Tuberculosis	33	8	9	3	1	1	5	6	-	-	-
A30	Leprosy	0	-	-	-	-	-	-	-	-	-	-
B20-24	HIV [AIDS]	10 [8]	3 [2]	-	0 [2]	-	2 [2]	5 [0]	0 [1]	0 [1]	-	-
Group 'C'Diseases & Syndromes												
J10-11	Influenza Like Illnesses (*ILI*)	11431	-	332	122	10909	-	-	6	59	3	-
-	aLRTI & Pneumonia *(childhood)*	2947	177	800	280	168	283	318	889	3	17	12
-	Acute 'Watery' Diarrhoea *(childhood)*	6302	871	2064	1479	-	429	840	137	364	118	-
B01	Chickenpox	10461	1351	425	2115	714	1061	1686	1509	1441	62	97
B26	Mumps	124[10]	29	18	14	8[2]	2	23[1]	15[5]	10[2]	1	-

Selected Communicable Diseases by Wilayat

Third Quarter (July to September 2007)

Region	Wilayat	AFP	Measles	Rubella	Meninngo. Infection	Hib Meningitis	TB (Total)	TB Sputum Positive	Hepatitis A	Hepatitis B	Malaria (imported)	Pertussis	Leprosy
MUSCAT	Muscat								1				
	Seeb				1		8	4	1		25	9	
	Muttrah						6	3	1		22	2	
	Bowsher						2	1			38	2	
	Al Amerat						3		6		1	2	
	Quriyat						2	2	6		4		
DHOFAR	Salalah						14	3			15	3	
	Thumrait						1						
	Taqah												
	Mirbat												
	Sadah												
	Rakhyut												
	Dhalqut												
	Muqshan												
	Shaleem												
	Mazyoona												
NORTH BATINAH	Sohar		1				5	4	1		27	3	
	Shinas						3	2			2		
	Liwa										12		
	Saham						6	2			2		
	Khabura						3	2			1		
	Suwaiq						4	3		1	3	8	
SOUTH BATINAH	Rustaq						2		7		5		
	Nakhl						1	1			1	1	
	Wadi Maawil										1		
	Al Awabi						1						
	Musanah						3	1			2		
	Barka						4	3	3	1	8	2	
DAKHLIYAH	Nizwa	1					1		2		7	1	
	Bahla										3		
	Adam						1	1			4		
	Al Hamra												
	Manah										9	1	
	Samail						1		21		1		
	Izki						1		5				
	Bid Bid												
DHAHIRA	Ibri								1		9	2	
	Yanqul	1							1		2		
	Dhank												
	Al Buraimi						2	2			5		
	Sunaina										4		
	Mahda												
NORTH SHARQIYAH	Ibra						1	1	11		4	1 [1]	
	Al Mudhaibi						1				6	3	
	Bidiyah										1		
	Al Qabel												
	Dima Al Tayeen												
	Wadi Bani Khalid												
SOUTH SHARQIYAH	Sur						1		3			1	
	Masirah						1		4		4		
	Al Kamil Wa Al Wafi	1					1	1	4		1		
	Bilad Bani Bu Ali						1	1	9				
	Bilad Bani Bu Hassan												
MUSANDUM	Khasab										1		
	Dibba												
	Bukha												
	Madha												
AL-WUSTAH	Haima										11		
	Duqum												
	Mahoot										3	1	
	Al Jazer												
NATIONAL TOTAL		**3**	**1**	**0**	**1**	**0**	**80**	**37**	**87**	**2**	**245**	**34 [1]**	**0**

Age Distribution of Communicable Diseases

Third Quarter (July to September 2007)

