



Editorial

Measles: Eliminated but Not Eradicated

In the June editorial (*Critical Care Nurse*, 2015;35[3]:10-14), several errors appeared in the table and text. This is a corrected version of the editorial published in the June issue.

If you were a critical care nurse as old as I am, you would most likely have personal experience with the measles virus, gained first-hand while attending elementary school, when you had your turn feeling foul and febrile while wearing a nasty red rash for a week or so. Some of us were provided with an additional opportunity to develop antibodies against measles by contracting both its more benign as well as more serious form. In addition to conferring immunity to future instances of this illness, one or more bouts of measles could also leave us with enduring recollections of how it looks and feels, memories that can serve in later years to recognize the reappearance of measles in children, grandchildren, or patients.

Critical care nurses whose academic and professional years have spanned only the past few decades, however, have had little opportunity to see measles in clinical practice. Since the first measles vaccine licensed in 1963¹ started eroding the scourge of this disease through the year 2000, when it was declared eliminated in the United States,² and throughout the next decade, a median of only 60 cases of measles were reported in the United States annually. As a result, it would be entirely plausible for younger generations of critical care nurses to be more familiar with the measles-mumps-rubella

(MMR) vaccine used since 1971³ than with specific attributes of the clinical entity itself.

Critical care nurses who are not members of the baby boomer generation may also be less familiar with the morbidity and mortality associated with measles that existed before an effective vaccine was produced. Centers for Disease Control and Prevention (CDC) estimate that between 1963 and 1973, some 3 to 4 million people in the United States were infected with measles annually, of whom 48 000 required hospitalization, 4000 were left with chronic disability from measles encephalitis, and 400 to 500 died.⁴ Measles was then and remains much more than an annoying childhood disease; it can and does disable and kill.

Between 2000 and 2013, the number of measles cases reported annually in the United States has varied from a low of 37 in 2004⁵ to more than 200 cases in 2011 and a few less than 200 in 2013. Nearly all of these cases were imported into this country from outbreaks originating in other parts of the world. A measles case is categorized as imported when exposure to the virus occurred outside the United States 7 to 21 days before the rash developed and the rash occurred within 21 days following entry into the United States, with no known exposure to measles within the United States during that time.⁶ In 2014, the United States experienced 644 cases of measles,⁷ the highest number reported in the past 20 years. Through April 24, 2015, the CDC reported a total of 5 outbreaks and 166 cases of measles in the United States, with the largest count in California⁷ (see Figure).

Owing to the current resurgence of this disease as well as to its potential for causing

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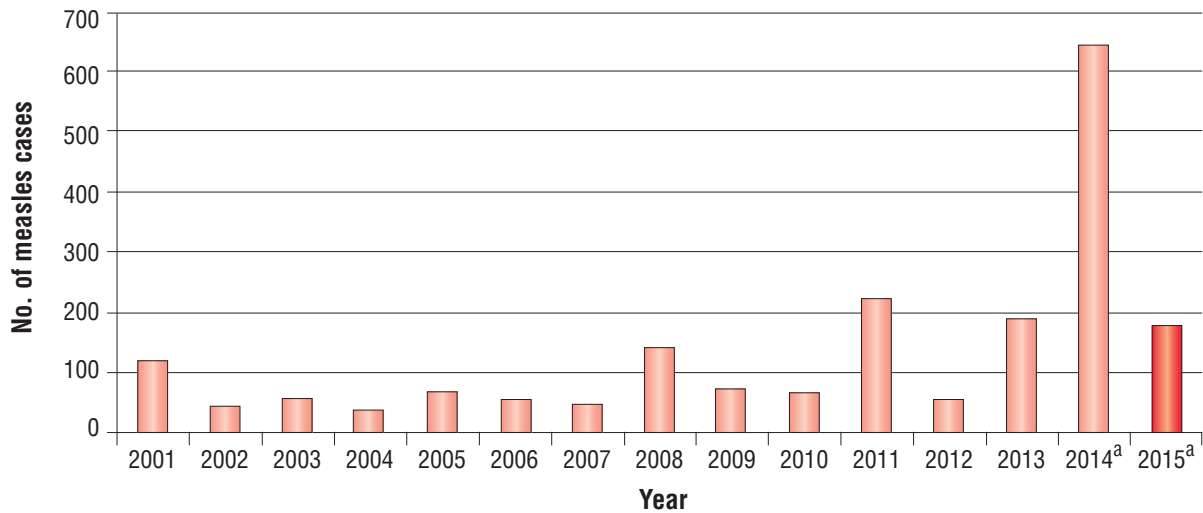


Figure Number of cases of measles in the United States 2001-2015, as of April 24, 2015.

