

An Ongoing Series

Measles Vaccination *A Matter of Confidence and Commitment*

*Richard Turner, on Behalf of the PLoS Medicine Editors**

Prominent among the anxieties of our times are those regarding health and disease. Not only are ageing populations expected to suffer an increased burden of non-communicable diseases in the future, but risks of and harms from existing and emerging infectious diseases could also increase, owing to population growth, migration, climate change, and other factors. At the population level, it is clear that the hard-won gains in medicine and public health brought about by vaccination, antimicrobial and other treatments, and improved sanitation will need to be sustained, broadened, and intensified to protect and provide for an increasing proportion of the human population. Global aspirations, including those set out in the Sustainable Development Goals, are unambiguous in setting out an anticipated future trajectory of improved health, well-being, and prosperity.

Measles, a highly contagious viral infection, is in various respects the perfect example of a threat to health that respects neither aspirations nor boundaries between developed and developing countries. Complications of measles infection include pneumonia (the most common cause of death in children with measles), encephalitis, ear infections that can lead to permanent deafness, and diarrhea. Although a safe and very effective two-dose vaccination schedule has been available and widely deployed since the 1960s, the need for very high and consistent vaccination coverage to elicit herd immunity means that the disease burden and harms of measles remain substantial. WHO reports that globally, in an apparent uptrend of cases occurring in 2017, measles led to an estimated 110,000 deaths, most in children aged under 5 years.¹ Tragically, these deaths were unavoidable, given the estimated 20.8 million children in low- and middle-income countries who had not received a single dose of measles vaccine through routine programs in that year.

In the 53 high- and middle-income countries that make up its European region, WHO has indicated that around 82,500 cases of measles were reported in 2018, an alarmingly high number even among a population in excess of 900 million people, and a greater than 3-fold increase since 2017.² There were 72 reported deaths in children and adults. Here, the European

Vaccine Action Plan 2015–2020 recognizes the need for high and consistent levels of vaccine coverage yet acknowledges the difficulties in meeting the challenges of achieving high and equitable coverage, owing to the existing pronounced variations in national and regional coverage with measles vaccination.

In the United States, despite the declared elimination of measles in 2000, outbreaks have been well documented in recent years—the outbreak in Southern California during December 2014–February 2015 involved at least 125 cases.³ Among these cases, a substantial proportion were in people known not to have been vaccinated, including infants who were too young to have been protected and individuals who had chosen not to receive measles vaccination (i.e., 49 people were unvaccinated among the 110 cases identified in California). More recently, an outbreak in Clark County, Washington State has been widely reported in the past few weeks, and at the time of writing there had been 65 confirmed measles cases in this area.⁴ In 2018, writing in *PLoS Medicine*, Jacqueline Olive and colleagues highlighted clusters of people claiming non-medical exemptions from measles vaccination in states where this is permitted by law.⁵ The authors noted that “new foci of antivaccine activities are being established in major metropolitan areas, rendering select cities vulnerable for vaccination-preventable diseases.” It is difficult to imagine a future scenario without repeated and serious measles outbreaks in the US and elsewhere, given the gaps in protection against the disease. A cautionary indication of the extent to which the dangers of so-called “vaccine hesitancy” can escalate is in the Philippines, where there are reported to have been thousands of measles cases and at least 189 deaths since the beginning of 2019, mainly in children.⁶

The reasons for people not accepting vaccination against measles and other potentially fatal and readily preventable infections are, unfortunately, all too well known. Fears about potential harms of the combined measles, mumps, and rubella vaccination were raised by a discredited study published in *The Lancet* in 1998 and are continuing to circulate. As Peter Hotez, dean of the National School of Tropical Medicine at Baylor College of Medicine, Houston, Texas, commented to

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PLoS Medicine, “the ‘anti-Vax’ movement began as a fringe group but has now become a media empire in its own right, producing hundreds of websites, books, and videos. Even if a concerted effort were mounted against this movement, it could take years to be effective.” Despite the volumes of scientific research and debate published in the intervening 20 years, supporting beyond reasonable doubt the overwhelmingly favorable benefit:risk assessment for vaccination against measles and other infectious diseases, levels of skepticism clearly persist and are being propagated in susceptible populations worldwide. It seems that the growth of social media has facilitated the development of geographically widespread communities with fixed yet indefensible opinions, where hearsay is spread intensively while robust medical evidence and guidance hold little sway.

It would probably be unwise to expect a single approach or constituency to be able to change minds opposed to vaccination. In the case of measles, high-quality surveillance activities alongside well-supported and planned vaccination programs are essential to bring about progressive reductions in the high burden of morbidity and deaths in developing countries. In settings where limited public acceptance of measles vaccination is a danger, imaginative governmental and, where viable, civil society- or NGO-led information campaigns are needed to drive uptake of vaccination, alongside the essential underpinnings of culturally appropriate incentives and legal provisions. Healthcare professionals, who in many countries are generally trusted and enjoy a high level of confidence from the public, are likely to be an underused resource in conveying accurate information and advice on vaccines and vaccination through formal and informal routes. Ultimately, the question is one of altruism: everyone who has experienced the silent but long-lasting protection afforded by vaccination has the responsibility to promote understanding and acceptance of the benefits to others. Our neighbors and, most of all, their children, deserve nothing less.

