



A Moral Imperative to Eradicate Measles, Rubella

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On Sept. 27, 2016, the Pan American Health Organization — the World Health Organization’s Americas branch — announced that measles had been eliminated in the region. It was exciting news! PAHO is the first WHO region to accomplish the task, a triumphant sequel to its 2015 announcement that, thanks to widespread vaccination, rubella (along with congenital rubella syndrome) had been eliminated in the Americas.¹

To declare a disease “eliminated” means that, for more than one year, any outbreaks were started by people infected abroad, not from continuous transmission within the region. But unless a disease is “eradicated” worldwide, outbreaks will continue to crisscross the globe. Smallpox was eradicated by a dedicated vaccination campaign, and we have a moral imperative to put in the same efforts to eradicate measles and congenital rubella syndrome.

Measles often is thought of as a simple childhood illness, but it is much more than that. The measles virus is airborne and highly communicable. Anyone who shares the same ventilation system with an infected person is at risk of catching it, including people who arrive up to two hours after the infected person has left.

Symptoms often start with the “3 C’s”— cough, coryza (runny nose) and conjunctivitis (red eyes). Whitish spots called Koplik spots may show up inside the cheeks. On the fifth day of the illness, a red, blotchy rash begins to appear on the face, often at the hairline or behind the ears, and fever may spike to over 104 degrees. During the next day or two, the rash spreads down the trunk and extremities. Some people also develop diarrhea.

Even in countries with good nutrition and health care, 20 to 25 percent of measles cases will need to be hospitalized for related complications.² The most serious include blindness, encephalitis (swelling of the brain), pneumonia and severe diarrhea leading to dehydration. Severe measles illness is most common in young children weakened by malnutrition, HIV/AIDS or other diseases. Pregnant women of any age who become infected with measles are at risk for severe illness, preterm delivery or miscarriage.³

A licensed measles vaccine became available in 1963, followed by an improved vaccine in 1968.

By contrast, rubella, often called “German measles” or “three-day measles,” is a mild illness for most people. For 25 to 50 percent of those infected with rubella, no symptoms appear. For those with symptoms, a rash starts on the face, and there may be a runny nose, cough, swollen lymph nodes and reddish eyes, but any fever is low-grade.

Rubella infection rarely leads to serious illness — unless a pregnant woman is infected. There is a 90 percent chance that rubella will cause an infected pregnant woman to miscarry, or for her fetus to develop multiple severe birth defects in



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what is known as congenital rubella syndrome or CRS. The fetus is particularly vulnerable during the first 20 weeks of gestation, but rubella infection remains dangerous for a fetus at any point during the pregnancy.⁴

In 1964, an epidemic of German measles hit the United States, causing 20,000 cases of CRS. The result was 11,250 abortions (spontaneous or surgical), 2,100 neonatal deaths, 11,600 cases of deafness, 3,580 cases of blindness and 1,800 cases of mental retardation. The epidemic led to a rush to develop rubella vaccines, which became available in 1969. The combination MMR (measles, mumps, rubella) vaccine has been in use since 1971.

CONTROVERSIES

The rubella vaccines were developed using cell lines from two different surgical abortions. Although these vaccines remain controversial, both public health officials and Vatican officials support their use.⁵ Additionally, repeatedly debunked theories about a link between the MMR vaccine and autism persist, fanned by conspiracy theorists. Spikes in U.S. rubella cases in 1997 and 2000 are believed to be due to waning vaccination rates.

As with other infectious diseases, severe illness and death from measles disproportionately affect the poor. People who have come into close contact with someone who has rubella need to be quarantined to home for 21 days if they lack evidence of immunity.⁶ Ultimately, that can mean losing a month's wages or more. If the diseases lead to hospitalization and/or permanent disability, as is possible with measles and rubella, the impact upon an individual or family who already struggle can be profound.

Some of the most vulnerable among us include pregnant women, the unborn, the very young and the very poor. These are the same groups most severely affected by measles and rubella. To protect these groups, we have a moral imperative not only to continue our vaccination efforts, but to increase them until eradication is attained worldwide. Attempts to achieve eradication through vaccination can be complicated by access to vaccines, various personal beliefs of the parents, distrust of vaccines and other pharmaceutical products, or parental fear about autism links, especially with the MMR vaccine.

Because many parents have concerns about vaccine safety, and Catholics also may be con-

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cerned about the use of fetal tissue in vaccine development, we have a duty to be informed and able to address these concerns in order to protect the health of our patients and of the public.

