



SCHOOL NURSE
Workshop

**Back to the Future: Preparing for “Old”
Infections to Return**

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Children's
of Alabama®

Back To the Future: Preparing For “Old” Infections to Return

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Objectives

- Recognize clinical presentations of measles, varicella, pertussis, and other vaccine-preventable diseases
- Understand isolation and exclusion criteria for measles, varicella, pertussis, and other vaccine-preventable diseases
- Discuss effectiveness of properly utilized vaccines to prevent measles, varicella, pertussis, and other vaccine-preventable diseases
- Identify effective roles that school nurses can provide in protecting students against measles, varicella, pertussis, and other vaccine-preventable

Faculty Disclosure

- I do intend to discuss use of commercial products/services – diagnostic tests and antiviral therapies.
- I do intend to discuss non-FDA approved uses of products/services – antiviral therapies, vaccines.
- I do have a relevant financial relationship with the manufacturers of commercial products and/or providers of commercial services discussed in this CME activity.
 - Site PI on two completed Gilead PK/PD studies of remdesivir in pediatric population
 - All monies went directly to my university and not to me

Prevaccine Era vs. Current Estimates of Disease

Disease	Prevaccine Era Annual Case Estimate ^a	2020 Reported Cases ^b	Percent Decrease
Diphtheria	21 053	1	>99
<i>Haemophilus influenzae</i> type b (Hib) <5 y of age	20 000	15	>99
Hepatitis A	117 333	9946	92
Hepatitis B (acute)	66 232	2155	97
Measles	530 217	12	>99
Mumps	162 344	694	>99
Pertussis	200 752	6124	97
Polio (paralytic)	16 316	0	100
Pneumococcus (invasive)			
All ages	63 067	11 946	81
<5 y	16 069	561	97
Rubella	47 745	6	>99
Congenital rubella syndrome	152	0	100
Smallpox	29 005	0	100
Tetanus	580	17	97
Varicella	4 085 120	2928	>99

Child Develops Difficulty Breathing



Diphtheria

- Membranous nasopharyngitis, obstructive laryngotracheitis, or bloody nasal discharge
- Local infections are associated with low-grade fever and gradual onset of manifestations over 1 to 2 days
- With upper respiratory infection, extensive neck swelling with cervical lymphadenitis (bull neck) is a sign of severe disease
- Life threatening complications of respiratory diphtheria include upper airway obstruction caused by membrane formation; myocarditis with heart block; and cranial and peripheral neuropathies
- Palatal palsy, noted by nasal speech, frequently occurs in pharyngeal diphtheria
- Case fatality rates attributable to respiratory disease are 5% to 10% and up to 50% in untreated people



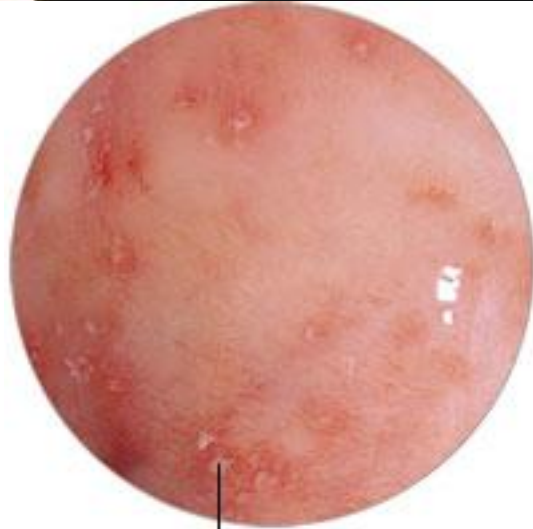
“If you connect the measles it spells out ‘My parents are idiots.’”