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References

1. WHO. Measles: Key facts. <https://www.who.int/news-room/fact-sheets/detail/measles>
2. WHO. Measles in Europe: record number of both sick and immunized. <http://www.euro.who.int/en/media-centre/sections/press-releases/2019/measles-in-europe-record-number-of-both-sick-and-immunized>
3. Zipprich J, Winter K, Hacker J, et al. Measles outbreak—California, December 2014–February 2015. *MMWR Morb Mortal Wkly Rep*. 2015;64:153–154. from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6406a5.htm>
4. Washington State Department of Health. Measles outbreak 2019: measles outbreak in Washington State. from: <https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Measles/MeaslesOutbreak>
5. Olive JK, Hotez PJ, Damania A, Nolan MS. The state of the antivaccine movement in the United States: a focused examination of nonmedical exemptions in states and counties. *PLoS Med*. 2018;15:e1002578. <https://doi.org/10.1371/journal.pmed.1002578>
6. Relief Web. NDRRMC Update Sitrep No.05 re Measles Outbreak, 22 February 2019, 5:00 PM. <https://reliefweb.int/report/philippines/ndrrmc-update-sitrep-no-05-re-measles-outbreak-22-february-2019-500-pm>

A JSOM Editor’s Note follows.

EDITOR'S NOTE

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Global Measles Immunization Update

In the United States, as of 22 May 2019, there were 880 measles cases reported in this year's outbreak, the largest since 1994.¹ The rise in cases has been attributed to a lowered rate of vaccination. Reasons for the declining rate include vaccine hesitancy or refusal and lack of vaccine availability or ability to afford the vaccine. So far, there have been no confirmed cases of measles in 2019 among military members or their families, at least not among those treated in military treatment facilities. All Servicemembers are required to receive the measles vaccination, and all family members are strongly encouraged to do so, too. Children attending Department of Defense Education Activity schools must provide proof of immunization.² However, military treatment facilities like Naval Hospital Bremerton, Washington, are monitoring the situation because Washington is one of the states with current measles outbreaks.³

Outside of the United States, in 2018, more children in the WHO European Region were vaccinated against measles than ever before, but progress has been uneven between and within countries, leaving increasing clusters of susceptible individuals unprotected and resulting in a record number of people affected by the virus.⁴ During 2017–2018, a resurgence of measles occurred, with large-scale outbreaks in Ukraine, Serbia, and some countries that had achieved elimination, including France, Israel, Georgia, Greece, and Italy. In the first 4 months of 2019, 179 countries reported 168,193 cases of measles, almost 117,000 more cases than reported during the same period in 2018. Actual numbers are probably much higher; the WHO estimates that only 1 in 10 cases are reported.⁵

Even after a country attains elimination—defined as the absence of the continuous transmission of measles for 1 year or longer—maintenance programs must be relentless. The Americas is learning this lesson the hard way. In 2016, the region became the first to eliminate measles after its 35 countries immunized 95% or more of their populations. That's the point at which herd immunity can keep safe those who are not immunized (often for health reasons or because they are too young). But across the region, vaccination rates have since dipped, and outbreaks in Brazil and Venezuela have cost the region its elimination status.⁶

Reasons for recent failures vary across the world. Political instability, conflict, and poverty can lead to shortages of vaccines (which must be refrigerated) and clinic closings. When civil war broke out in Côte d'Ivoire in late 2010, for example, the percentage of individuals getting vaccinated against measles plummeted, from 70% in 2010 to 49% in 2011.⁷ In December 2018 in Israel, a female soldier had symptoms of measles. Tests revealed that the soldier had contracted measles, which is making a major comeback in Israel amid a decline in some communities of parents vaccinating their children. The soldier

is from an ultra-Orthodox neighborhood, which is associated with an incorrect perception that fervently religious Jews are protected from infection by the insulated nature of their communities, as well as discredited rumors that the life-saving practice of vaccination is dangerous.⁷

Are all adults protected against measles? Not necessarily. Measles vaccines became available in 1963. If you received the standard two doses of the measles, mumps, and rubella (MMR) vaccine after 1967, you should be protected against the measles for life. Most people born before 1957 are thought to have been infected naturally with the virus through measles outbreaks, but some are not immune. Physicians can check a patient's immunity levels with a blood test. People born before 1957 who have had the lab testing that shows they are not immune and may be at high risk should have one dose of the MMR vaccine and then a second dose 28 days later.⁸

You are at a high risk if you travel during an outbreak, are near travel hubs or destinations, or are a healthcare provider. You could be at risk if you only received one dose of the vaccine or if a blood test shows you are not immune.⁸

The live version of the vaccine introduced in 1963 appears to have worked well, but there was another version (the “killed” version) that did not. That was also administered between 1963 and 1967. Therefore, people who either received the killed version of the measles vaccine or do not know what kind they received in the 1960s should be reimmunized.⁸

In general, older adults are at a low risk for contracting measles. Most people born before 1957 were exposed to at least two major measles outbreaks, which confers immunity. Once a person has had the measles, he or she is immune for life. Those who received the vaccine between 1963 and 1967 are the exceptions.⁸

References

1. <https://www.nbcnews.com/health/kids-health/cdc-reports-41-new-measles-cases-outbreak-continues-grow-n1007681>
2. <https://www.nytimes.com/2019/05/20/health/measles-outbreak-washington-new-york.html#storylines>
3. <https://www.militarytimes.com/pay-benefits/2019/04/19/so-far-no-measles-cases-at-military-medical-facilities-but-officials-are-watching/>
4. <http://www.euro.who.int/en/media-centre/sections/press-releases/2019/measles-in-europe-record-number-of-both-sick-and-immunized>
5. <https://www.sciencenews.org/article/measles-global-spread-vaccination>
6. <https://www.cdc.gov/mmwr/volumes/68/wr/mm6817a4.htm>
7. <https://www.timesofisrael.com/idf-rushes-to-complete-measles-vaccinations-after-soldier-contracts-virus/>
8. <https://www.healthline.com/health-news/some-adults-need-to-be-revaccinated-against-measles-021115#3>



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- › TCCC CRITICAL DECISION CASE STUDIES
- › SPECIAL ARTICLE: Assessment of Trainer Skill
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