AUDIT AND EVALUATION OF THE ACUTE FLACCID PARALYSIS SURVEILLANCE SYSTEM IN KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

OBJECTIVE: To evaluate acute flaccid paralysis (AFP) surveillance system in Khyber Pakhtunkhwa (KP), Pakistan.

METHODS: This descriptive cross-sectional study was conducted at directorate-general health-services office Peshawar, Pakistan from 10th November– 31st December, 2012. AFP Surveillance System of KP was evaluated by using a validated tool "Centre of Disease Control (CDC) Updated Guidelines for Evaluating Public Health Surveillance System 2001". Review of surveillance documents/reports, records and interviews of stakeholders were carried out using semi-structured questionnaire. Specified surveillance system attributes were assessed objectively. Sensitivity and positive predictive value (PPV) was calculated using WHO estimates for KP. Data was analyzed and inferences were drawn according to guidelines in the study tool.

RESULTS: System was found easy to operate so declared simple as collecting all necessary information. It was found flexible with ability to accommodate other diseases like neonatal Tetanus & Measles. As active surveillance is done and private-sector is involved, so it was a representative system. System is stable as ownership was found among all stakeholders at all levels. Average timeliness of different indicators like proportion of cases with two adequate stool specimens collected at least 24-hours apart and within 14 days after onset of paralysis, arriving at the laboratory in good condition was 84%. Case sensitivity was 100% while PPV was 2.78%. Overall system was ranked as good as per criteria.

CONCLUSION: AFP surveillance system though vertical, operating through partners, is well-established and has an impact by identifying all AFP cases. It is a disease-based system and is meeting its objectives effectively.

KEY WORDS: Acute Flaccid Paralysis (Non-MeSH), Poliomyelitis (MeSH), Polio (MeSH), Surveillance System, Khyber Pakhtunkhwa (Non-MeSH), Pakistan (MeSH).

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INTRODUCTION

Surveillance is known as information for action and is defined as, 'the ongoing systematic collection, collation, analysis and interpretation of data and the dissemination of that information to those who need to know so that appropriate action can be taken.[1,2] The evaluation of surveillance system is, 'the process that attempts to determine as systematically and objectively as possible, the relevance, effectiveness and impact of activities in the light of their objectives.[3]

International Scenario:

Polio in history trace backs to 1580 – 1350 BC as highlighted in one of the Egyptian carvings, showing a priest with a crippled leg strengthening the belief that this disease was present thousands years ago. In 1789, British Physician Michael Underwood has described polio clinically for the first time, calling it 'debility of the lower extremities'. Later in 1840, German Dr. Jacob Heine described for the first time that polio may be contagious. In 1843, the first established outbreak of polio was documented in USA. Afterwards in 1908, Austrian physicians Landsteiner and Popper have claimed that 'polio may be caused by a virus'. New York in USA has witnessed the first recorded polio epidemic in 1916. The years 1955 and 1961 have seen the development of first vaccines against polio – an inactivated (killed) injectable polio vaccine (IPV) by Dr. Jonas Salk and a 'live' oral polio vaccine (OPV) by Dr. Albert Sabin.[4-6]

Humans are the only reservoir of poliovirus and virus transmission occurs from person-to-person via fecal-oral route and infects mostly the non-immune children especially in areas of poor sanitation. Majority of polio infections are asymptomatic as only less than 1% of all the poliovirus infections cause paralysis leading to permanent disability.[7-9] Polio, if occurs, is a paralyzing disease for life. In the period from 1988-2010, the world has spent more than $9 billion in the polio eradication efforts, and has succeeded in reducing the incidence of the disease to a large extent and it is estimated that if the

eradication efforts succeed in stopping the transmission in the next five years, financial benefits of up to $40-50 billion could be achieved in the next 15-20 years.[10,11]

Regional Scenario:

Since the start of the Global Polio Eradication Initiative (GPEI) in 1988, the number of polio cases, have been considerably reduced and now by the end of year 2014 the disease is only confined to 03 endemic countries (Pakistan, Afghanistan and Nigeria) but since 2008 there is an upward surge in the cases and the same trend is seen in the province of Khyber Pakhtunkhwa (KP) of Pakistan which is incidentally one of the high transmission zone for the wild polio viruses.[12]

In south east Asia post-cold war conflicts started in Afghanistan in 1991 leading to Afghan refugees persistent stay in the neighboring countries. This situation had serious impact on the health systems of developing countries like Pakistan and Iran.

