Poliovirus returns to the UK after nearly 40 years: current efforts and future recommendations

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ABSTRACT

On 22 June 2022, the UK Health Security Agency declared a 'rare national incidence' after finding poliovirus in sewage in London for the first time in nearly 40 years. Although no cases of the disease or accompanying paralysis have been documented, the general public's risk is considered minimal. However, public health experts recommend that families are up to date on their polio vaccines to decrease the chance of harm. This article discusses the epidemiology of poliovirus by examining the aetiology of the disease and current mitigation policies implemented to prevent the spread of type 2 vaccine-deceived poliovirus in the UK. Finally, by examining the clinical features of polio, which range from mild gastroenteritis episodes, respiratory sickness, malaise and severe paralysis type, this article offers an advice on particular therapies and tactics to avoid poliovirus outbreaks and other future outbreaks.

INTRODUCTION

Poliomyelitis is an infectious disease that belongs to the family of *Picornaviridae*. It has a varied clinical mechanism, from mild to severe cases. Poliovirus diseases have been linked to crippling deformities in thousands of individuals globally.[1]

Poliomyelitis has not been reported in the UK or many other European nations for at least 10 years.[2] However, the 1950s saw the highest prevalence in the UK.[3] Poliomyelitis has been effectively controlled in the UK since the advent of the oral polio vaccine (OPV) created by Sabin and the inactivated poliovirus vaccine (IPV) created by Salk[3] in the late 1950s.[2]

Even after 5 years without paralytic cases, the probability of silent transmission may still be in the range of 0.1%–1.0%, according to computer simulations of poliovirus transmission in low-income and middle-income countries. However, the UK is even more likely to be transmission-free after 10 years without paralytic cases.[4] Even though it is generally acknowledged that OPV could slow the disease's progress in Israel, live virus vaccinations are not universally supported. Israel's situation is comparable to that of the UK, where strong coverage and the switch to IPV occurred concurrently.

A virus may be spreading undetected in the UK. No current UK environmental poliovirus surveillance is in place, with many contacts between varying populations (where there have not been any cases for at least 10 years) and Pakistan (where polio is a public health concern because it has never been eradicated) residing in the UK.[3] This is in contrast to Finland, India, Egypt and many other countries where sewage surveillance is playing a larger role and is regularly conducted. Therefore, such sewage surveillance should undoubtedly be initiated in the UK.[5]

Several new surveillance studies are suggested in the UK to demonstrate the absence of wild polioviruses, which may be sufficient to meet certification requirements.[2] Every nation will profit greatly from the option to discontinue poliovirus vaccination programmes. However, this will not happen until strong data are demonstrating the absence of wild polioviruses in circulation worldwide. The standards of evidence required will be high. The UK must rise to such a challenge.[2]

Epidemiology and outbreak of polio in the UK

Throughout history, the UK has had its fair share of poliomyelitis cases. During the early 1940s, the annual poliovirus cases and notifications were just shy of 1000 cases.[6] This number skyrocketed to a staggering 8000 cases annually in the early 1950s.[6] On introducing the Sabin vaccine in 1962, these numbers declined to less than 1000 cases.[7]

The last poliovirus case in the UK was in 1984 (see figure 1).[1 7] However, the UK has been declared poliovirus-free since 2003, the WHO considers the UK poliovirus-free, with a low risk of transmission due to widespread vaccination. Therefore, with reports of the poliovirus being detected in the sewage system of the northern UK, the nation's 'polio-free' status is in jeopardy.[8]

Aetiology of poliovirus

Poliomyelitis is an illness brought on by poliovirus. This virus is typically spread by infected individuals through contact with their faeces. Poliovirus infects individuals via the faecal-oral route.[9] In addition, transmission through consuming contaminated food or drinking contaminated water has been reported. However, this rarely occurs as transmission via the faecal-oral route is predominant.[10] Moreover, the primary causes of contracting this virus may also include poor sanitation and hygiene, a lack of water and other elements that might contribute to poor hygiene.[11]

After viral entry into the body, poliovirus multiplies in the small intestine of the infected individual and occasionally in the pharynx.[11] Poliovirus may also be observed in the blood for short periods, disseminating throughout the body before reaching the central nervous system (CNS).[12] Poliovirus replicates rapidly in the CNS, such as the spinal cord or the brain stem, where temporary or permanent paralysis ensues depending on the amount of damage caused. As a result, the disease manifests paralytic poliomyelitis, where respiratory arrest followed