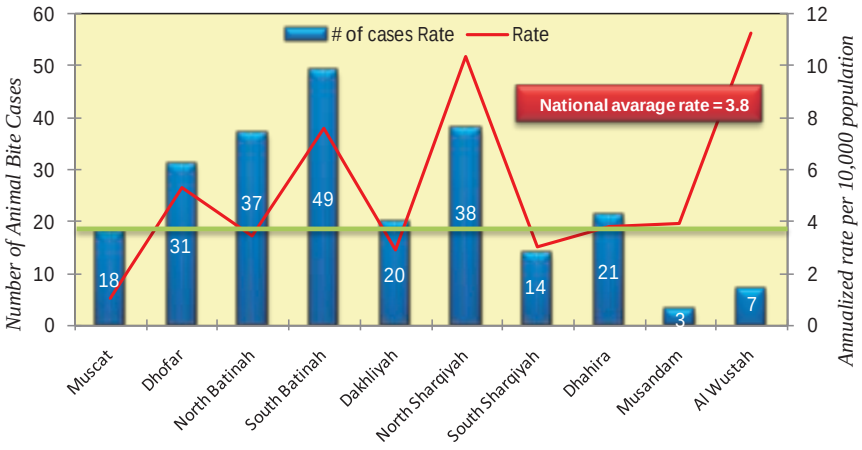
ICD Code	Priority Communicable Diseases	Total	Age Groups in Years								
			< 1	1-4	5-9	10-14	15-19	20-24	25-34	35-45	45+
Group 'A' Diseases											
A00	Cholera	3 (i)	-	-	1 (i)	-	-	-	2 (i)	-	-
A20	Plague	*Never reported*									
A95.9	Yellow Fever	*Never reported*									
A39, 39.0, 39.2-39.4	Meningococcal Infection	1	1	-	-	-	-	-	-	-	-
G00.0	H. influenzae type b, meningitis *(Hib)*	0	-	-	-	-	-	-	-	-	-
A82	Rabies	0	-	-	-	-	-	-	-	-	-
A-15	Pulmonary Tuberculosis (sputum+)	37	-	-	-	4	2	7	7	6	11
	Group 'A' Syndromes										
	Acute Flaccid Paralysis (*AFP*)	3	1	-	1	1					
-	Fever & Rash-Illness	133	55	50	17	4	2	-	4	1	-
-	Clinical	3	2	-	1	-	-	-	-	-	-
B05	Measles (*IgM+*)	1	-	-	-	-	-	-	1	-	-
B06	Rubella (*IgM+*)	0	-	-	-	-	-	-	-	-	-
P35.0	Congenital Rubella Syndrome (*CRS*)	0	-	-	-	-	-	-	-	-	-
U04, 04.9	Severe Acute Respiratory Syndrome	*Never reported*									
	Acute Haemorrhagic Fever Syndrome	0	-	-	-	-	-	-	-	-	-
A02	Food Poisoning (*Infectious origin*)	208	11	36	35	35	27	19	24	16	5
Group 'B' Diseases											
G00.1-9	Bacterial Meningitis *(except Hib & Nm)*	5	2	-	-	2	-	-	-	1	-
A87	Viral Meningitis	2	1	-	-	-	1	-	-	-	
G03	Other Meningitis (*unspecified*)	3	1	1		-	-		1	-	-
	Acute Viral Hepatitis (*Total*)	143	-	44	50	22	5	8	5	3	6
B15	Acute Viral Hepatitis A	87	-	32	37	13	3	2	-	-	-
B16	Acute Viral Hepatitis B	4	-	-	-	-	-	-	2	-	-
B17.1	Acute Viral Hepatitis C	8	-	-	-	-	-	2	-	1	5
B17.0	Acute Viral Hepatitis D (*amongst B+*)	0	-	-	-	-	-	-	-	-	-
B17.2	Acute Viral Hepatitis E	0	-	-	-	-	-	-	-	-	-
B19/B17.8	Acute Viral Hepatitis (*unspecified*)	46	-	12	13	9	2	4	3	2	1
A03.0, A01.4	Typhoid & Paratyphoid Fever	12	-	2	1	-	2	1	1	2	3
A37	Clinical Pertussis [*Sero-confirmed*]	34 [1]	27	6 [1]	-	1	-	-	-	-	-
A71	Trachoma (*active*)	20	-	3	2	8	2	2	2	1	-
A23	Brucellosis *(human)*	25	-	-	10	-	2	4	3	4	2
B55.1	Leishmaniasis Cutaneous (*CL*)	1	-	-	1	-	-	-	-	-	-
B55	Leishmaniasis Visceral (*VL*)	0	-	-	-	-	-	-	-	-	-
B65	Schistosomiasis (*intestinal*)	0	-	-	-	-	-	-	-	-	-
A16	Pulmonary Tuberculosis (*sputum Neg.*)	10	-	-	-	3	2	-	1	-	4
A17-19	Extra-pulmonary Tuberculosis	33	-	-	-	1	5	3	7	7	10
A30	Leprosy	0	-	-	-	-	-	-	-	-	-
B20-24	HIV [AIDS]	10 [8]	-	-	-	-	-	2 [1]	6 [1]	1 [2]	1 [4]

Note:

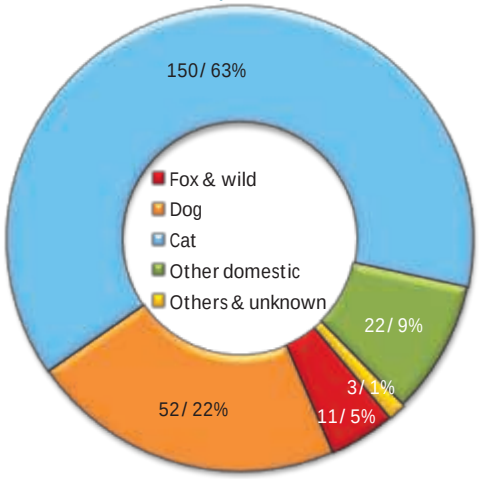
- *The quarterly data are 'provisional' & should be scrutinized & verified by the focal point of communicable diseases (Epidemiologist) at the provincial level. The data would be finalized. after receiving feedback.*
- *The Group C data should be carefully checked & verified for accuracy. Ensure that the case definitions are strictly followed .*
- *Tuberculosis, Leprosy & HIV [AIDS] data are for nationals only.*
- **All notified cases of Malaria are imported cases.*
- *(i) = imported case.*

Animal Bite Surveillance *Third Quarter (July to September 2007)*

Notified Animal Bites by Regions (# & rate)



Notified Animal Bites by Type of Animal (# / %)



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Please write to us concerning your ideas and experiences, both good & bad, sharing them with a wider audience could benefit others, leading to new ideas, techniques and policies and helping to avoid struggling with problems others have already solved.

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