National Scenario:

As an effective vaccination campaign, endorsed by The WHO, is going on in Pakistan for the last 20 years. Epidemiological assessment is as equally important in emergency situations as treatment of endemic diseases, especially in long-term camps. The public health actions can be directed if effective disease surveillance and outbreak response is done in these long term camps.

Local Situation and Rationale of the Study:

As KP is considered to be high risk regarding polio virus transmission so this study was planned to evaluate the effectiveness of "The Surveillance System" for AFP /Polio in KP. It is also a zone where majority of the cases were reported annually.

METHODS

Study Site:

This study was conducted in Provincial EPI Office at the Directorate General Health Services, Peshawar, KP, Pakistan.

Study Duration:

This study was conducted in November to December of 2012.

Study Tool:

1. Updated Guidelines for Evaluating Public Health Surveillance System 2001, a validated tool which was developed by CDC Atlanta, and
2. A semi-structured questionnaire was used in this study which was developed for interviewing the major stakeholders identified in process.

Provincial and Federal teams were interviewed about the system's output and completeness for one complete calendar year i.e. 2011. Surveillance data of the year 2011 held by the Polio Eradication Initiative of The World Health Organization (PEI-WHO) was also reviewed. The reports and formats were also witnessed which were used in the AFP surveillance. Annual surveillance data and interviews with the stakeholders were the main sources of data for this evaluation.

The following stakeholders were identified and engaged at the federal, provincial, district and facility levels.

i. The Deputy Director (Provincial Manager) EPI (Extended programme on immunization)
ii. Team Leader PEI-WHO
iii. Assistant Director EPI (Provincial Focal Person PEI) KPK
iv. Data Analyst
v. District Coordinators
vi. Area Coordinators
vii. Polio Eradication Officers
viii. Computer Operator/Record Keeper EPI Peshawar
ix. General Practitioners
x. Pediatricians of Peshawar
xi. The National Surveillance Coordinator
xii. The Federal Surveillance Officer PEI-WHO Islamabad.

Using the evaluation tool, check list was developed and all the variables were assessed. Interviewing the major stakeholders through semi-structured questionnaires and using following steps as mentioned in the guideline were adopted. The collected data of interviews and discussions was organized, entered and analyzed using SPSS Version 16 followed by interpretation for drawing inferences. Qualitative and quantitative assessment of the surveillance system attributes and interview data was done. The AFP Surveillance System attributes like simplicity, flexibility, acceptability, stability, data quality, sensitivity, and predictive value positive, representativeness and timeliness were assessed using descriptive statistics. The results for these system attributes were transcribed by following the CDC guidelines and the measures considered for evaluation were graded as poor, average, good and excellent (Table I). A comprehensive analysis of the surveillance data obtained through desk and field reviews was also done. Variations in the functioning of the system are presented in tabulated form. Recommendations were given for the identified gaps to the concerned stakeholders in order to bring improvements in the surveillance system.

RESULTS

The results of this evaluation were obtained against the system attributes described in the Updated Guidelines for Evaluating Public Health Surveillance System 2001.

System Attributes

Following list of system attributes were assessed in this study:

1. Simplicity of the System
2. Flexibility
3. Data Quality
4. Acceptability
5. Stability
6. Sensitivity
7. Positive Predictive Value
8. Representativeness
9. Timeliness

Details of various system attributes are given in Table I.

TABLE I: THE RESULTS OF THE EVALUATION OF THE AFP SURVEILLANCE SYSTEM IN KPK BASED ON THE SYSTEM ATTRIBUTES AS PER CDC GUIDELINES 2001.

S. No.	System Attributes	Results
1	Simplicity	Good
2	Flexibility	Excellent
3	Data quality	73%
4	Acceptability	Good
5	Stability	Good
6	Sensitivity	100%
7	Predictive Value Positive	2.78%
8	Representativeness	70%
9	Timeliness	84%

Key: CDC Criteria for grading Surveillance system attributes.
Excellent: >80%; Good: 61%-80%; Average: 50%-60%; Poor:< 50%