^a Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases.

serious and even fatal outcomes together with the possibility that some critical care nurses may not be as familiar with it to recognize and protect against it, I am devoting this editorial to providing *Critical Care Nurse* readers with a synopsis of the essentials that critical

care nurses need to know about this disease (see Table), derived primarily from our major resource for that information, the CDC.

Measles has never been eradicated from the United States. As the past 2 years have strikingly illustrated,

Table Essential information about measles for critical care nurses

Attributes of measles

Essential information for critical care nurses

Synopsis of measles	Measles is a highly contagious, acute viral respiratory illness with the potential for causing serious complications and death
Rubeola and rubella: shared features	<p>Caused by different viruses</p> <p>Highly contagious</p> <p>Originate outside the United States and are imported by travelers who enter or return to the United States</p> <p>Transmission is oropharyngeal; susceptible individuals exposed to an infected person who is coughing and sneezing⁹</p> <p>Produce fever and rash</p> <p>Measles-mumps-rubella (MMR) vaccine protects against rubeola and rubella¹⁰</p>
Distinguishing between types of measles	<p>Rubella and rubeola are different diseases caused by different viruses</p> <p>Rubella (German measles, 3-day measles)</p> <ul style="list-style-type: none"> • Rubella is a contagious viral disease with mild fever and rash that lasts only a few days before resolving spontaneously. • About half of patients have no symptoms. • The most significant concern is the possibility of congenital rubella: a pregnant woman contracting rubella early in her pregnancy may pass it to her fetus, who may then have a 20% or higher chance of birth defects, including cardiac defects, cataracts, deafness, mental retardation, and liver and spleen damage, or experience stillbirth or miscarriage.¹⁰ <p>Rubeola ("red measles," hard measles, measles)</p> <ul style="list-style-type: none"> • Although most people recover without problems, rubeola can lead to pneumonia or inflammation of the brain (encephalitis).⁹

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Prevention	The most effective way to prevent measles is through immunization (vaccination) with the MMR vaccine. The MMR vaccine protects against both types of measles. The MMR vaccine is about 95% effective in preventing either type. ¹¹
Who should be vaccinated?	Children should receive 2 doses of the MMR vaccine. Vaccination is required for school entry. • 1st dose at 12-15 months of age • 2nd dose at 4-6 years old (may be given earlier, if at least 28 days after 1st dose) Infants younger than 12 months should get one dose if traveling outside the United States. Any adult 18 years or older born after 1956 should receive at least 1 dose, unless they can show that they have been vaccinated or had all 3 (measles, mumps, rubella) diseases. The MMR vaccine may be given with other vaccines. ¹¹
Vaccinations for health care staff	For health care staff born before 1957, the CDC admonishes that facilities should consider vaccinating staff who do not have laboratory evidence of immunity, laboratory confirmation of past disease, or vaccination with 2 appropriately spaced doses of MMR vaccine. ¹² Health care personnel born in or after 1957, who have not had MMR vaccine and have no serologic evidence of immunity, should receive 2 doses of MMR (1 dose now, 2nd dose at least 28 days later). ¹²
Who should <i>not</i> be vaccinated?	Anyone who has ever had a life-threatening allergic reaction to the antibiotic neomycin Anyone who has had an allergic reaction to the MMR vaccine Pregnant women A number of other patient situations warrant notifying the physician if vaccination is considered, including patients who are sick when the vaccination is due and those with severe allergies, cancer, immunosuppressed or immunocompromised states, thrombocytopenia, or recent blood or blood product transfusion. ¹¹
Preventing transmission	Transmission is via direct contact or airborne spread when an infected person coughs, sneezes, or breathes. Virus remains infectious in the air and on surfaces for 2 hours after an infected person has left the area. ⁵ Covering mouth, especially when coughing, and nose and mouth when sneezing plus good hand-washing help prevent spread. ⁹
Risk factors for measles	Being unvaccinated ¹³ Traveling to countries where measles is more common ¹³ Having a vitamin A deficiency ^{13,14}
Major clinical features (rubeola)	Symptoms begin 7 to 21 days after exposure (incubation period) Prodrome begins 3 to 4 days before skin rash and includes high fever ($\geq 105^{\circ}\text{F}$); malaise; cough, coryza, and conjunctivitis Toward end of prodrome, a pathognomonic oral enanthema called Koplik spots may appear on buccal mucosa of the cheeks as small white spots on reddened areas About 14 days after exposure, a maculopapular rash appears and spreads from forehead to trunk to lower extremities, including palms of hands and soles of feet Patients are contagious from 4 days before to 4 days after the rash appears Providers should note that immunocompromised patients may not always develop the rash Rash gradually fades cephalocaudally Measles usually resolves on its own in 7 to 10 days Most patients fully recover ^{4,5}

