Evaluation of the Acute Flacid Paralysis (AFP) Surveillance System in Bikita District Masvingo Province 2010

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Abstract

Background: AFP is a rare syndrome and serves as a proxy for poliomyelitis. The main objective of AFP surveillance is to detect circulating wild polio virus and provide data for developing effective prevention and control strategies as well planning and decision making. Bikita district failed to detect a case for the past two years.

Findings: A total of 31 health workers from 14 health centres were interviewed. Health worker knowledge on AFP was low in Bikita. The system was acceptable, flexible, and representative but not stable and not sensitive since it missed 1 AFP case. The system was not useful to the district since data collected was not locally used in anyway. The cost of running the system was high. The district had no adequate resources to run the system. Reasons for not reporting cases was that the mothers were not bringing children with AFP and ignorance of health workers on syndromes captured under AFP.

Conclusion: Health worker’s knowledge on AFP was low and all interviewed workers needed training surveillance. The system was found to be flexible but unacceptable. Reasons for failure to detect AFP cases could be, no cases reporting to the centres, lack of knowledge on health workers hence failure to recognise symptoms, high staff turnover.

Keywords: Acute flacid paralysis, Surveillance, Bikita

Introduction

Surveillance is defined as ongoing, systematic collection, analysis, and interpretation of data and the distribution to those who need to know [1]. This means the dissemination of information that results from properly executed surveillance to those who plan public health programmes, to those who develop local, regional, national and international policies, to those who implement intervention and carry out public health action, to the public who need to have information in order to evaluate public health practice, and to those who need the information for personal action for their health and well being [1]. Surveillance whether active or passive is a dynamic process. It is fundamental to public health decision making and subsequent action. Many factors can change and as a dynamic process surveillance often needs adjustments. Evaluation of surveillance is advisable on a cyclic basis and should be done objectively. No single surveillance is perfect but a combination of approaches work best [1].

A major pre requisite for polio free certification by the World Health Organization (WHO) is that the local AFP surveillance system successfully detects one case of non polio acute flaccid paralysis(AFP) per 100 000 children below fifteen years per annum and that no polio cases are occur for three consecutive years [2]. The goal of AFP surveillance is to detect polio virus within the population and communities and provide accurate data for developing appropriate supplementary vaccination and other preventive strategies. AFP surveillance adequacy and quality is evaluated by the following key performance indicators recommended by WHO;

a) Timeliness and completeness of reporting, at least 80% of expected routine weekly AFP surveillance reports should be received on time, this has to
include zero reporting where no AFP cases are experienced. Representativeness has to be considered on the distribution of reporting centers in terms of geographical and demographical characteristics of the country or district.
b) Completeness of case investigation, all AFP cases should have a complete clinical and virological investigation and at least 80% AFP cases having two adequate stool specimens (24–48 hours apart) these are collected for enterovirus studies within fourteen days of onset of symptoms.
c) Laboratory performance, all virological studies on AFP cases must be done in a laboratory certified by the Global Poliomyelitis Laboratory Network (GPLN).
d) Sensitivity of surveillance, at least one case of non polio AFP should be detected annually per 100 000 population under the age of fifteen years.
e) Completeness of follow up, at least 80% of AFP cases should have a follow up examination for residual paralysis at 60 days after the onset of paralysis [3].

AFP surveillance in Zimbabwe
Zimbabwe and other African countries adopted the polio eradication initiative of the WHO at the National Expanded Programme on Immunisation Meeting Held in Windhoek, Namibia 2004. They adopted the following targets in their AFP surveillance as a way towards attaining polio free certification.

- An AFP detection rate of at least two cases for every 100 000 children below the age of fifteen tears. This was done so as to increase the index of suspicion and hence increase chance of detecting AFP towards eradication.
- There should be at least 90% stool adequacy for all samples of suspected AFP cases. These should be sent to the National Virology laboratory. The requirements are two specimens per case. The specimens should be 24 hours apart, and should be collected within 14 days of onset of paralysis. The specimen should be kept at temperatures of between 2 and 8 degrees Celsius and arrive at the laboratory within 72 hours of collection [4].