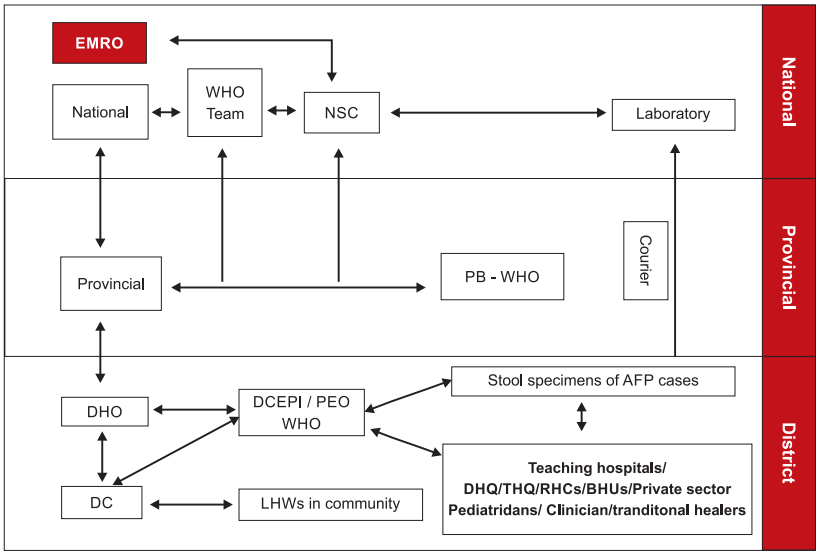

Figure 1: Organogram of AFP Surveillance System, Pakistan
Key: DC-District Coordinator, DHO-District Health Officer, EPI-Expanded Program on Immunization, PEO-Polio Eradication Officer, WHO- World Health Organization, LHW-Lady Health Worker, NSC-National Surveillance Cell, EMRO- Eastern Mediterranean Regional Office.

Simplicity:

The "Simplicity" of AFP surveillance system of KP can be graded as "Good" as per CDC guidelines because the case definition used for selection of cases is uniform throughout the program and the data is establishing that the case definition is met. The case reporting Performa provides all relevant information regarding demographic, health seeking behavior, exposure, contacts and treatment. Therefore; the system attribute of AFP surveillance system was graded as good.

Flexibility:

Other vaccine preventable diseases like Neonatal Tetanus (NNT) and measles have also been included in the AFP weekly reporting since 2009. The "Flexibility" of AFP Surveillance system can be graded as "Excellent" as CDC guidelines can easily accommodate new health related events like it has already started doing so by inclusion of NNT and measles reporting in the weekly zero reporting since 2009. The staff is skilled enough and can accommodate changes in the case definition or technology without much costing to the program.

Data Quality:

Data from active and passive (zero reporting) sites is in hard copies and manually transferred to the district office and transferred electronically as well as through courier to the provincial office within the given time frame. Follow up and updating of data on regular bases is the key feature of the program. Management of data including time spent on transferring, storing, backing up and data editing is done at each level within the given time frame i.e. weekly and monthly basis. So the data quality can be graded as good. The "Completeness" of the case files of all the reported 145 AFP cases in 2011 from district Peshawar was observed as 70%. The completeness of the 124 zero reporting sites of district Peshawar was observed as 75% and some errors were found in its filling as well.

Acceptability:

Staff training is needed to increase the capacity for detection and management of the cases effectively. The general practitioners and health healers do not have good capacity due to lack of proper trainings. Time spent on maintaining the system is not uniform as most of the staff feels overburdened due to overwork. So we can grade acceptability as good.

Person / Organizations participation rate is good both from health care providers and community. Facility / hospital are reporting cases regularly during the stipulated time.

Sensitivity:

Sensitivity of a system is its ability to detect all cases of a disease; it is calculated by taking proportion of the expected

cases to detected cases. It helps a system with low resources to timely detect any abnormal disease trend in a community. The "Sensitivity" of AFP surveillance system was found to be 100%, which can be considered "Excellent". This high sensitivity is due to the reason that the case definition has been kept very broad and no potential case can be missed. Increased / high sensitivity also provides a greater opportunity to detect remaining polio cases by reporting a syndrome (Acute Flaccid Paralysis) which should include all polio cases.

Positive Predictive Value

The existing surveillance system has the capability to study trends and detect outbreaks including (ability to monitor changes in the number of cases over time). The numbers of reported AFP cases from KPK province in 2011 were 1076 against the expected number of 206 cases for the <15 years target population of 10.2 million at the rate of ≥ 2 cases per 100,000 children < 15 years of age.