Measles

- Highly contagious
- Vaccine preventable
- Typically occurs in childhood
- Classic rash and fever clinical presentation
- Severe complications: pneumonia, diarrhea, encephalitis, death
- Case-fatality ratio: 0.1%–10%



Photo courtesy of Professor Samuel Katz, Duke University Medical Center



Koplik spot

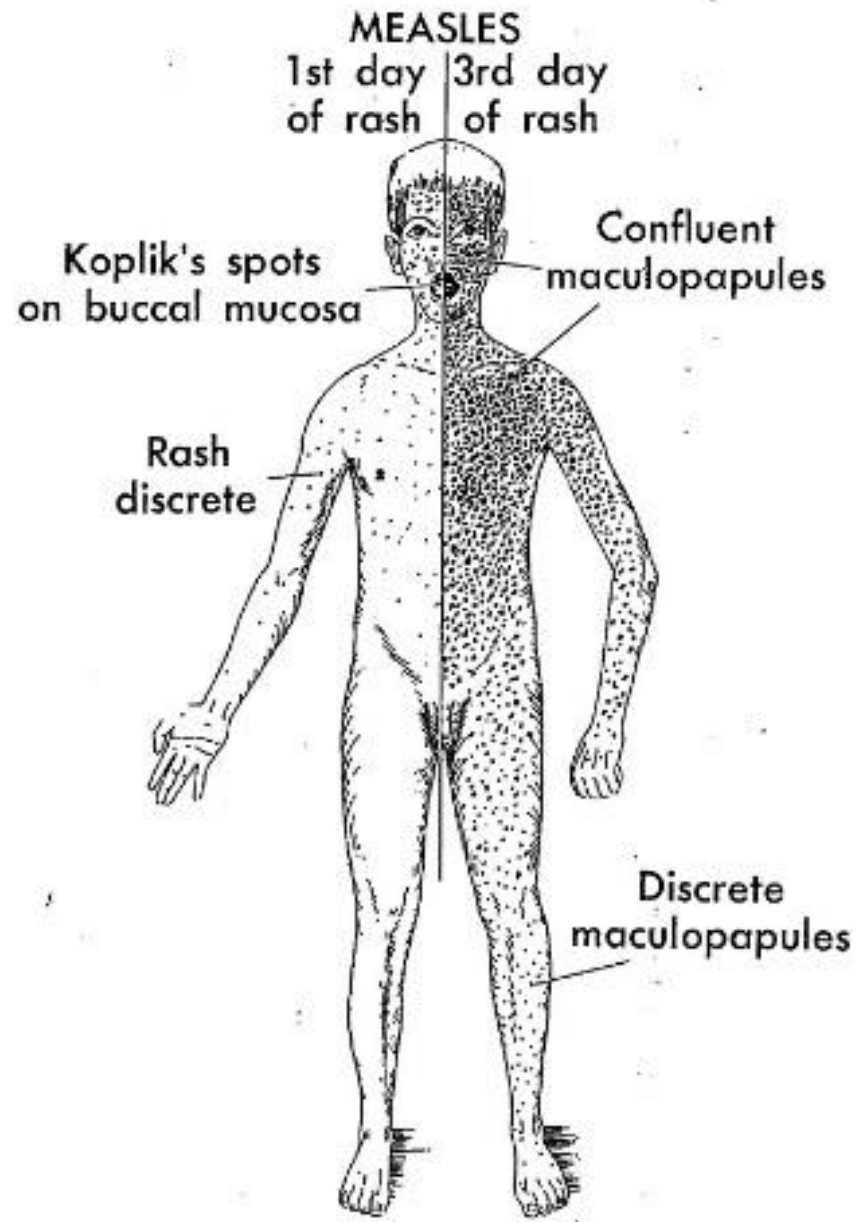




Measles

Clinical Presentation

- Classic Presentation:
 - **Fever, rash, and the “three C’s”:**
 - Cough
 - Coryza (redness and swelling of nasal mucosa)
 - Conjunctivitis (red, watery eyes)
 - Maculopapular rash that spreads cephalocaudally and centrifugally
- Other manifestations:
 - Koplik spots (scattered blue-white tiny spots on a bright red background)
 - Malaise
 - Diarrhea
 - Anorexia
 - Lymphadenopathy



From: Krugman S et al.
Infectious Diseases In
Children, 8th Edition, Mosby
1985, Chapter 13, 153

Fig. 13-3. Development and distribution of measles rash.