There was a AFP surveillance improvement in Zimbabwe from 2000 to 2003 with a consistent detection rate of 80% and above. There was also a stool adequacy improvement from 78 to 83% by end of 2003. There was a decline of the indicators from 2004 onwards [5]. In 2011 the Ministry of Health EPI report reported that the country was failing to meet their target since 2004 [5].

Objectives of the surveillance system
1. To provide information to guide the development of appropriate strategies towards eradication of polio.
2. To identify areas of transmission of Poliovirus.
3. To investigate all cases of AFP and prove absence of wild polio virus in the country.
4. To measure the impact of intervention such as routine immunization and supplementary immunization activities against polio.

Under the syndromic approach to AFP, a case is defined as any person aged 14 years or younger who presents with a history of recent floppy, inability to use limbs irrespective of what the final outcome will be, or any person of any age diagnosed of polio by a medical officer. This excludes cases due trauma or injury. The following criteria is used for diagnosis;

1. Polio virus found in stool specimen of the case or contact.
2. Death, especially 10 days after onset of symptoms and if difficulty in breathing was reported by the deceased.
3. Presence of residual paralysis after 60 days of symptoms and
4. Patient lost to follow up.

There is great need for 60 day follow up because, if it is not done it may result in misdiagnosis of a false positive case to be a positive case. All cases of AFP cases must be notified, correct case investigation forms filled accurately and properly for surveillance purposes and also adequate stool specimen taken for virological tests.

According to World Health Organization (WHO) “Acute flaccid Paralysis (AFP) detection rate of two per 100 000 children under 15 years and stool adequacy rate of at least 80% and above” is required for a good surveillance system. The country is looking forward to be certified polio free by WHO, and failure by Bikita district (<15 yr population 102000) to detect at least 2 cases per year since 2007 is very disturbing, may lead to the country’s failure to be certified polio free and lead to so many undetected cases of polio in the community. It is against this background I intent to evaluate the surveillance system of Bikita.

Materials and methods
A descriptive cross-sectional study was carried out in Bikita district (worst performing district) of Masvingo province. Fourteen of the twenty two clinics randomly selected using the lottery method where each centre was assigned a number and the numbers put in a box, the numbers where then pick after shuffling until 14 clinics
were picked and four of the five hospitals were purposively selected. Health workers involved in the system were conveniently sampled (those on duty at the selected centres) and interviewed. A total of 31 health workers who were found on duty were recruited into the study. The District Nursing Officer (DNO), Health Information Clerk (HIC), District Environmental Health Officer (DEHO) and the District Medical Officer (DMO) were interviewed as key informants.

A pre tested interviewer-administered questionnaire was used to elicit information from health workers to determine their knowledge on the operations and usefulness of the surveillance system. Cost of running the surveillance system was done by listing all the resources required to run the surveillance system and then these resources were costed as per the prevailing price (in US Dollars) as reported by purchasing department in Bikita district. A checklist was used to assess the system’s stability resources available for use in the surveillance system. Records of patients 0–14 years who were admitted at the hospital were reviewed to check on how many AFP cases were seen how many were captured by the surveillance system and how many were missed. Epi info was used to calculate proportions and measures medians.

Permission to carry out the study was obtained from the Medical research Council of Zimbabwe, Health Studies Office, PMD Masvingo and DMO Bikita. Written consent was obtained from all study participants. Confidentiality was assured and maintained throughout the study.

