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Original Article

Contribution and Effectiveness of Event-Based Surveillance System in Disease Detection and Containment in Pakistan for Year 2017

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Abstract

Background: Event Based Surveillance (EBS) is the organized and rapid captures of information about events that are a potential risk to public health. Information can be about events related to occurrence of disease in humans or a potential exposure to a risk e.g. contaminated food,-chemicals or radio nuclear events. In Pakistan it is a recent phenomenon and is a compliment to Indicator Based Surveillance (IBS) which is traditionally going on in public sector health care facilities. Literature on effectiveness and contribution of EBS is scarce.
Methodology: A cross sectional study was conducted based on retrospective record review of events reporting in Pakistan. For this purpose, Disease Surveillance and Response Units (DSRU) were identified and descriptive analysis of their reporting per epidemiological week was done.
Results: Public sector health facilities were found the most frequent 75% (n=88) in reported events. Vector borne diseases 49% (n=58) were the most frequently reported event. In 85% (n=101) of events, WHO and/or CDC standard case definitions were used followed by operational cases definition 10% (n=12). System was found operational in all provinces and regions and was linked to laboratory based surveillance in all DSRUs. Median delay was found high in Vaccine Preventable Diseases (Measles and Diphtheria), eight days (range: 0-10 days) and Vector borne diseases (Dengue, Chikungunya and CL) six days (range: 0-8 days). Among all, 90% (n=105) response activities were establishment and/ or strengthening of surveillance system by training of local staff. All investigations were linked with public health laboratory investigation except for food/water borne outbreak 3% (n=4), where no laboratory confirmation of causative organism was found.
Conclusion: Event based surveillance **(**EBS) should be strengthened as a compliment of IBS and its network should be expanded to regional and district levels. Frequent trainings of health care providers at health facilities and informal sources like media should be done to gather credible and timely information of events' time place and persons involved. However, monitoring and evaluation should be integral part to improve event recording and hence targeted response.
Key words: Surveillance, event based surveillance, disease detection, Pakistan,

Introduction

Surveillance is an integral part of disease detection and evaluation of response activities. Standard surveillance definition revolves around systematic collection, analysis and interpretation of health data and dissemination of reports to the relevant public health communities.[1] International Health Regulation (IHR) 2005 depicts an important public health aspect to "detect, assess and respond" to public health events that may pose a health risk at national and/or international level.[2] Scope of disease detection ranges from emerging and re-emerging Infectious diseases and across the borders spread of epidemics and this cannot be done merely depending upon the traditional reporting going on around the world.[3,4]

In countries, where a robust Indicator-Based Surveillance system (IBS), tailored to frequency of reporting exists, outbreak detection and response is easy and timely.[5] However, in resource-poor countries, a relatively new event-

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Authors Contribution

AC conceptualized the project. AC & AA data collection and literature search. AC, AY & AW performed the statistical analysis. Drafting, revision & writing of manuscript was done by AC, AY, AW, RF & AI.

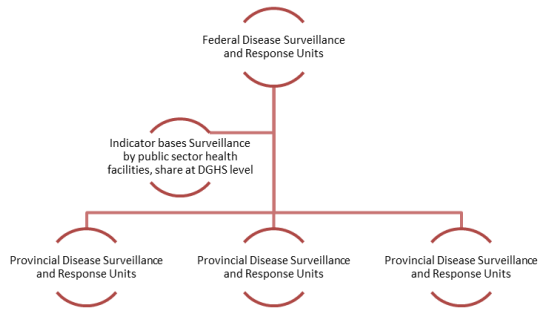
based and syndromic approach has been considered as a compliment to routine IBS to detect infectious diseases to smartly use the resources and save the response time.[6]

Evidence suggests that Event based surveillance (EBS) remained a primary source of information in situations such as mass gatherings, disasters and small scale outbreaks in developing countries so as in Pakistan.[7-9] While in standardized and uniform Indictor-Based surveillance (IBS), events can be missed even if data is analysed on routine basis and its timely reporting is also an issue.

In Pakistan, IBS exists in public sector health facilities and in various vertical preventive programs such as National TB control Program, HIV/AIDS Control Programe but it effectiveness and contributions has not been measured. Limited evidence is available on existence and functions of EBS. Although IBS has been evaluated by researchers so there is a need to determine reporting pattern of diseases detected by EBS, along with geographical network of reporting. Our study was aimed to determine the existence, reporting and timeliness EBS in detection and containment of infectious diseases in Pakistan. Our objectives were to determine the kinds of diseases being reported by the system, the sources of initial information, the type of case definitions used and the time between the first report and response of the system.

Methodology

It was a cross sectional study based on retrospective record review of event based surveillance. Disease Surveillance and Response Units at Director General Health offices were the only point of response to health events. The work force is deployed by FELTP-Pakistan trained epidemiologists, who collect analyse and responds to diseases outbreaks.



All the available records on health events captured in 2017 at Director General Health Services at national and provincial level was reviewed for the period, enlisted to number the diseases reported per epidemiological week, types of the diseases reported during this time period, sources of information, date of reporting and response activities and any novel disease captured during the said time period. Timeliness of system as well as the acceptability at public and private level was assessed by calculating proportions.

Weekly reports from disease surveillance and response units established by field epidemiology and laboratory training programs at directors generals health services at provincial and federal level were the source of data.

Data was double entered and validated into Epi-Data version 3.1 by the researcher herself.

Data was analysed using Epidata analysis (version 3.2). Both descriptive and inferential statistics were reported in frequencies and percentages.