Measles Epidemiology

- *Mode of transmission:* Airborne
 - Virus can be suspended in the air for 2 hours
- *Infectiousness:* R_0 estimated at 12-18, herd immunity threshold of 92-94%, secondary attack rates in families often 90% or greater among susceptibles
- *Incubation period:* 10-14 days to onset of symptoms, rash onset 3-4 days after symptom onset
- *Infectious period:* Contagious from 4 days before the rash through 4 days after appearance of the rash
- *Immunity:* lifelong after wild-type infection

Measles Complications

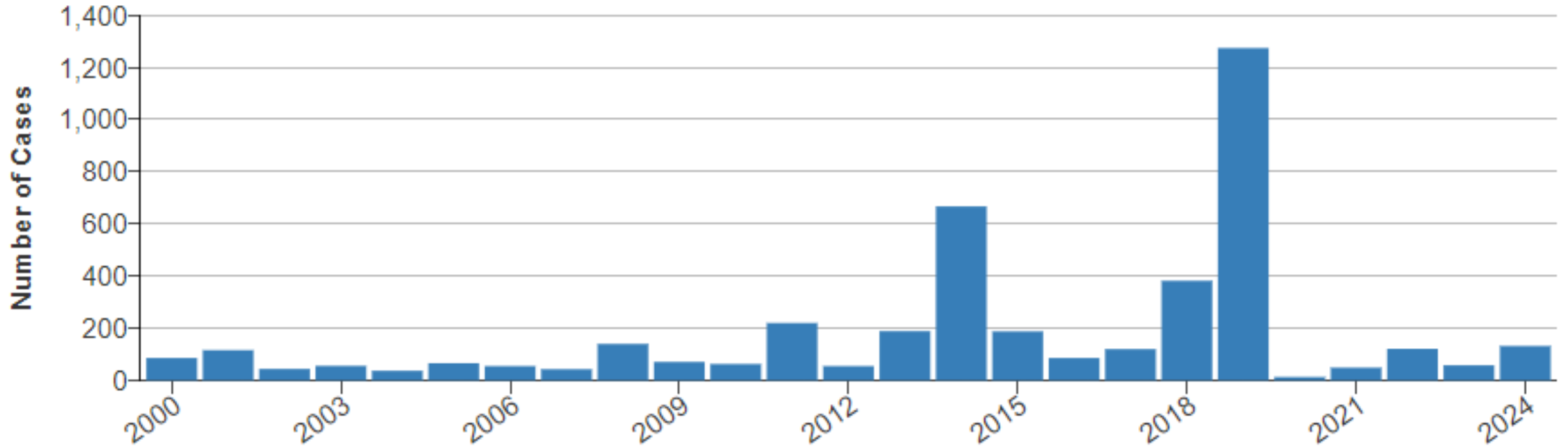
United States		Developing World	
Otitis Media	7 – 9%	Death	2 – 15%
Pneumonia	1 – 6%	Pneumonia	Most common cause
Diarrhea	8%	Diarrhea	2 nd most common cause
Post-infection encephalitis	1 – 4 per 1,000 – 2,000 cases	Blindness in areas with Vitamin A deficiency	
SSPE	1 per 2,500 – 10,000 cases	Estimated to cause more than 100,000 deaths annually	
Death	1 – 3 per 1,000 cases	Neurological complications	1 – 4 per 1,000 cases

From Strebel PM, et al. Measles Vaccine, *Plotkin's Vaccines*, 7th edition, Elsevier, 2018

Measles Cases in U.S. as of May 9, 2024

- 132 cases of measles in 21 jurisdictions
 - Arizona, California, Florida, Georgia, Illinois, Indiana, Louisiana, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York City, New York State, Ohio, Pennsylvania, Vermont, Virginia, Washington, West Virginia, Wisconsin
- 70 of 132 (53%) hospitalized
- Age
 - < 5 y: 58 (44%)
 - 5-19 years: 30 (23%)
 - ≥ 20 years: 44 (33%)
- 81% unvaccinated or unknown vaccination

