

EDITORIALS



No Country Is Safe without Global Eradication of Poliomyelitis

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In 1988, the World Health Assembly endorsed the goal of eradicating poliomyelitis worldwide. At the time, the estimated annual number of new cases of paralysis was 350,000, and poliomyelitis was considered to be endemic in 125 countries.¹ In the 25 years since then, the incidence of poliomyelitis has been reduced by more than 99%, and only three countries — Pakistan, Nigeria, and Afghanistan — have never terminated indigenous transmission.^{1,2}

Wild-type poliovirus type 2 has probably been eradicated; the last naturally occurring case was detected in 1999.² Wild-type poliovirus type 3 appears to be close to eradication, with no new cases detected in 2013 (as of October 31, 2013).³⁻⁵ However, wild-type poliovirus type 1 remains in circulation.^{2,3} As illustrated by the 2011 poliomyelitis outbreak in China — a country that had not reported a case of paralysis caused by wild-type polioviruses since 1994 — as long as polioviruses circulate anywhere in the world, they can be exported to countries that are now poliomyelitis-free and can cause serious outbreaks.⁶

Public health authorities in China are to be commended for containing the outbreak so quickly. As described by Luo et al.⁶ in this issue of the *Journal*, a mass campaign to inoculate children with trivalent oral poliovirus vaccine was started within 3 weeks of outbreak confirmation, and the last case was detected approximately 1 month after the campaign was initiated. However, to make sure that polioviruses were truly eliminated, a total of five mass campaigns were conducted, in which 43.7 million doses of oral poliovirus vaccine were administered.⁶

The cost of containing the outbreak was considerable. Approximately \$26 million (in U.S.

dollars) was allocated for outbreak control. This cost does not include the less tangible cost of diverting hundreds of public health experts and local health workers from other important public health work. The apparently high immunity levels in this area of China probably made containment easier, since the population immunity was already close to herd-immunity thresholds.⁶

Should a similar outbreak occur in a poorer country with lower routine immunization coverage, or in a country that is not capable of responding as quickly, containment could prove far more difficult, as may be the case in the current importation of the poliovirus to the Horn of Africa and the Middle East, including Syria. Underscoring the highly infectious nature of poliomyelitis, importation of polioviruses from reservoir countries into areas that had been free of wild-type poliovirus has occurred in at least six countries so far this year, including Somalia (which had been free of the wild-type poliovirus since 2007), Kenya, Ethiopia, Syria, Cameroon, and Israel.^{3,7} The outbreak in the Horn of Africa was genetically traced to viruses from Nigeria, whereas the widespread circulation of wild-type poliovirus type 1 in Israel was linked to virus originating in Pakistan.^{7,8}

To end poliomyelitis forever, the Global Polio Eradication Initiative (GPEI) has developed a comprehensive strategic plan to interrupt all transmission of wild-type poliovirus by the end of 2014 and to certify the world as poliomyelitis-free by 2018.² Global eradication will require several key actions; these include administering oral poliovirus vaccine to interrupt the transmission of wild-type polioviruses, building and sustaining political commitment, improving routine immunization delivery in remaining reservoir

countries, delivering vaccines to children living in areas in conflict, and providing rigorous, ongoing oversight.

One essential part of the plan was to replace the current trivalent oral poliovirus vaccine with a bivalent vaccine containing only virus types 1 and 3. Oral poliovirus vaccine has been the major vaccine used in the eradication program because it is easy to administer, can passively immunize persons who do not receive the vaccine directly, is relatively inexpensive, and induces greater intestinal immunity than that conferred by inactivated poliovirus vaccine. This superior intestinal immunity should be more effective in decreasing transmission, since in the developing world most poliovirus is thought to be spread by the fecal-oral route. However, on rare occasions, oral poliovirus vaccine has been known to cause paralysis, either as a result of vaccine-associated paralytic polio or by means of circulating vaccine-derived polioviruses that have acquired some properties of wild viruses.^{3,9} Removing type 2 oral poliovirus vaccine should reduce vaccine-associated paralytic polio and cases of circulating vaccine-derived poliovirus infection by about 40% and more than 95%, respectively.^{3,9}

A further benefit of the bivalent oral poliovirus vaccine (as compared with the trivalent vaccine) is that it would enhance immunogenicity against types 1 and 3 poliovirus.¹⁰ To maintain population immunity to the type 2 virus and to reduce the risk of outbreaks of type 2 if it were reintroduced (e.g., through a break in laboratory containment), the administration of at least one dose of inactivated poliovirus is recommended in routine immunization.¹¹

The estimated cost of the 2013–2018 GPEI strategic plan is approximately \$5.5 billion.² This is clearly a substantial investment, but the failure to achieve global eradication would cost far more. Mathematical models suggest that abandoning the program before eradication is achieved would result in a massive resurgence of poliomyelitis, with approximately 200,000 cases of paralysis annually.¹² In addition to the huge financial burden this would impose — particularly in coun-

tries in the developing world — the human costs of a resurgence of poliomyelitis are incalculable.

The history of successful eradication efforts over more than two decades has proven that we can finish the job. The real lesson of the outbreak in China is that if we do not, any country is vulnerable to reimportation of poliomyelitis. Without question, the best defense against poliovirus is a good offense that eliminates the virus from the remaining reservoirs and truly eradicates the disease.

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