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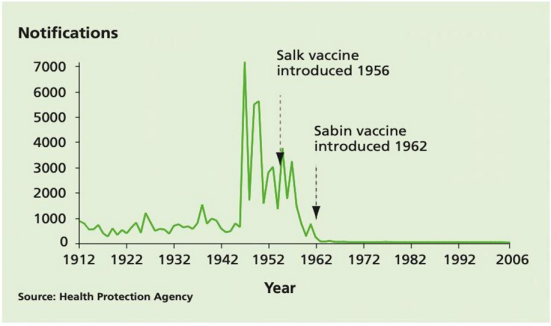

Figure 1 Graph illustrating poliomyelitis case notifications from 1984 to 2003 (figure 1 was adopted from GOV.UK. January 2013 on poliovirus outbreak).

by death occurs.[12] However, this happens in less than 1% of infected cases. In most, this disease is considered asymptomatic.[12]

The poliovirus is not age-specific; it may affect people of all ages. Non-immunised people are those who are most at risk of contracting this illness.[9] In addition, if the UK administers vaccines against poliomyelitis as part of the routine childhood vaccination programme, the disease's shift is somehow limited to older individuals only. As well, administering the vaccine to the elderly decreases the percentage of infected individuals.[9]

Current efforts to mitigate poliovirus in the UK

In the UK, strict mitigation policies must be implemented to prevent the spread of type 2 vaccine-derived poliovirus and keep a poliovirus-free nation. The high vaccination rate in the UK using IPV will prevent vaccine-derived polioviruses from spreading and safeguard those who have received the vaccine from developing poliovirus paralysis. Checking immunisation records, especially those of young children to ensure that poliovirus vaccination is covered, is the most efficient strategy to cease disease spread.[13] Ensuring a high vaccination coverage (≥95%) in the routine childhood immunisation programme is crucial to fulfilling the UK's commitment to eradicating poliovirus worldwide since vaccine-derived poliovirus may spread in communities with low vaccination rates and manifest as paralytic cases.[14] The UK Health Security Agency (UKHSA) is conducting investigations and measures to determine the source of sewage isolates and the potential risk of recirculation to improve poliovirus surveillance.[15] Plans for targeted IVP catch-up will be developed by UKHSA and Reckonable Service and Continuous Service Dates (NHSEI) in collaboration with regional partners beginning in London (see figure 2).[14]

Exploring immunisation history is especially important for those whose families have recently arrived from nations using the type 2-containing OPV. Also, raising awareness of this incidence among medical professionals and caregivers is paramount.[16–18] As part of the nation's poliovirus surveillance programme, any suspected cases of acute flaccid paralysis or acute flaccid myelitis that cannot be attributed to a non-infectious cause should be reported and investigated.[5] First, a report informing the UKHSA should be initiated. This should be followed by two stool samples taken within 48 hours in addition to throat swabs or nasopharyngeal aspirate and cerebrospinal fluid (if collected) being sent to the UKHSA Virus Reference Department. There, a responsible physician must complete a survey for all acute neurological illness presentations.[19–22] Finally, all samples that test positive for local enteroviruses by regional laboratories should be sent to the enteric virus unit.[14]

Future recommendation

To achieve global polio eradication, several strategies should be considered. One such strategy comprises routine immunisation in low-income countries by performing