Ethical approval for using data was taken from competent authorities of National Institute of Health (NIH).

Results

Out of total 117 recorded, 75% (n=88) events were reported through public health facilities while no event was reported by NGOs. Among all, 49% (n=58) were vector-borne diseases (Dengue Fever, Chikungunya Fever and Cutaneous Leishmaniasis outbreaks) (Table-1). Events were report from all across the country with highest incidents of Dengue from Sindh, Cutaneous Leishmaniasis from Baluchistan province, including the detection and response activities for novel diseases. In 85% (n=101) of events, WHO and/or CDC standard case definitions were used followed by operational cases definition 10% (n=12). Thirteen mortality audits were done to establish epidemiological link.

System was found operational in all provinces and regions and was linked to laboratory based surveillance in all DSRUs. Median delay was found high in Vaccine Preventable Diseases (Measles and Diphtheria) eight days (0-10 days) and Vector borne diseases (Dengue, Chikungunya and CL) six days (0-8 days) highest delay in reporting was nine days (2-16 days) in reporting of novel disease. However, timeliness in investigation and response was found within the one time incubation period of all diseases i.e.1day (Table-2) 90% (n=105) response activities were establishment and/ or strengthening of surveillance system by training of staff followed by community awareness sessions of staff and of surveillance system.

Vaccination campaigns were conducted in only 35% (n=41) of events. All investigations were linked with public health laboratory investigation except for food/water borne outbreak 3% (n=4), where no laboratory confirmation of causative organism was found.

Table 1: Description of health related events reported by year 2017, using event-based surveillance in Pakistan.

	n (%)
Total number of events reported	117
Reporting pathway	
Public	88 (75)
Private	18 (15)
Community	1 (1)
NGO*	0
Media and others	11 (9)
Type of Disease	
Zoonotic	12 (10)
Vector borne	58 (49)
VPD†	41 (35)
Food/Water borne	4 (3)
Novel disease	2 (2)
Case definition used	
Standard	101 (85)
Operational	12 (10)
Syndromic	4 (3)
Mixed	1 (1)

*NGO = Non-Governmental Organization,
†VPD =Vaccine Preventable Diseases
Standard = According to WHO and/or CDC
Mixed = Mix of standard and/or operation and syndromic

Table 2: Timeliness of reporting and response in event based surveillance in Pakistan 2017.

Disease type	*Delay in Reporting Median (min-max)*	*Delay in Investigation Median (min-max)*
Zoonotic	1 days	1 day (0-1)
Vector borne	6 days (0-8)	1 day (0-4)
VPD†	8 days (0-10)	1 day (0-3)
Food/ Water borne	1.5 (1-2)	1 day (1-2)
Novel Disease	9 days (2-16)	0 days (0-0)
†VPD= Vaccine Preventable Diseases		

Discussion

Major components leading to plausible public health interventions are collection, analysis and timely dissemination of information.[10,11] EBS, event-based risk communication and risk assessments are the main points to work on to improve country capacities in these areas. Our assessment of EBS showed that public sector health facilities are the major contributor of the information regarding new health events. Our results compliment the findings of other authors [12] that event based surveillance will be a critical alternatives/compliment to traditional IBS system going on in public sector and will provide invaluable information of outbreaks. Major reports were found from routine surveillance going on in the provinces/regions. Role of private sector and NGOs are minimal in reporting the health events. While, media had some contribution in reporting novel diseases or up surge in on going outbreaks. We recommend that a comparison study should be conducted to estimate the strengths and weaknesses of surveillance systems going on in public and private sector and their capacity in disease detection and response. The time to time systematic evaluation of surveillance systems ensures the quality of information with alert verification, threshold determination and dissemination of alerts to concerned communities.[10,11] In this regard, integration of all existing systems is mandatory for smart use of scarce resources of the country.

Certain reports from media or other non-traditional sources may be difficult to verify but it can be proved beneficial in probing the diseases event and preparing for response activities. Incorporating bio-surveillance, either non-traditional or laboratory based have also been proven complimentary to traditional source of information.[13]

Like many other low and middle income countries, Field Epidemiology Training Program of Pakistan was found the biggest contributor in event based surveillance through well trained intervention epidemiologists working in the government sector and hence serving as an essential ancillary unit of routine surveillance.[14] Reporting of zoonotic diseases is an essential component of early warning system. Also recommend that One-health approach should be taken into account while incorporating the EBS in IBS.

Timeliness of reporting and response is critical when it comes to infectious disease surveillance. Delay in reporting of infectious diseases with high mortality, social concerns and/or threat to mass spread should be minimized. Such disease should be prioritized in reporting to health authorities to device control measures and save the population at risk. We found that the monthly and weekly reporting was done indiscriminately from in IBS at all levels; however response time was short through Disease Surveillance and Response Units (EBS).

Our study has limitations that no comparison group was chosen to analyse the strengths weaknesses against a set criteria, only one year data was chosen so seasonality of disease reporting was not assessed and vertical programs were not explored for their events reporting systems.

Periodic analysis of existing surveillance systems as well as integration of event based surveillance into indicator based one and certain vertical programs are the need of time. Since majority of notifiable diseases are being reported with timely response, strengthening the system will help in implementation of IHR regulation. In low and middle income countries, sustainability in infectious disease surveillance, outbreak and response can be attained by incorporating non-traditional sources of information and device an early warning system. Government need to direct its efforts to uplift the lag in prevention and forecasting outbreaks by producing more epidemiologists.

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Conflict of interest: None declared.

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