

ORIGINAL RESEARCH

Defining Polio: Closing the Gap in Global Surveillance

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Abstract

BACKGROUND By late 2012 the Global Polio Eradication Initiative (GPEI) had nearly eradicated this ancient infectious disease. Successful surveillance programs for acute flaccid paralysis however rely on broad governmental support for implementation. With the onset of conflict, public health breakdown has contributed to the resurgence of polio in a number of regions. The current laboratory based case definition may be a contributory factor in these regions.

OBJECTIVE We sought to compare case definition rates using strict laboratory based criteria to rates obtained using the clinical criteria in modern day Syria. We also sought to examine this distribution of cases by sub-region.

METHODS We examined the World Health Organization (WHO) reported figures for Syria from 2013–2014 using laboratory based criteria. We compared these with cases obtained when clinical criteria were applied. In addition we sought data from the opposition controlled Assistance Coordination Unit which operates in non-Government controlled areas where WHO data maybe incomplete. Cases were carefully examined for potential overlap to avoid double reporting.

FINDINGS Whilst the WHO data clearly confirmed the polio outbreak in Syria, it did so with considerable delay and with under reporting of cases, particularly from non-government controlled areas. In addition, laboratory based case definition led to a substantial underestimate of polio (36 cases) compared with those found with the clinically compatible definition (an additional 46 cases). Rates of adequate diagnostic specimens from suspected cases are well below target, no doubt reflecting the effect of conflict in these areas.

CONCLUSIONS We have identified a gap in the surveillance of polio, a global threat. The current laboratory based definition, in the setting of conflict and insecurity, leads to under diagnosis of polio with potential delays and inadequacies in coordinating effective responses to contain outbreaks and eradicate polio. Breakdown in public health measures as a contributing factor is likely to result in a resurgence of previously controlled infectious diseases. The clinical definition should be reinstated to supplement the lab-based definition.

KEY WORDS polio, vaccination, conflict, Syria, clinical diagnosis, acute flaccid paralysis

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The near eradication of polio is one of the greatest public health successes of our time. By the end of 2012, after 25 years and a multibillion-dollar campaign by the Global Polio Eradication Initiative

(GPEI), 99% of the poliovirus had been eliminated from the world and the number of countries with endemic polio had been reduced from 125 to 3. Eradication appeared imminent after the successful interruption of transmission in India in 2011, and only 223 cases were recorded in 5 countries in 2012. Of the 3 wild-type polioviruses, type 2 was eradicated in 1999 and type 3 has been undetected since November 11, 2012.

Yet over the course of 2013 the numbers almost doubled, with 416 new cases of type 1 wild polio in 8 countries. In 2014, the collective toll was 359 cases in 9 countries. The virus was detected in the sewers of several other countries that had previously eliminated polio: Palestine, Israel, Egypt, and Brazil, the latter in June 2014 after more than a 20-year absence. The type 1 virus not only is the most virulent—causing the most serious paralysis and the worst epidemics—but also has the highest ratio of paralytic to subclinical infection (1 in 200). Rather than being eradicated by the end of 2014, as per the target, polio now has a foothold on 3 continents. It has a persistent presence in Africa, it has re-emerged in the Middle East after more than a decade of absence with the outbreak in Syria and spread to Iraq, and it continues to flourish in Pakistan and Central Asia, threatening India's new polio-free status.

As the lead partner of the GPEI, the World Health Organization (WHO) is responsible for the polio eradication strategy. In late April 2014, WHO convened an emergency committee under the International Health Regulations (IHR) to address the international spread of polio. A week later, WHO declared that the conditions for a public health emergency of international concern had been met. Since then, this public health emergency has been renewed 4 times, most recently on February 27, 2015.

There are numerous reasons for this giant step backward, including attacks on polio vaccinators in Pakistan, myths about the debilitating effects of the polio vaccine in Somalia, and armed conflict interrupting public health efforts in Syria and Pakistan. Last October, the Independent Monitoring Board (IMB) report highlighted the dismal failure of the current strategy and made several critical recommendations to address some of these problems, singling out suboptimal surveillance.¹

An overlooked but key factor in the resurgence of polio is the current case definition. A precise case definition is of great importance because it is *the cornerstone of successful surveillance and thus directs*

appropriate response measures. Notably, the eradication of smallpox, a much easier disease both to detect (every person infected had an obvious rash) and to prevent (1 vaccination was sufficient for 5 years) relied at every stage on accurate surveillance.

When does a child have polio? Ordinarily, the answer is straightforward: when a child presents with acute onset of flaccid paralysis (AFP) and a WHO-accredited laboratory within the Global Polio Laboratory Network confirms that poliovirus is present in his or her stool. This is the current and sole definition used by WHO and its GPEI partners to inform the global eradication effort.

In the past, a clinical definition was used as a highly sensitive screen, but with limited specificity because a small number of other diseases can also cause flaccid paralysis. Under normal circumstances, when children are guaranteed access to healthcare and doctors can order investigations at will, this laboratory-based definition provides high diagnostic specificity. Sensitivity, however, is immediately constrained if laboratory access is compromised. In layman's terms, clinical diagnosis alone catches all cases of polio but is over-inclusive given that some are "false positives" as a result of other causes of AFP, whereas laboratory testing alone excludes false positives but misses many true cases in situations in which best-practice laboratory testing is difficult or impossible.

The limits of a laboratory test are evident in situations of armed conflict where insecurity hinders the collection and transport of a stool sample to a laboratory. War can also prevent an afflicted child from even seeing a doctor during the period when poliovirus is present in the stool. Currently, that is the grim reality in many areas of Syria, where polio reappeared 18 years after it was eliminated.² Yet the global health community has not yet adapted to a situation in which the Syrian military deliberately attacks hospitals, clinics, ambulances, and other parts of the healthcare system and has forced tens of thousands of doctors to flee the country.^{3,4} Rather than being a cooperative state concerned about the health of its citizens, the Syrian government uses disease and deprivation as an element of its internal war strategy against the civilian population in areas of the country considered politically unsympathetic. This includes the deliberate targeting of water treatment plants and the withholding of chlorine supplies needed to provide safe drinking water—an effective method of reducing transmission of polio and other waterborne diseases. After several years of indeterminate national

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