ABOUT THE MMR VACCINE

The MMR vaccine is a combined, attenuated (weakened) live-virus vaccine against measles, mumps and rubella. The Measles and Rubella Initiative (a collaboration among the Centers for Disease Control and Prevention, WHO, UNICEF, the United Nations Foundation and the American Red Cross) states that it costs only \$1.50 to vaccinate a child against measles and rubella in low-income countries. Since 2001, they have supported the vaccination of more than 1.8 billion children.⁷

WHO estimates that between 2000 and 2015, measles vaccination prevented an estimated 20.3 million deaths worldwide. In 1980, before widespread measles vaccination, WHO states that measles caused an estimated 2.6 million deaths worldwide each year. In 2015, after widespread immunization, this number had decreased to 134,200 deaths from measles, mostly children under 5 years old.⁸

FETAL TISSUE CONCERNS

The rubella vaccine and the measles-rubella (MR) and MMR combinations are among the live vaccines that use human cell lines originating in tissue from two aborted fetuses, one in 1964 and one in 1970. In 2003, a Florida woman wrote to the Vatican on behalf of Catholic parents for clarification and guidance about the parents' rights to refuse such vaccines for their children when schools and state laws require children to be vaccinated.

In 2005, the Pontifical Academy for Life issued a statement titled "Moral Reflections on Vaccines Prepared from Cells of Aborted Human Foetuses." It is called a "moral duty" to push for development of vaccines that are not based on lines of cells that originated in aborted fetuses. If there is no alternative, however, they strongly encourage vaccina-

tion with what is currently available “in order to avoid a serious risk not only for one’s own children but also, and perhaps more specifically, for the health conditions of the population as a whole — especially for pregnant women.”⁹

The Pontifical Academy for Life goes on to say: “This is particularly true in the case of vaccination against German measles, because of the danger of Congenital Rubella Syndrome. This could occur, causing grave congenital malformations in the foetus, when a pregnant woman enters into contact, even if it is brief, with children who have not been immunized and are carriers of the virus. In this case, the parents who did not accept the vaccination of their own children become responsible for the malformations in question, and for the subsequent abortion of foetuses, when they have been discovered to be malformed.”

The Vatican thus has expressed concern that waning rates of vaccination will lead to the re-emergence of these diseases. Because of the threat to everyone, especially to young children, pregnant women and the unborn, the Vatican states that we have a moral imperative to utilize the available vaccines.

HERD IMMUNITY

Because MMR vaccine contains live viruses, it isn’t usually given to the very people who would be most severely affected by becoming infected with those viruses —pregnant women (and their fetuses), infants under 1 year old and people with immune system problems from health issues such as cancer, AIDS or organ transplants.

Immunity within 90 to 95 percent of the entire population is the only way to prevent ongoing transmission of measles and rubella. This is called herd immunity: If enough people are immune, the virus keeps encountering inhospitable hosts and outbreaks can’t happen. Because no vaccine is 100 percent effective, and some people should not receive the vaccine, everyone else around them needs to be immune, hence unable to transmit the viruses to vulnerable members of the population.¹⁰

MEASLES OUTBREAK

A place like Disneyland presents perfect conditions for an outbreak: crowds from all over the world in very close proximity, lots of surfaces to

touch, lots of hand-to-face activities like eating, large numbers of young children with inadequate hand-washing skills, and a native surrounding population of Southern Californians with relatively low herd immunity from declining vaccination rates.

Enter a perfectly suited virus like measles — highly contagious, airborne and able to live on surfaces. Plus, the illness is sneaky; for the first few days of communicability, vague viral symptoms don’t raise suspicion that a person is contagious with measles.

Before the Disneyland measles outbreak of 2014-2015, I had some ambivalence about the

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MMR vaccine. Even though I am an infection control nurse, my background was in natural medicine way before I was an RN or an infection preventionist. I knew that no link had ever been found between the MMR vaccine and autism, but there has been so much confusing media on the subject that I couldn’t entirely blame parents for utilizing a personal belief exemption to avoid giving the vaccine to their kids. That was before January 2015, when I learned a lot more about measles. I came to the conclusion that personal belief exemptions for measles are inexcusable.

I had a lot of sleepless nights and clocked a lot of unwanted overtime during the Disneyland measles outbreak, when I was working communicable disease for a county health department in Southern California. In late December 2014, a person who had been infected with measles while abroad came to Disneyland in Orange County, California. From January to April 2015, Southern California was awash in measles cases and suspected measles cases.