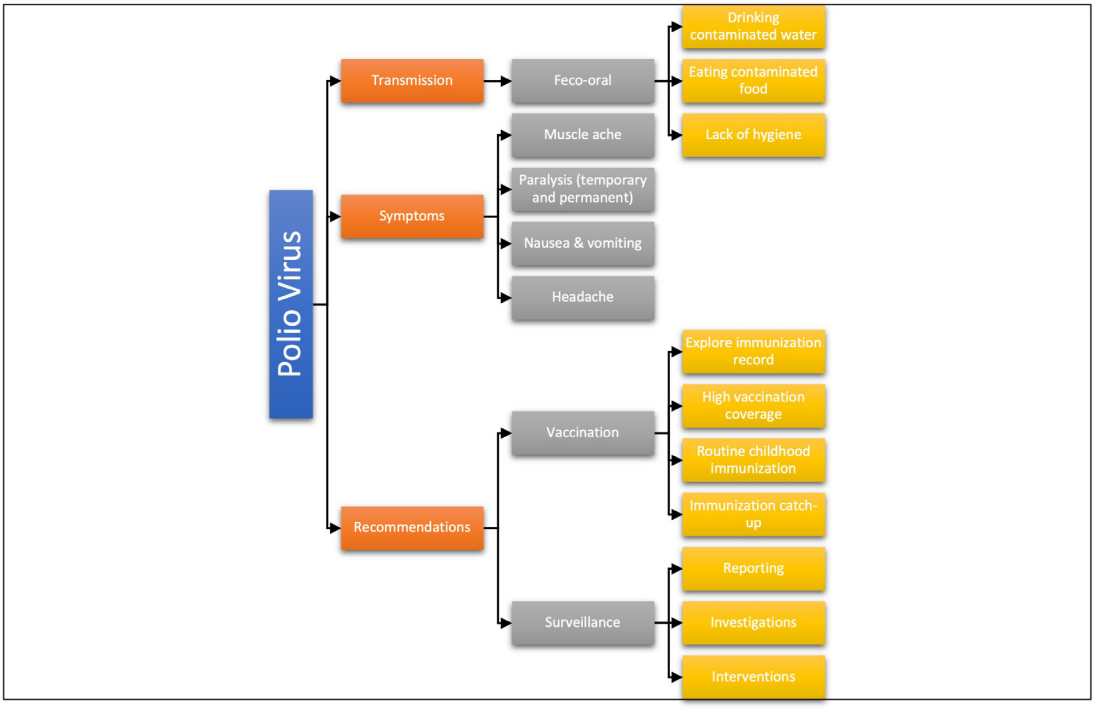

Figure 2 Infographics of the symptoms, transmission, recommendations and prevention of poliovirus in the UK (figure 2 was drawn, analysed and edited by authors: EEJ, OFO and OU).

highly organised campaigns that are conducted at certain locations targeting populations of specific age ranges, such as children below 5 years of age.[23 24] Preventing the spread of the poliovirus among travellers and tourists from low-income countries travelling to the UK is the primary objective of routine immunisation programmes in these nations (see figure 2).

In addition, door-to-door mop-up campaigns should be conducted in areas where poliovirus is being transmitted.[23–27] Furthermore, routine poliovirus vaccination should be recommended for individuals who are at high risk of exposure, such as visitors to endemic polio countries, healthcare workers and adults with an undocumented vaccination history.[24 28] In addition, a single booster dose of the poliovirus vaccine should be administered to adults who have had a primary vaccination series before their departure to poliovirus-infected countries.[28] For instance, health authorities can implement mandatory vaccination in airports on arrival or departure to high-risk countries. Furthermore, tracking poliomyelitis-positive cases, testing their close contacts, and maintaining isolation are important to prevent the shedding and spreading of the virus to the surrounding population.[29–32]

Finally, it is crucial for countries to implement environmental surveillance for polioviruses by a scheduled sampling of the sewage, especially in high-risk areas, as it detects the circulation of poliovirus in the absence of poliomyelitis cases.[29]

CONCLUSION

Polio, which yearly paralysed thousands of children and was one of the most feared diseases in industrialised countries at the start of the 20th century, was brought under control when effective vaccines were produced in the 1950s and 1960s. In the UK, polio was last reported in 1984. In 2003, the disease was deemed eradicated in the UK. Efforts are now shifted towards making sure poliovirus vaccines are up to date, especially for parents and young children in the UK. To halt the spread of the virus and ensure safety for all, it is essential to implement an integrated strategy to stop all poliovirus transmission cycles as well as to guarantee high vaccine coverage.

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Contributors OU: conceptualisation, project administration, writing-review and designing. SCE: collection and assembly of data. OU: reviewed and edited the first draft, supervisor HO: reviewed and edited the final draft, supervisor .HO, OU, JWLGM: reviewed and edited the second draft Figure 1: Graph illustrating poliomyelitis case notifications from 1984 to 2003 (figure 1 was adopted from GOV.UK. January 2013 on poliovirus outbreak) Figure 2: infographics of the symptoms, transmission, recommendations and prevention of poliovirus in the UK (figure 2 was drawn, analysed and edited by authors: EEJ; OFO and OU), manuscript writing—all authors. Final approval of the manuscript—all authors.

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