

## Polio Outbreak Response; Evaluation of Acute Flaccid Paralysis Surveillance in Karbala, Iraq

### Abstract

**Background:** After the last outbreak of wild polio infection in Baghdad, April 2014, the Iraqi response to the outbreak was activated through solid surveillance of Acute Flaccid Paralysis (AFP) case detection in all governorates to interrupt the circulation of poliovirus in addition to the strengthening of Expanded Program on Immunization. This response to the last outbreak has to be evaluated independently to ensure effective mopping and surveillance to stop further outbreak all over the country including the holy province Karbala. We aimed to evaluate the response to the last polio outbreak by evaluating surveillance activities of acute flaccid paralysis cases whether they meet the recommended standards. **Methods:** Observational evaluation study conducted through August 15–25, 2015. Checking of Acute Flaccid Paralysis surveillance (AFP) activity through detection of nonPolio acute flaccid paralysis rate and immediate reporting with adequate stool sampling, and 60 days follow-up examination four districts of the province. The reviewing checked whether the surveillance system in Karbala met the global standards required for stopping wild poliovirus circulation. The evaluation included immunization coverage rates and active National Immunization days of oral polio vaccine campaigns. **Results:** During the period of review, the core surveillance indicators in Karbala met the globally set standards. Percent of acute flaccid paralysis cases with specimens reached to the reference laboratory within 3 days was 100%. Nonpolio cases was 4.2 per 100000 population under 15 years of age through week 33 of the year 2015. Eleven AFP cases were reported from all districts of Karbala among Population of children under 15 years of age. The percentage of cases with adequate specimens was 100% in 2015 versus 93% in 2014. The percent of AFP Cases notified within 7 days of paralysis onset (during first 33 weeks) was 100% in 2015 versus 87% in 2014. **Conclusions:** As Karbala response to polio outbreak met the target global indicators and standards of polio surveillance. The circulation of the virus in this locality was interrupted and further transmission of the disease is unlikely.

**Keywords:** AFP surveillance, mopping campaigns, NIDs, polio outbreak

### Introduction

Iraq is still free from confirmed wild polio virus infection since the last case of poliomyelitis in 2014. When a single child remains infected, the children of the country become at risk of polio virus infection. As global eradication of polio fails this strongholds could result in 200 000 new cases every year within 10 years, all over the world.<sup>[1]</sup>

In 2014, witnessed reporting of two confirmed polio cases in Iraq, both belonged to Baghdad - Resafa province. The first one at Al Shaab District (10<sup>th</sup> February.), and the second one at Al Madaien district (7<sup>th</sup> April.). Occurrence of one case of polio represents an outbreak.<sup>[2]</sup> Following the elapse of one year after the detection

of last polio case, Iraq has been removed from the list of polio infected countries, but is still at highest risk for importation and resurgences of wild polio virus. Through polio surveillance, 289 new AFP cases were reported during the first 33 weeks of the year 2015 over all governorates. Adequate stools tested negative for polio and non polio enteroviruses at national polio laboratory.<sup>[1,2]</sup> Overall surveillance indicators meeting the international standards of non-polio AFP Rate was 3.2 per 100,000 children below 15 years and 87% of cases with adequate specimen. The immunity profile of the AFP cases showed 87% coverage rate with four and more of oral Poli vaccine (OPV) in 2015. Coverage rate for three and more OPV doses was 94%.<sup>[3,4]</sup>

The majority of internally displaced population (IDPs) to Karbala; are displaced

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from hot spots within neighboring provinces. From the eastern districts of Anbar moving into Baghdad and Karbala.<sup>[5,6]</sup> So Karbala might be a high risk area. It is a holy city visited by million Muslims annually and its surveillance system needs to be checked.

Karbala is a governorate of 1,176,687 population located in middle of Iraq south of Baghdad. It was one of six Iraqi provinces selected by to be reviewed by independent team to evaluate the solidity of AFP surveillance activities and strength of polio eradication strategies including immunization coverage. The aim of this review is to evaluate the AFP surveillance response and the associated immunization coverage activities to interrupt the future possibility of wild polio virus circulation.

## Methods

On behalf of occurrence of the last two confirmed cases of poliomyelitis in Baghdad 2014, The AFP surveillance system and coverage of expanded program on immunization (EPI) were evaluated through comparing the estimated activities with recommended standards and indicators planned by WHO. The evaluation process was conducted through August 15-25, 2015. This governorate received thousands of refugees from Anbar and Ninewa which requires an active efficient surveillance system to detect AFP cases and monitoring of immunization coverage.