I came to understand firsthand the urgency involved with a measles outbreak. Because measles is so very contagious, is airborne and makes people so sick, outbreaks are immense, expensive



and urgent, moving other health care issues to the back burner. Before people even know they have measles, they are contagious, and they may go to multiple public venues like theme parks, movie theaters, shopping centers, emergency rooms, schools and day cares, and so on.

Even with help from two staff members on loan from the U.S. Centers for Disease Control, hospitals performing the contact investigations for

exposure events at their facilities, public health staff diverted from other departments and attention diverted from other cases, the measles outbreak took all the resources our county health department could muster. Likewise, our county's hospitals quickly were overwhelmed.

The California Department of Public Health estimates that the Disneyland measles outbreak in 2015 may have cost public health depart-

FEARS ABOUT VACCINES AND AUTISM

Concerns about vaccines and autism fall into three main categories: 1) that use of a preservative called thimerosal in vaccines leads to autism, 2) that too many vaccines given to infants and children (singularly and in combination) overwhelms their immune systems, causing a pathologic autoimmune response that leads to autism, and 3) Andrew Wakefield's 1998 hypothesis that MMR administration causes intestinal damage, allowing for proteins that damage the brain and lead to autism. All of these hypotheses have been repeatedly debunked by large and reputable studies.¹

Thimerosal is an antibacterial ethylmercury compound that has been used to preserve the integrity of multidose vaccine vials. Thimerosal is not contained in live-virus vaccines like MMR. Although no harm has been shown to result from vaccines that contain thimerosal, pediatric and public health experts removed thimerosal in 2001 from vaccines given to children under the age of 6 years. After removal of thimerosal, there were no changes in autism rates, and repeated studies again failed to show any connection.² Some flu vaccines from multidose vials contain thimerosal, but thimerosal-free flu vaccines also are widely available. The U.S. Food and Drug

Administration has a list available of which vaccines contain traces of thimerosal and which are thimerosal-free.³

The second main theory is that the cumulative excess of these vaccines overwhelms and weakens the immune system. Proponents of this theory often cite the fact that infants receive more vaccines than they used to. Since 1980, the number of diseases against which we can vaccinate has increased, but the immunologic load has decreased due to advances in protein chemistry and recombinant DNA technology. In 1980, the seven vaccines administered had more than 3,000 viral proteins and polysaccharides, whereas 14 vaccines given in 2009 had fewer than 200. Repeated studies have not shown vaccinated children to be more susceptible to autism or to illnesses indicating a weakened immune system. The infant immune system has been found to be very competent in handling these attenuated exposures.⁴

Thirdly, concerns about an autism link with MMR vaccination emerged after the 1998 publication of a paper by British then-physician Andrew Wakefield in the medical journal *The Lancet*. In Wakefield's report on 12 children, ages 3 years to 9 years old, he proposed that MMR vaccina-

tion causes intestinal inflammation leading to nonpermeable peptides getting into the bloodstream and subsequently damaging the brain. He proposed that this was a "new variant" of autism.⁵

Wakefield's study subsequently was found to be a deliberate fraud, with the findings not supported by the author's data. Also, in a major conflict of interest, it was found that Wakefield was paid for this study by a lawyer seeking to sue the vaccine manufacturer. Wakefield was stripped of his medical license in Britain, and the study has been retracted by *The Lancet*, but not before considerable damage was done to measles and rubella vaccination efforts.⁶

NOTES

1. Jeffrey Gerber and Paul Offit, "Vaccines and Autism: A Tale of Shifting Hypotheses," *Clinical Infectious Diseases* 48, no. 4 (2009): 456-61.
2. Gerber and Offit, "Vaccines and Autism: A Tale of Shifting Hypotheses."
3. U.S. Food and Drug Administration, *Thimerosal in Vaccines*. www.fda.gov/BiologicsBloodVaccines/SafetyAvailability/VaccineSafety/UCM096228#t1.
4. Gerber and Offit, "Vaccines and Autism."
5. Gerber and Offit, "Vaccines and Autism."
6. Fiona Godlee, "The Fraud behind the MMR Scare," *BMJ* 342 (Jan. 6, 2011). www.bmj.com/content/342/bmj.d22.

ments more than \$3.9 million. That figure does not include the costs to hospitals, clinics, lost wages during quarantine, furloughing staff, or the median cost of \$25,000 for a hospitalization with measles.¹¹

IMMUNE AMNESIA

With measles, scientists have found a phenomenon called “immune amnesia,” whereby a large segment of the person’s defenses against other pathogens is destroyed by the measles virus. This exponentially compounds the health and financial struggles associated with each measles infection.