**Findings**

Fourteen of the 22 health facilities were randomly selected into the study. Thirty one participants out of a total two hundred were enrolled into the study. Majority (74.2) of participants were females and were nurses. The median years in services was 16 (Q1 = 14, Q3 = 20) and the median age of participants was 36 (Q1 = 28, Q3 = 46) as shown in Table 1 attached. Knowledge on AFP surveillance was low among health workers in Bikita as shown in Table 2. Knowledge on time required to completely investigate a case and when to do follow up was low 32% and 29% respectively.

**Usefulness**

Despite the fact that the system did not detect cases in the past two years (2008 & 2009), the DMO, DNO, DEHO and 96% of the health workers reported the system to be useful. Only two participants mentioned that they did not know whether the system was useful or not. Meetings were not held in the district with only three health workers reporting having held meeting though the minutes were not seen, in addition there was no local use of AFP surveillance data. However only 1 centre reported that they use the data to do awareness campaigns.

**Simplicity**

Of the 31 health workers we interviewed only two (6.7%) had filled in a AFP case notification form. For those two who filled the AFP notification forms both reported taking less than 20 minutes to fill the forms and that the forms are not difficulty to fill. However 31(100%) felt they need to be trained in filling the AFP surveillance forms.

**Acceptability**

Out the 31 health worker we interviewed 30(96.8%) felt that it was their duty to filling AFP notification forms,

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**Table 1 Demographic characteristics of health workers in Bikita district 2010**

| Variable               | Category          | Total | %  |
|------------------------|-------------------|-------|----|
| Sex                    | Male              | 8     | 26.8|
|                        | Female            | 23    | 74.2|
| Years in service       | Median years in service = 16 (Q1 = 14, Q3 = 20) |       |    |
| Age in years           | Median age in years 36 (Q1 = 28, Q3 = 46) |       |    |
| Occupation             | Doctors           | 1     | 3.2 |
|                        | Matron            | 1     | 3.2 |
|                        | Sister in Charge  | 3     | 9.7 |
|                        | General Nurse     | 11    | 35.5|
|                        | Primary Care Nurse| 13    | 41.9|
|                        | Lab tech/Scientist| 1     | 3.2 |
|                        | Health Inspector  | 1     | 3.2 |

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**Table 2 Knowledge of AFP surveillance by health workers; Bikita district 2010**

| Variable                               | Total | %  |
|----------------------------------------|-------|----|
| AFP acronym                            | 29    | 93.5|
| Number of forms to be filled           | 18    | 58.1|
| Target population                      | 18    | 58.1|
| Where to sent forms                    | 26    | 83.9|
| Specimen collected                     | 28    | 90.3|
| Number of specimen taken               | 23    | 74.2|
| Times specimen collected               | 22    | 71.0|
| Temperature at which specimen transported| 27  | 87.1|
| Time within specimen should reach National laboratory | 20  | 64.5|
| Time required to completely notify and investigate AFP case | 10  | 32.0|
| When to follow up a case               | 9     | 29.0|
and 30(96.8%) also felt they are still willing to continue with the duty of filling AFP surveillance forms.

**Stability**
Out of the 31 participant in the study only two (6.5%) reported having AFP notification forms at their health centres, none of the participants were trained in AFP/EPI surveillance, 31(100%) reported using personal cell phone to contact the district office. On transportation of specimen 14(45.2%) reported using hospital vehicle the rest use public transport. Only two centres had a functional telephone.

**Flexibility**
All the 31(100%) respondents reported that the AFP notifying forms were flexible since they have space for other conditions.

**Representativeness**
Majority of the centres were rural health centres with the exception of the two mission hospital. There are no private clinic or hospital in the district.

**Data quality**
Since there were no forms that were filled, data quality assessment was not done.

**Timeliness**
In 2008 and 2009 the system failed to detect any case so timeliness was not measured.

**Sensitivity**
Reviewed records of inpatients for the under 15 years 1 case was found at a mission hospital. Therefore the system was not sensitive.