The evaluation process including first; collection of data about detected cases of AFP and checking the required investigation forms and follow up assessment of each case registered by the unit of surveillance. second; checking the registered data of immunization coverage rates for target diseases of expanded program on immunization in the four district of Karbala including oral polio vaccine and comparing difference in coverage rate of the years 2014 and 2015 to evaluate the response to polio outbreak.<sup>[7]</sup> To ensure this effect, the current study on Karbala response to interrupt polio virus transmission was conducted by the team to investigate the reported data of AFP surveillance and checking whether they meet the standards and key indicators suggested by World Health Organization.

The study included reviewing of surveillance data collected by the four districts of Karbala through visiting AFP surveillance unit in Public Health Department.<sup>[8]</sup> The national recommended indicators of evaluation included; outbreak response indicators, effectiveness of partner coordination during outbreak response, AFP surveillance sensitivity, quality of routine immunization, assessment of need for additional supplemented immunization activities (SIA) with special focus on known high-risk areas and populations. The core AFP surveillance standards in Karbala that have been reviewed for evaluation include: Percent of AFP Cases notified within seven days of paralysis onset in 2015 versus 2014 for the same period of time, percent of cases with adequate stool sampling

to the reference laboratory within three days, Non polio AFP cases per 100000 population under 15 years of age, and sixty days examination. As a part of evaluation, the team selected three cases from line list and checked them in the documented reports. Stool sample collection, storage and shipment process were checked whether they meet recommended standards.<sup>[9]</sup> Two stool samples were collected (24 hours apart) from each AFP case. One case was visited at home to check the documentation. The first stool specimen was taken at hospital or at home for second stool sample when the child leaves hospital. The collected stool specimens should be sent in a good condition to reference polio laboratory in Baghdad with documented investigation form.

All the indicators and standards of the year 2015 were calculated during the reviewing process and checked through electronic and line lists of data to compare them with the reported estimates of the year 2014. The surveillance indicators including immunization coverage were checked regarding standards reported by WHO and checked whether they achieved the Iraqi goals.<sup>[10,11]</sup>

## Results

Regarding surveillance system in Karbala province, it was sensitive enough to detect all transmission. The percentage of AFP cases Investigated within 48 hours of notification (during first 33 weeks of the year) was 100% in 2015 versus 78% in 2014. Total eleven cases were reported in 2015. None of the AFP cases in 2015 is below one year of age and 8 cases are 2-5 years of age. Missing an infant with AFP is still probable. Both Private and governmental pediatricians were well aware of reporting system.

Regarding Documentation: The case files were well maintained, copy of line-list and spot maps were available, in addition to laboratory results, follow up forms and maintaining records of zero reports. All AFP cases were clinically assessed and discussed with pediatricians and neurologists. Standard case definition of AFP was well understood with differential diagnosis of Traumatic Neuritis and Gillian Barrie Syndrome. There was need to carry out case by case review to minimize possibility of any misclassification.

The primary health care centers and hospitals in the four districts submitted weekly communicable disease report which included AFP cases. To ensure timeliness, AFP zero reports were collected by telephone followed by the a written report. Freezers are available in any storage under security situation like road blockade. The AFP indicators were proved to meet the WHO and national standards [Table 1]. The core AFP surveillance indicators in Karbala met the globally set standards. Percent of AFP cases with specimens reached to the lab within 3 days was 100%. Non polio AFP cases was 4.2 per 100000 population under 15 years of age through week 33 of 2015. Eleven

AFP cases were reported from all districts of Karbala where total population of children less than 15 years of age were 529509. The registered AFP cases with adequate specimens were 100% in 2015 versus 93% in 2014. The percentage of cases notified within 7 days of paralysis onset (during first 33 weeks of calendar year) was 100% in 2015 versus 87% in 2014. No confirmed polio case and reported case detection rate of acute flaccid paralysis was 4.2 per 100000 population and non polio enterovirus was detected in 5% of investigated cases [Table 1].

### Quality of supplementary immunization activities (SIAs)

The immunization unit at Public Health department had been visited and reviewed. A qualified micro-plans were prepared for each immunization campaign. Average target was 100 children per team daily as a minimum number. The supervisor to team ratio was 1:7 as any other governorates. The teams spent enough time to ask about those absent children to be revisited during mopping. The recording of “not available children”, made implementation of a revisit strategy. Four campaigns of NIDs (National immunization Days) and two SIAs (Supplementary Immunization activities) followed the outbreak in 2014 versus two NIDs and one SIA during first five months of 2015 in Karbala. The coverage percentage exceeded the target of ministry of health [Figure 1].