Our study found that Predictive Value Positive (PVP) of the system is "Poor" (<3%) according to CDC criteria. In evaluating PVP, the main emphasis is on the confirmation of cases reported through the surveillance system. The number of confirmed polio cases in 2011 in KPK province were 30, while the reported AFP cases during the same period were 1076, therefore; the PVP for Polio only was 30/1076 × 100 = 2.78%, otherwise; PPV for AFP being a syndrome could not be calculated, as there are no diagnostic laboratory tools to confirm AFP. The high sensitivity and the low PVP also suggests that the AFP surveillance system is sensitive enough to detect all cases and the polio eradication initiatives are in the right direction.

Timeliness:

The "Timeliness" of the system is "Very Good". The reported %ages of different AFP surveillance indicators of KPK for 2011 are; a) cases with adequate specimens reported within the specified time – 86%, b) 60-days follow-up – 81%, c) cases detected within 7 days of onset – 77%, d) cases investigated within 2 days of notification – 94%. The average of the timeliness of these indicators is 84%.

Stability:

Finally the information from the facilities to districts and onward to provincial office are available and the data from the district is sent within time. The system has the ability to collect, manage and provide data without any disruption and delay. This surveillance system has the ability to be operational when it is needed. The operational cost is borne by the WHO, but apart from one Polio Eradication Officer (PEO) at each district, rest of the human resource at the district level is from the public sector. Apart from the district human resource, the facilities utilized are also government owned. KP is the only province in the country that has budgetary allocation for EPI as part of the regular health budget. Therefore; any lack / shortage of external resources might not affect the stability of the system.

DISCUSSION

AFP surveillance is one of the four major strategies of the Polio Eradication Initiative. Pakistan has a well-functioning and sensitive AFP surveillance system at the national, provincial and district levels. The information received through AFP surveillance in Pakistan continues to lead decisions for conducting Supplemental Immunization Activities (SIAs) and ensure rapid response to outbreaks, facilitates focused vaccination strategies, leading to the interruption of wild poliovirus transmission. The AFP Surveillance System in KPK is well organized and its organized structure is important for priority setting, planning, resource mobilization and allocation; prediction and early detection of epidemics; monitoring and evaluation of disease prevention and case response activities (Figure 1). AFP surveillance is thus a vital part of the PEI, providing crucial information to guarantee cost effective health strategies. A study conducted in Ghana by Odoom JK et al[13] stressed on the importance of the role played by the AFP Surveillance System in making the country Polio free.

Our study showed that AFP Surveillance system of KPK is simple, flexible and acceptable to the people of KPK in contrast to the AFP Surveillance system of Zimbabwe which is though acceptable but more complicated and costly and less sensitive.[14] Similar findings from another study by Macama A et al.[15] Gambo Aliyu and colleagues showed that an approach to eradicate polio in Northern Nigeria is by engaging Muslim clerics in influencing community perceptions.[16] Pakistan along-with Nigeria is among the three remaining countries which are still endemic for polio. A study conducted on the Surveillance system of Nigeria by Bassey BE and co-authors showed that the surveillance performance was of high levels though with some challenges in the cold chain system, the continuation and sustained AFP case detection, prompt investigation and response.[17]

CONCLUSION

The AFP Surveillance System is meeting its objectives of detecting the outbreaks and responding to them while the system's sensitivity was found to be 100% which shows it is not missing any case due to clear case definition and staff training.

This study revealed that the system is very useful in early detection of an outbreak, monitor disease over time, place and person and provide information for action to policy makers. The system was found to be simple with enough flexibility to allow other diseases without drastic changes in time, human resources or finances. This surveillance system already had an impact in reducing the number of polio cases to 57 in December 2012 from 1147 cases reported in 1997.

The AFP surveillance system in the KP province is considerably established. It was revealed that the existing staff is

overworking, which may hamper their capability to sustain a good quality of surveillance. All attributes were ranked well in the evaluation which reflects an efficient and effective AFP Surveillance System in KP. However, failure to eradicate polio from Pakistan is very serious issue and needs further research and multidimensional approach for making Pakistan a polio free country.

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CONFLICT OF INTEREST

Authors declared no conflict of interest

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

MS: Concept & study design, acquisition of data, drafting the manuscript, final approval of the version to be published

IH: Analysis and interpretation of data, critical revision, final approval of the version to be published

FA: Drafting the manuscript, final approval of the version to be published,

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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