Only two of the 14 visited clinics had a functional telephone in Bikita district. The total anticipated cost of effectively running the AFP surveillance system in Bikita is US$10384 per year as shown in Table 3 and would be covering the above stated activities. Hyper inflation is no longer anticipated since the country is now using a more stable currency the United States dollar(USD). The cost of sending forms and other items is based on the prevailing charges by public transport in the district since most clinics use public transport for this activity.

All the health workers reported that no AFP cases occurred during the period under review that’s why they never reported the cases. On the other hand 10(32.2%) reported that mothers in the community were not bringing their children with AFP to the clinic, furthermore 19 (61%) reported that they were not aware of syndromes under AFP.

**Discussion**
The study revealed that knowledge of AFP surveillance system operations were low in Bikita district except on four areas, the AFP acronym (93.5%), type of specimen to be collected (90.3%) and where to sent notification forms (83.9%) and temperature at which specimen is transported (87.1%). Such low knowledge of a vital surveillance system like AFP surveillance is detrimental to public health and this might be attributed to the poor performance of the surveillance system in Bikita.

Lack of knowledge in the syndromes classified under AFP may have led to low index of suspicion and a lot of cases besides the one picked during records review in the study might have been missed/misdiagnosed by the health workers in the district. There was also shortage of AFP notification forms in the district with only two (6.2%) reporting having the notification forms on the day of data collection. This is contrary to a study in South Africa 2001 by Durrheim et al. where they found out that hospital based nurses were excelling in zero reporting, detection of priority syndromes and prompt appropriate response [6]. Our study findings are also consistent with findings by Ndiaye et al. 2003 in Niger, where they found out that hospital based nurses were excelling in zero reporting, detection of priority syndromes and prompt appropriate response [6]. Our study findings are also consistent with findings by Ndiaye et al. 2003 in Niger, where they found out that hospital based nurses were excelling in zero reporting, detection of priority syndromes and prompt appropriate response [6].

None of the 31 health workers that we interviewed in Bikita were trained in AFP surveillance and yet are expected to do the surveillance system, this may be another reason for poor performance of the system in Bikita. Lack of AFP knowledge was also reported to be a reason for failure to detect cases as shown in Table 4 attached. These finding are also supported by a study by Ndiaye SM et al. on the value of community participation on surveillance, Ndiaye reported that lack of training health workers on surveillance and knowledge were the main challenges to the system [7]. However in a

| Activity                     | Calculation unit cost in USD | Total cost US dollars |
|------------------------------|------------------------------|-----------------------|
| Printing and stationery      | 15 for 22 health facilities per month × 12 | 3960                  |
| Repairs and maintenance      | 1000 telephones and two way radio communication | 1000                  |
| Sending forms to the next level | 6 per RHC/per month × 12 | 1584                  |
| Training and workshop        | 50×60 x1 workshop per year | 3000                  |
| Vehicle maintenance          | 200×3 times per years       | 600                   |
| Support and supervision      | 20×3×4                      | 240                   |
| **Total cost**               |                             | **USD 10384**         |

*Table 3 Anticipated cost of operating the AFP surveillance system in Bikita district Masvingo Province 2010*
since they do not get airtime. Those who once used personal cell phones this may prevent them from calling
(100%) reported using telephones but they are using public transport to send forms to next level, while 31
surveillance purposes 17(54%) of the participants use port and telephones for communication with district of-
that threatened stability of the system was lack of trans-
tions and decision making. The financial resources
was not being used to plan public health activities or ac-
was not sensitive similar findings were reported by
Chimamise et al. 2009 in AFP surveillance study in
Mberengwa were they found out that the system was not sensitive [10].
All study participants reported that the system was useful to the district although they are not holding meet-
ings and use data locally for public health action or con-
tinuous improvement (Total Quality Management), they
are just gathering data and storing in files and no use is
made of the data, this will lead to poor planning of pub-
lic health activities and actions. No feedback is given to
the reporting centres from the district or province. Feed-
back helps reporting centres know their performance and even other centre’ performances and brings about competition and motivation. The non use of surveillance data for public health action leads to actions that are not evidence based and waste of resources and time.
The cost of running the system is very high given the
country’s economy and there is need for partnership in
AFP surveillance. The CDC states that in 2003 98 mil-
ion dollars was provided and 47 million was used for surveillance purposes [12] this shows how crucial sur-
veilance is for polio eradication.