### Routine immunization performance

After the outbreak of 2014, the expanded program on immunization (EPI) was strongly activated to the target of 90%. The reported coverage of BCG, oral polio vaccine (OPV) dose 3, measles and first dose of MMR

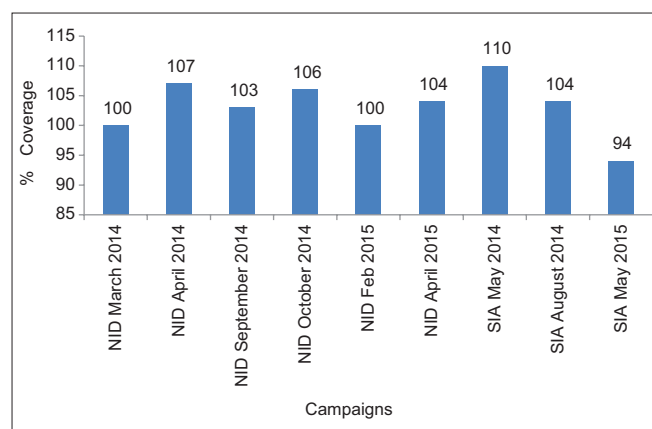


Figure 1: Coverage (%) of oral polio vaccine through National immunization days (NIDs) and supplementary immunization activities (SIAs) campaigns in Karbala province 2014-2015

had been improved in comparison with coverage of 2014 [Figure 2].

Vaccination status of non polio AFP cases shows 91% received more than 5 doses of OPV. The Coverage of OPV 3 children under 1 year of age was 72% in 2014 and more than 80% in 2015. The reported coverage (%) by each district for OPV3 was >80% except Al -Hur District (<80%). As immunization services were available in most of PHC centers, the dropout rate was calculated and lists of defaulters were prepared to visit the defaulters by a team on two days a week. The coverage of most available vaccination like BCG, OPV 3, measles and second dose of Rota virus vaccine showed clear drop during the holy days of visiting Karbala by millions of muslims every year specially in Al Hur District in spite of availability of the required vaccines [Figure 3].

### Discussion

The external review of Karbala revealed that active surveillance is carried out by provincial surveillance staff unit through active visits plan. All AFP cases in the line-list and those reported from the hospital were validated in our hospital visit. All registration units at hospitals regularly visited by the surveillance director in the communicable disease department.<sup>[12]</sup> The hospital was visited regularly with frequency of at least once per week. In each district, surveillance focal person visited all PHCs to search for AFP cases during a week. These reports were available for all the districts. Feedback like copy of lab results were not provided to the doctors who reported an AFP case.<sup>[13]</sup> There is need to strengthen feedback system to the pediatricians once an AFP case is reported. Advisory meetings workshops about AFP surveillance have been

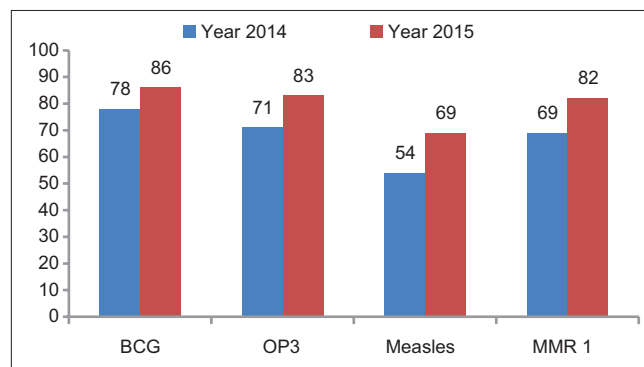


Figure 2: Immunization coverage (%) of BCG, Oral polio vaccine 3<sup>rd</sup> dose, measles and MMR in Karbala province through 2014 and first 6 months of 2015

Table 1: Acute Flacci Paralysis surveillance indicators for Karbala province 2015 (Week 33)

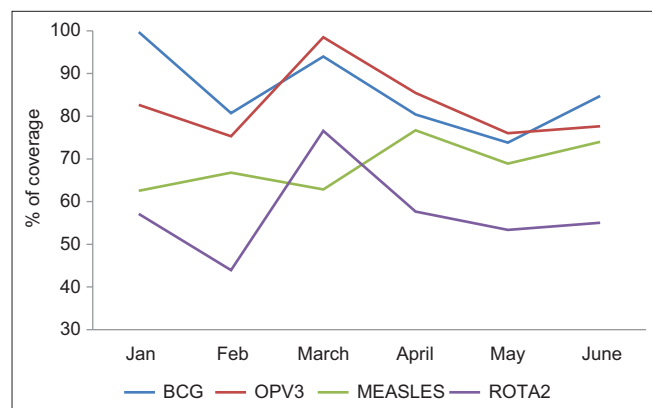
Indicators	Population estimate <15 yrs	Number of reported AFP cases	Confirmed polio case	Compatible case	Per 100000 NP AFP rate	% adequate stool specimens	Cases notified within 7 days	% reached in the lab within 3 days	% enterovirus	% zero does AFP	Zero Dose AFP cases
Estimates	529509	11	0	0	4.2	100%	%100	100%	5	0	0

held at hospitals annually which enhance awareness and to maintained appropriate actions.