Measles Cases in U.S. as of May 9, 2024



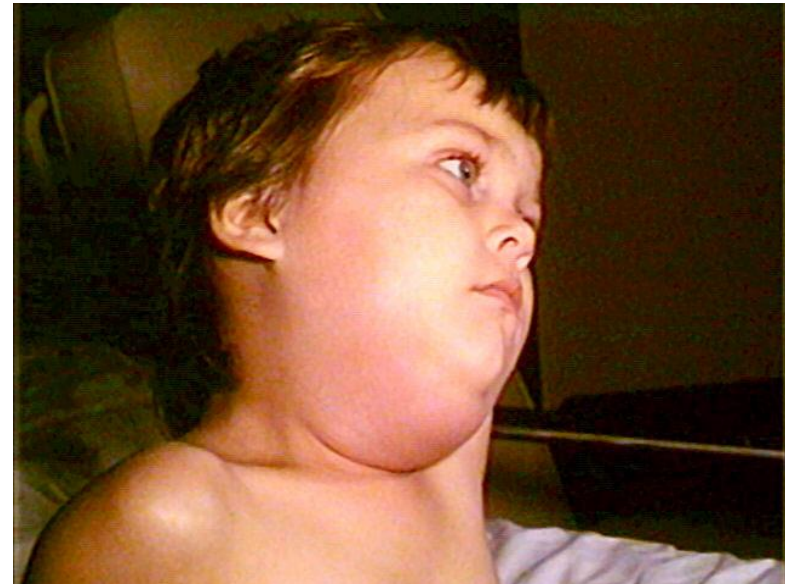
Child With Really Bad Persistent Cough



Pertussis

- Begins with mild upper respiratory tract symptoms similar to the common cold (catarrhal stage)
- Progresses to cough, usually paroxysms of cough (paroxysmal stage), characterized by inspiratory whoop (gasping) after repeated cough on the same breath, followed by post-tussive emesis
- Fever absent or minimal
- Duration of classic pertussis is 6 to 10 weeks
- Complications among adolescents and adults include syncope, weight loss, sleep disturbance, incontinence, rib fractures, and pneumonia
- Case fatality rates are approximately 1.1% in infants younger than 2 months

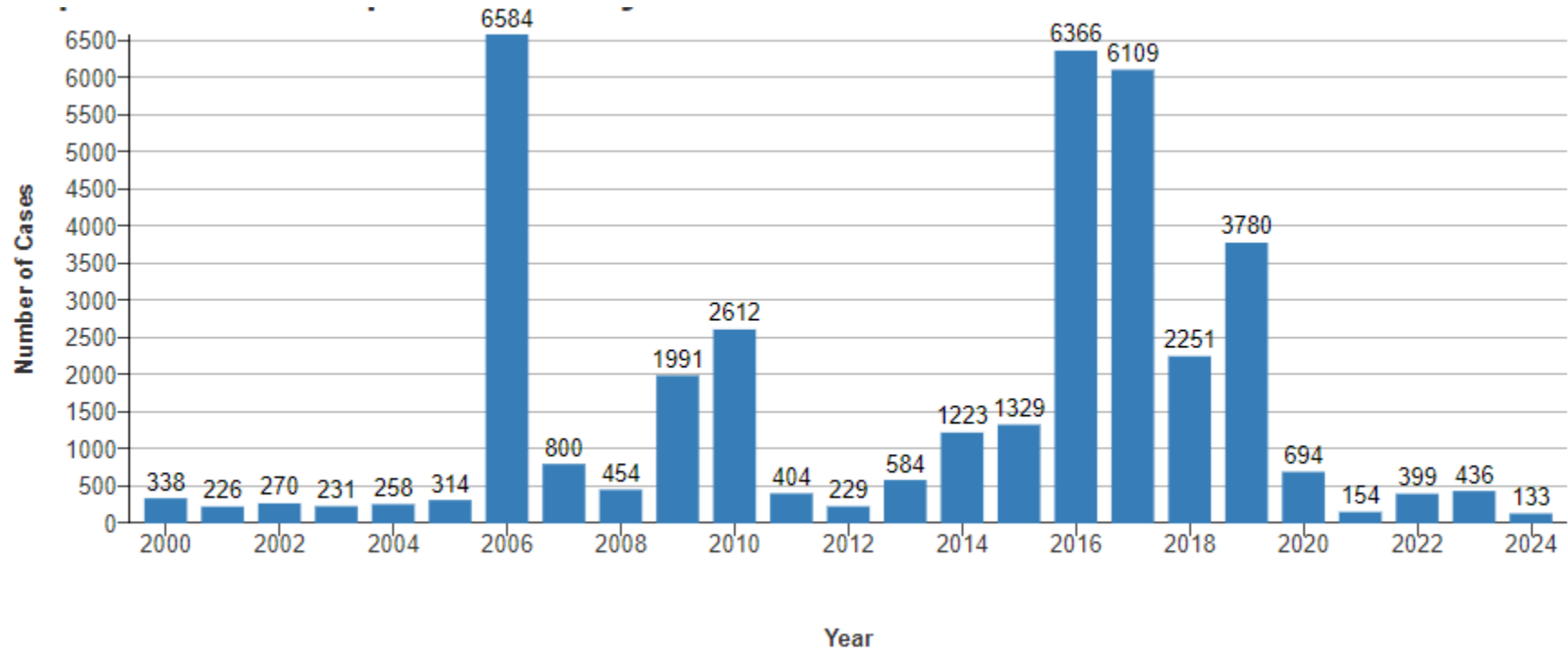
Pain and Swelling Over Jaw, With Groin Pain