Appearance

Appearance of measles a maculopapular rash

Appearance of Koplik spots



Courtesy of CDC, Public Health Image Library, and Heinz F. Eichenwald, MD. phil.cdc.gov/phil/details.asp?pid=3168



Available at CDC, Public Health Image Library, and Heinz F. Eichenwald, MD. phil.cdc.gov/phil/details.asp?pid=3187

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Table *Continued*

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Potential complications	<p>Complications are more likely in</p> <ul style="list-style-type: none"> • Children younger than 5 years • Adults over 20 years • Pregnant women • Anyone with compromised immune status <p>Common complications</p> <ul style="list-style-type: none"> • Ear infections • Diarrhea <p>Severe complications</p> <ul style="list-style-type: none"> • Pneumonia: develops in 1 of every 20 children; most common cause of pediatric death related to measles • Measles encephalitis: develops in 1 of every 1000 children who get measles; may cause deafness, convulsions, cognitive disability • Prematurity, low birth weight delivery <p>Long-term complication</p> <ul style="list-style-type: none"> • Subacute sclerosing panencephalitis: arises 7-10 years after acute measles, despite apparent full recovery; rare, fatal degenerative central nervous system disorder; rarely seen in the United States; risk for developing may be higher for those who contract measles before 2 years of age <p>Death</p> <ul style="list-style-type: none"> • 1-2 of every 1000 children who get measles die¹⁵
Diagnostic findings	<p>Laboratory confirmation can be obtained via samples of serum, naso- or oropharyngeal swab, or urine</p> <p>Diagnosis is confirmed via serologic detection of measles-specific findings:</p> <ul style="list-style-type: none"> • Measles-specific immunoglobulin M antibody • Significant increase in measles immunoglobulin G • Isolation of measles virus • Measles RNA via nucleic acid amplification⁶
Index of suspicion	<p>CDC⁴ admonishes health care providers to be particularly vigilant for measles in patients who present with fever, rash, and characteristic signs such as the 3Cs (conjunctivitis, coryza, cough), especially if they also:</p> <ul style="list-style-type: none"> • Are not vaccinated against measles; or • Live in an area experiencing cases of measles; or • Recently traveled (or were exposed to someone who recently traveled) outside the United States
What health care providers need to do if you suspect a case	<p>Immediately isolate the patient to avoid airborne transmission</p> <p>CDC recommended isolation in health care facilities:</p> <ul style="list-style-type: none"> • Follow respiratory etiquette and airborne precautions • Use respiratory protection and follow airborne infection control precautions • Despite the low likelihood of MMR vaccine failure, all staff who provide care to infected patients need to follow airborne precautions • Preferred placement for measles patients is in a single-patient airborne infection isolation room⁵ <p>Recognize and communicate that patients with measles are infectious from 4 days before through 4 days following appearance of the rash</p> <p>Quickly report the case to the local health department</p> <p>At <i>first contact</i> with suspected cases, obtain the following laboratory samples for diagnosis and genotyping: serum, throat (or nasopharyngeal) swab, urine, and viral specimens^{4,5}</p>
Management	<p>Management is symptomatic, for example:</p> <ul style="list-style-type: none"> • Rest for malaise • Lukewarm water sponge baths and mild antipyretics for fever • Fluids to avoid dehydration • Humidifier or vaporizer for cough⁹
Additional resources	<p>Consult the MMR Vaccine Information Statement (http://www.cdc.gov/vaccines/hcp/vis/vis-statements/mmr.html) and the Childhood Immunization Schedule (http://www.cdc.gov/vaccines/schedules/easy-to-read/child.html).</p> <p>In response to the 2015 outbreaks of measles in the United States, the American Academy of Pediatrics issued an early online release of its updated <i>Red Book: 2015 Report of the Committee on Infectious Diseases</i> to provide guidelines for managing measles in pediatric populations.</p>

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cases will likely continue to arise as our citizens reenter or visitors newly enter our borders after contracting it elsewhere. Virtually all of the cases reported for 2014 (97%) were associated with importations rather than domestic origins.⁸ A majority of the importers are unvaccinated, as are those most likely to develop and spread the disease within the United States. The issue of some US citizens choosing to forego vaccination for themselves and/or their children has the potential for inflicting widespread public health burdens across our nation's health care system. As the CDC so cogently summarized,⁶

These outbreaks demonstrate that unvaccinated persons place themselves and their communities at risk for measles and that high vaccination coverage is important to prevent the spread of measles after importation.

Although critical care nurses may not be able to mitigate the introduction of measles into our homeland, we can surely make our contribution to minimizing the potential harm that measles can inflict upon our patients, our unit, our health care facility, and community. Our prompt recognition, isolation, confirmation, reporting, and management of measles can surely assist in curtailing its further penetration into our lives for generations to come. CCN



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