Karbala surveillance unit met the standards of case detection rate with adequate stool sampling in internally displaced population (IDPs) camps. The selected mothers from hospital and IDPs camp reported that vaccination team visited their house to vaccinate their children and good efforts were made to let mothers be aware of the vaccination importance for their children in prevention the target diseases.<sup>[14]</sup> Scattered sporadic houses outside cities were visited by the NIDs/SIAs teams. There was some improvement in immunization coverage of third dose of oral polio vaccine. Moreover, the supplementary campaigns had a role in strengthening of coverage.

There is update micro-plans and mapping of area of nomadic settlements.<sup>[15]</sup> Also special monitoring plan for high risk groups in general has been developed for the next campaigns. The role of private health sector and sensitization efforts: Five pediatricians we met at private clinics and hospitals, had adequate knowledge on AFP and reporting procedures. Resident doctors at both governmental and private hospitals and GPs were not aware of AFP surveillance and reporting technique. Seminars and clinical meetings for Training and orientation sessions were conducted since the report of outbreak. In teaching hospitals like pediatric hospital, where new doctors join on rotation there is need to plan for regular orientation seminars.

The expanded program on immunization (EPI) in Karbala is well organized and supported by international organizations, mainly WHO, to make vaccines available, but the frequent holy occasions in Karbala made the EPI and surveillance system exposed to some difficulties in detection of more AFP cases in spite of achieving the target rate. The immunization coverage was significantly improved in the first half of 2015. Moreover several campaigns of national immunization days (NIDs) and supplementary immunization activities (SIA) strengthened



**Figure 3: Reported infant vaccination coverage; Al Hur district; by BCG; Oral polio vaccine 3<sup>rd</sup> dose; Measles and Rota vaccines by month; first 6 months of 2015**

the coverage of oral polio vaccine to exceed the global target (90%) and some of the coverage rates exceeded 100% The EPI will be updated to include injectable polio vaccine by 2016 in Iraq.<sup>[16]</sup>

This evaluation review verified that Karbala surveillance and immunization activities showed an increase in coverage rate of vaccination like oral polio vaccine, BCG, Measles, MMR and the second dose of rotavirus vaccine as a response to outbreak of Poliomyelitis in April 2014 especially in Al Hur District. Vaccination coverage in Al Hur District was promptly activated through national immunization days and supplementary activities campaigns. However, funding for payments of vaccination teams was limited which may inversely affect the coverage activities. This can affect the forthcoming campaigns and has to be dealt with urgency. The immunization coverage with oral polio vaccine exceeded the national target which represents the cornerstone in interruption of wild polio virus circulation.<sup>[17]</sup>

## Conclusions

Considering these findings, the reviewing team concluded that an ongoing missing transmission of (wild) poliovirus in the reviewed areas of Karbala is unlikely. Moreover active surveillance and ZERO-reporting networks met the standards including non polio case detection rate of 4.2/per 100000 population, adequate specimens more than 90% and other performance indicators with Polio vaccine coverage more than 95%.

The strengthened EPI activities with SIAs for refugees local communities and foreigner people can prevent poliovirus circulation. For these findings, probability of transmission in districts of Karbala (with refugees) can be ruled out confidently. Availability of vaccine is the key resource in increasing vaccine coverage and likelihood of stopping polio virus transmission.

## Recommendations

The active surveillance supervision in this locality should be properly documented and all diagnosed children as suspected cases should be highlighted and discussed with attending pediatrician. Feedback like copy of laboratory results were informed to the doctors who reported an AFP case. The authorized person in Karbala should strengthen feedback activities to the pediatricians when an AFP case is reported.

Conducting several meetings and workshops to enhance awareness of pediatrician, physiotherapists, neurologists and other related health care provider about active surveillance of AFP cases and ensure reporting adequate stool sampling practice. Regarding the new resident doctors during rotation there is need to put a plan for regular case detection seminars.

Emphasizing to update micro-plans and mapping of area of nomadic population. Special monitoring plans are needed

for high risk groups in general citizens and nomads to be prepared before the next campaign.

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### Conflicts of interest

There are no conflicts of interest.

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