Mumps

- Pain and swelling of one or more of the salivary glands, usually the parotid glands
- 80% of unvaccinated people are symptomatic
- Nonspecific symptoms may precede parotitis, including fever, myalgia, anorexia, malaise, and headache
- Parotitis occurs in 95% of symptomatic individuals and may be unilateral initially with involvement of the contralateral parotid gland in 70% of cases
- Orchitis is the most frequently reported postpubertal complication and occurs in approximately 30% of those who are unvaccinated
 - Unilateral testicular involvement is common
- Approximately half of patients with mumps orchitis develop testicular atrophy of affected testicles
- Infection in adults is more likely to result in complications

Mumps Cases in U.S., 2000-2024



Rash an Elementary School Student



Rash in an High School Student



Chickenpox



Chickenpox in the Prevaccine Era

- Approximately 4 million cases annually
- 8,000-18,000 hospitalizations annually due to complications of varicella
- 100 deaths annually

Chickenpox

Pediatric Complications

- Secondary bacterial skin infection
 - Most common complication in children
 - Staphylococci, group A β -hemolytic Strep
- Pneumonia
 - Varicella pneumonitis
 - Bacterial superinfection
- Reye syndrome

Chickenpox

Pediatric Complications

- CNS involvement
 - Acute cerebellar ataxia
 - 1 per 4,000 cases in children < 15 yoa
 - Encephalitis
 - 1.7 per 100,000 cases in children < 15 yoa
- Hepatitis
 - Relatively rare

Chickenpox

- Incubation period 14-16 days (range: 10-21 days)
 - May be prolonged for as long as 28 days after VARIZIG or IGIV
 - May be shortened in the immunocompromised host

Chickenpox

- Wild-type chickenpox
 - 250-500 lesions
 - Predominantly vesicular
 - Fever to 105°F
 - Rash averages 12 days



- Breakthrough chickenpox in vaccinated persons
 - < 50 lesions
 - Predominantly maculopapular
 - Less fever
 - Rash averages 5 days



Chickenpox

- May be more severe in:
 - Neonates
 - Adolescents and adults
 - Immunocompromised hosts

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A photograph of a modern glass skyscraper at dusk. The building features a grid of windows with numerous vertical light fixtures in various colors (yellow, red, blue, green) integrated into the facade. A red circular logo is visible on the upper right side of the building. The sky is a clear, light blue. In the foreground, there are streetlights, traffic signals, and some trees. The overall scene is illuminated by the building's lights and the ambient light of the twilight.

QUESTIONS?