Research published in *Science* in May 2015 found that the measles virus can wipe out the immune memory for two to three years after infection, starting an ongoing cycle of illness, lost productivity and risk of death. Because of this trait of measles infection, preventing measles illness with measles vaccination appears to decrease all infectious disease deaths, not just deaths from measles.¹² The authors found that once measles vaccination became widespread, there was an overall 30 to 50 percent decrease in child mortality in resource-poor settings, with a 90 percent decrease in child mortality in the poorest of countries.

VACCINATION EXEMPTIONS

We live in a global context. One infection hopscotches between susceptible hosts ultimately to infect people around the world. Measles was able to grab a foothold in Southern California in 2015 because the level of herd immunity was too low to stop an outbreak. As the measles virus kept encountering susceptible hosts, it was able to spread.

Many California parents had used the state personal belief exemption to reject vaccinating their children, often citing concerns about autism. On June 30, 2015, California Gov. Jerry Brown closed that loophole by signing California Senate Bill 277 into law, disallowing the personal belief exemption in favor of personal medical exemptions only. The personal medical exemption was allowed to accommodate those kids who may not be able to receive live vaccines because of serious health conditions like cancer treatment, AIDS and organ transplants.¹³

The American Academy of Pediatrics has published guidelines on how to talk to vaccine-

hesitant parents.¹⁴ Some of its guidelines are as follows:

- Listen to parents’ concerns about vaccines in a nonconfrontational manner, realizing that parents generally want to do what is best for their child.

- Discuss the benefits and possible adverse effects of vaccines, providing vaccine information statements from the Immunization Action Coal-

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tion, which works with the CDC and others to create and distribute educational material about immunization and to modify misconceptions. These are available online in multiple languages at immunize.org.

- Stress the number of lives saved by vaccination rather than the number of deaths resulting from not vaccinating.

- Discuss state laws and how vaccines benefit individual children as well as communities. Some parents do not see how vaccination benefits them or their children, and they think their rights to make health care decisions for their children are being taken away.

- Use “presumptive recommendations,” such as informing parents which shots are due. Research has shown this to be more effective than “participatory recommendations,” which ask parents what they think about vaccines or whether they want vaccines to be administered that day. Research shows that most parents turn to those of us in health care to provide them with the information and guidance to help them make these decisions.

The American Academy of Pediatrics recommends talking to parents using the “CASE” model, like this:

- **Corroborate:** “I understand why you might be concerned. There is a lot of information online about vaccines and autism.”

- **About Me:** “I like to be sure that I stay informed about the most up-to-date information so that I can help families make informed choices about vaccines.”

- **Science:** “None of the scientific studies



have found a causal link between vaccines and autism. Many large studies have been done seeking a link, but none has been found. Some studies have shown a link, but they were discredited as bad science.”

■ **Explain/Advise:** “Vaccines prevent diseases that can cause real harm. Choosing not to vaccinate will not protect children from autism, but it does leave them open to diseases. I recommend your child get these vaccines today.”

ONWARD TO ERADICATION

Regional disease elimination of measles and rubella was made possible only by widespread and continued vaccination. The recent elimination of measles and rubella in the PAHO Americas region is a great triumph, but only a small step toward worldwide eradication. Measles continues to be a leading cause of death worldwide among children under age 5, with a mortality rate of up to 10 percent in populations that are malnourished or lack access to adequate health care.

The Disneyland measles outbreak showed us what happens if we allow herd immunity to decrease by being laissez-faire about vaccines. In health care, it is our responsibility to protect the most defenseless — the very poor, young children, pregnant women, fetuses and the immunocompromised. One of the most effective ways we can fulfill this duty is to speak openly and calmly in favor of vaccination.

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10. Marcel Salathe, “Herd Immunity and Measles: Why We Should Aim for 100 Percent Vaccination Coverage,” *The Conversation*, Feb. 2, 2015. www.theconversation.com/herd-immunity-and-measles-why-we-should-aim-for-100-vaccination-coverage-36868.

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12. Michael J. Mina et al., “Long-Term Measles-Induced Immunomodulation Increases Overall Childhood Infectious Disease Mortality,” *Science* 348, no. 6235 (May 8, 2015): 694-99.

13. California Senate Bill 277, June 30, 2015. www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0251-0300/sb_277_bill_20150630_chaptered.html.

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