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Review

Public health response to the silent reintroduction of wild poliovirus to Israel, 2013–2014

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ABSTRACT

During 2013/14, Israel witnessed the silent reintroduction and sustained transmission of wild poliovirus type 1 (WPV1) detected through routine environmental surveillance performed on sewage samples. The public health response to silent poliovirus transmission in a population with high inactivated polio vaccine (IPV) coverage poses an emerging challenge towards the 'End Game' of global poliovirus eradication. This paper reviews the risk assessment, risk management and risk communication aspects of this poliovirus incident. Special emphasis is placed on the use of scientific data generated in the risk assessment phase to inform the public health response. Reintroducing a live vaccine in supplemental immunization activities in response to transmission of WPV or vaccine-derived poliovirus should be considered close to the 'End Game' of polio eradication, especially if targeting the population at risk is feasible. Such circumstances require a comprehensive contingency plan that will support the generation of important public health evidence at the risk assessment stage, thereby allowing to tailor the risk management approaches and underpin appropriate risk communication. **J. Moran-Gilad, CMI 2016;22:S140**

Introduction

Poliomyelitis remains an imminent threat to global health. Despite global eradication efforts, which have resulted in a dramatic decrease in poliovirus circulation and paralytic poliomyelitis worldwide [1], active poliovirus transmission is still evident in several parts of the world, especially in Asia [2,3]. During 2013, circulation of wild poliovirus type 1 (WPV1) has been detected in Israel through routine environmental surveillance without the reported occurrence of any clinical cases [4]. This unusual presentation of reintroduction of wild poliovirus into a country exclusively using inactivated polio vaccine (IPV) for a decade and in the absence of paralytic poliomyelitis for over 25 years, posed many public health challenges and generates lessons to be learned from this incident that are important for polio eradication near the 'End Game'. This article will therefore review the polio incident in Israel, 2013/2014 through outlining the risk assessment, risk management and risk communication aspects of the incident. Special emphasis will be placed on the use of scientific data generated throughout the investigation to inform the public health response.

The incident

Poliomyelitis has been a notifiable disease in Israel since the early 1950s, almost since its establishment in 1948. Polio vaccination was introduced into the routine immunization schedule in Israel during the late 1950s, starting with IPV (1957–60), followed by trivalent oral polio vaccine (tOPV, 1961–89), a combined IPV/tOPV regimen (1990–2004), and since 2005, exclusively IPV (like the remainder of the WHO Euro region) [5,6]. In the years preceding the incident, the national coverage of IPV among the Israeli population has been around 95%, similar to many other vaccines used routinely in this country [7].

Poliomyelitis was last reported in Israel during 1988, when an outbreak of 15 paralytic cases occurred. [8]. This incident resulted in a large national supplemental immunization activity (SIA) using tOPV. Following this incident, a routine environmental surveillance programme was set up in Israel in 1989. This programme involves periodic (monthly) testing of sewage samples obtained from designated sentinel sites across Israel, covering ~35%–40% of the

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Israeli population [9,10]. Samples from those large catchment areas are preferentially obtained through in-line continuous samplers generating 24-h composite samples from sewage treatment facilities (STFs). Environmental surveillance of polio in Israel is complemented by surveillance for acute flaccid paralysis (AFP) in children <15 years of age, as mandated by the WHO. This environmental surveillance system has successfully detected previous events of non-sustained cross-border reintroduction of wild poliovirus into Israel [11]. The ability of this surveillance system to detect and trace back individuals excreting vaccine-derived poliovirus in large urban settings provided another indication of its analytical performance and practicability [10].

The aforementioned environmental surveillance programme has detected WPV1 in routine sewage samples obtained from an STF near the Bedouin city of Rahat (c. 60,000 residents) in the Negev (southern Israel) during early spring 2013 in the absence of any reports of clinical cases or evidence for increased AFP activity in Israel. Following confirmation of the finding by the Central Virology Laboratory of the Ministry of Health, a national public health response has been initiated [4] and was coordinated by a national outbreak control team. Parallel to the national response, international authorities, including WHO, US CDC and the European Centre for Disease Prevention and Control were notified and consulted. The risk assessment, risk management and risk communication strategies employed throughout the incident are described below and summarized in Table 1 and Fig. 1.

Fig. 1. The response cycle to polio incident. The risk assessment phase informed both risk management and risk communication, which also influenced each other. The entire process is iterative as feedback from risk management and risk communication is used to fine tune the risk assessment during the course of the response.

Risk assessment

The risk assessment phase involved a combination of public health actions in an attempt to verify the risk posed by the outbreak strain and the level of protection of the population, to assess the spread of the virus through clinical and environmental laboratory surveillance and to look for clinical cases (Table 1).

Table 1
Risk assessment, risk management and risk communication aspects of silent wild poliovirus circulation and their related response elements

Risk category	Public health action	Corresponding response element
Risk assessment	Confirmation of laboratory findings	Repeated testing of local sewage
		Confirmation at reference laboratory
	Characterization of poliovirus	Molecular characterization of virus
		Molecular typing of the virus
		Neurovirulence assessment
	Degree of protection against polio in population	Evaluation of national versus local vaccine coverage
		Survey of specific protection (neutralizing antibodies)
		Laboratory assessment of specific protection
	Surveillance of poliomyelitis	Extension of AFP surveillance to all ages
		Active surveillance at hospitals
		Addition of aseptic meningitis surveillance
	Monitoring of circulation	Intensified local/regional environmental surveillance
		Enhanced national environmental surveillance
		Faecal sample survey in the region
	Expert consultation	At national and international levels (WHO, ECDC, US CDC)
Risk management	Catch-up immunization of at-risk individuals	Catch-up IPV for healthcare workers
		Catch-up IPV for sewage workers
		Outreach for immunization of migrants
	Improvement of vaccine coverage	Active outreach for completion of IPV immunization in children at epicentre
		Active outreach for booster IPV immunization in adults at epicentre
		Active outreach for completion of IPV immunization in children in other communities
	Local/regional SIA using bOPV	Administration of bOPV to at-risk population (per age and vaccination status criteria) at local level
		Repeated administration of bOPV to at-risk population at regional level
	National SIA using bOPV	Administration of bOPV to at-risk population at national level
	Monitoring of efficacy	Continued environmental surveillance
		Expanded environmental surveillance at national level
		Weekly sampling of faecal excretion around epicentre
	Routine immunization	Continued utilization of bOPV in routine immunization schedule
Risk communication	Improved personal hygiene	Media campaign for awareness to personal hygiene measures
	Safety monitoring	Enhanced surveillance and communication of vaccine adverse events
	Communication to healthcare professionals	Distribution of written materials
		Organization of professional meetings
		Engagement of national medical societies
	Communication to the public	Immunization campaigns in local and national media
		Interaction through social media
		Establishment of a national call centre
		Engagement of opinion leaders in segregated communities

AFP, acute flaccid paralysis; bOPV, bivalent oral polio vaccine; IPV, inactivated polio vaccine; SIA, supplemental immunization activity.