AFP surveillance system in Bikita was acceptable, flexible, not sensitive ad representative, however health worker knowledge on operations of the system was low. However on the other hand the system was not stable, and simple. Data that was collected through the system was not being used to plan public health activities or ac-
tions and decision making. The financial resources
needed to run the system were huge however it is mainly funded by WHO and UNICEF. Resources to run the sur-
veilance system are not available in the district There
was lack of knowledge on syndromes classified under
AFP. We therefore recommend;
i) The District Health Executive (DHE) to train all
health workers on AFP surveillance and Integrated
Disease Surveillance and Response (IDSR).

Table 4 Reasons for not detecting AFP cases in Bikita
district 2010

| Reason                                      | Frequency n = 31 | %  |
|---------------------------------------------|------------------|----|
| Mothers not bringing their children with AFP| 10               | 32.2|
| No AFP cases occurred in the catchment area | 31               | 100 |
| Not aware of syndromes classified under AFP | 19               | 61  |
ii) DMO/PMD to source resources needed for EPI.
iii) DHE to ensure motorized Environmental Health Technician (EHT) assist in reaching hard to reach population.
iv) All should clinics to hold surveillance meetings and use data for public health action at local level.
v) Involve community in AFP surveillance.

Competing interests
We declare no competing interests.

Authors’ contributions
KWP designed protocol, collected data, analysed data, wrote report. RF collected data, analysed data, wrote report. MT analysed data, edited report. MM analysed data, developed protocol. All authors read and approved the final manuscript.

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References
1. Losos JZ: Routine and sentinel surveillance methods. East Mediterr Health J 1996, 2(1):46–50.
2. WHO: Acute Flaccid Paralysis Surveillance: the surveillance strategy for poliomyelitis eradication. Weekly epidemiological record No. 16. Geneva: WHO; 1998:113–120.
3. De Quadros CA: Strategies for disease control/eradication in the Americas, In Vaccination and World Health. Edited by Cutts FT, Smith PG. West Sussex: Wiley and Sons; 1994:17–34.
4. The National Polio Expert Committee: NPEC report. Zimbabwe; 2005 (Unpublished).
5. Government of Zimbabwe: Ministry of health and child welfare. Expanded program on immunisation report 2011. 2011.
6. Durrheim ND, Harris BN, Ogunbanjo GA: Polio eradication—the validity of surveillance indicators. Eur J Trop Med Int Health 2003, 8(5):386–391.
7. Ndiaye SM. The value of community participation in disease surveillance. Niger; 2003. http://www.ncbi.nlm.nih.gov/pubmed/12746380.
8. Varughese P: Acute flaccid paralysis. Canadian paediatric society. Canada; 1999–2005. http://www.docstoc.com/docs/48034774/Acute-Flaccid-Paralysis.
9. Chiba Y, Xu A, Li L: Poliomyelitis surveillance in Shandong Province, China, 1990–1992. Bulletin of the World Health Organization number 72; 1994:915–920.
10. Chimamzie A, Chadambuka A, Chimuroro A: Analysis of the acute flaccid paralysis surveillance system in Mberengwa District, Midlands Province. 2009 (unpublished).
11. WHO: Recommended standards for surveillance of selected vaccine-preventable diseases. Geneva; 1998.
12. CDC MMWR: International notes on emerging polio-free zone- Southern Africa. 1994. http://www.cdc.gov/health/diseases.htm accessed on 09/10/2010.
13. World Health Organization: Global polio eradication initiative strategic plan. WHO: CDC and UNICEF.