

**Emerging Infectious Diseases 2020:
A Discussion of New and Upcoming Infections**

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Disclosures

- Speaker Bureau: Sanofi-Pasteur, Merck, Pfizer, Amgen
- Consultant: Sanofi-Pasteur, Pfizer, Merck, GlaxoSmithKline, Gilead

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Objectives

- Upon completion of this lecture, the nurse will be able to:
 1. Discuss various viral and bacterial infectious diseases
 2. Identify the most common tests to identify etiology of various infectious diseases
 3. Discuss treatment options for various emerging viral and bacterial infections

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What Driving Emerging Diseases in 2019

- Antibiotic overuse and antimicrobial resistance
 - *Resistant C. difficile*
 - *Resistant candida strains*
 - *Resistant gram negative pathogens*
- Vaccine hesitancy and refusals
 - Measles
 - Influenza
- Opioid epidemic
 - Hepatitis C, HIV, and *MRSA* infections

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Antibiotic overuse and antimicrobial resistance

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C. Difficile 2017 Guidelines

Table 1.
Recommendations for the Treatment of Clostridium difficile Infection in Adults

Clinical Definition	Supportive Clinical Data	Recommended Treatment*	Strength of Recommendation/Quality of Evidence
Initial episode, non-severe	Leukocytosis with a white blood cell count of ≤ 15000 cells/mL and a serum creatinine level < 1.5 mg/dL	• VAN 125 mg given 4 times daily for 10 days, OR	Strong/High
		• FDX 200 mg given twice daily for 10 days	Strong/High
		• Alternate if above agents are unavailable: metronidazole, 500 mg 3 times per day by mouth for 10 days	Weak/High
Initial episode, severe*	Leukocytosis with a white blood cell count of ≥ 15000 cells/mL or a serum creatinine level > 1.5 mg/dL	• VAN, 125 mg 4 times per day by mouth for 10 days, OR	Strong/High
		• FDX 200 mg given twice daily for 10 days	Strong/High

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<https://academic.oup.com/cid/article/66/7/e1/4855916>

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Vaccine hesitancy and resistance

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Influenza

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2019 - 2020: Influenza Activity

A Weekly Influenza Surveillance Report Prepared by the Influenza Division
Weekly Influenza Activity Estimates Reported by State and Territorial Epidemiologists*

Week Ending Dec 07, 2019 / Week 49

Influenza Activity Estimates

- No Activity
- Sporadic
- Low Activity
- Regional
- Intense
- No Report

Season: 2019-20

<https://www.cdc.gov/flu/weekly/#S5> accessed 12-15-2019

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2019 – 2020 Influenza Vaccine

- A/Brisbane/02/2018 (H1N1)pdm09-like virus (updated)
- A/Kansas/14/2017 (H3N2)-like virus (updated)
- B/Colorado/06/2017-like (Victoria lineage) virus
- B/Phuket/3073/2013-like (Yamagata lineage)

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December 2019 Strains Reported

Public Health Laboratories

The results of tests performed by public health laboratories nationwide are summarized below. Data from public health laboratories are used to monitor the proportion of circulating viruses that belong to each influenza subtype/lineage.

	Week #1	Data Cummulative since September 26, 2019 (week #1)
No. of specimens tested	1,508	15,172
No. of positive specimens	637	4,556
Positive specimens by subtype/lineage		
Influenza A	283 (44.8%)	5,932 (42.4%)
pH1N1pdm09	221 (83.7%)	5,171 (86.7%)
H3N2	43 (15.3%)	645 (10.9%)
Subtyping not performed	19	121
Influenza B	348 (55.2%)	2,624 (57.6%)
Yamagata lineage	6 (1.7%)	99 (3.7%)
Victoria lineage	232 (67.3%)	1,904 (72.9%)
Lineage not performed	110	661

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<https://www.cdc.gov/flu/weekly/#S5> accessed 12-15-2019

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Important Influenza Messages

- Begin to vaccinate as soon as flu vaccines are received in clinics
- Immunity lasts throughout entire flu season, even if vaccines are given in August
- Universal recommendation for all individuals ages 6 months and older

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Importance of Improving Influenza Protection in the Older Adult

"Of all infectious diseases, influenza is foremost in its association with an age-related increase in serious consequences leading to hospitalization, debilitating complications, and death."¹

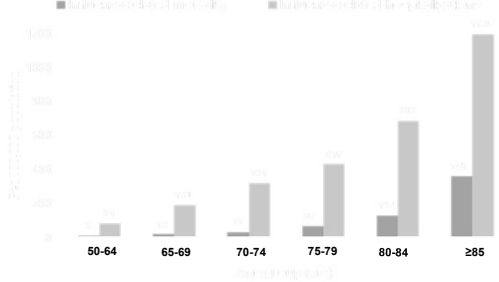
Reference: 1. McElhaney JE, Dutz JP. *J Infect Dis.* 2008;198(5):632-634.

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Influenza-related Hospitalizations^a and Deaths^b Increase with Age¹



^a Hospitalization rates are for 1979-2001. ^b Mortality rates are for 1976-2000.

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Reference: 1. Thompson WW, et al. *J Infect Dis.* 2006;194(suppl 2):S82-S91.

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High Dose Influenza Vaccine

- The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) decided to:
 - Include High-Dose influenza vaccine (Fluzone High-Dose, Influenza Virus Vaccine) among the vaccines recommended for adults 65 years of age and older in its 2011-2012 annual influenza prevention recommendations

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Efficacy Study on High Dose vs. Standard Dose Influenza Vaccine

- High dose vs. standard dose in individuals ≥ 65 years of age
- 24.2% more effective in preventing flu and complications than standard dose flu vaccine
- Studied more than 30,000 individuals

<http://www.rttnews.com/2178150/sanofi-fluzone-high-dose-influenza-vaccine-efficacy-trial-meets-primary-goal.aspx> accessed 12-27-2013

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Recent Study on High Dose Influenza Vaccine

- Studied: 190 HIV patients
 - Vaccine indicated at present for individuals 65 years of age and older
- Those receiving high dose influenza vaccine had more seroprotection against the flu than those who received normal doses
- For every antigen studied, the high-dose formulation increased average antibody titers and resulted in higher seroconversion and seroprotective rates when compared with the standard-dose influenza vaccine

<http://annals.org/article.aspx?articleid=1487780> accessed 01-04-2013

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Egg Allergy and TIV

- 2011 - The recommendation is as follows:
 - For patients with a history of egg allergy WITHOUT anaphylaxis, there is no need to divide doses or perform skin testing before vaccination
 - There will be no need to confirm the levels of ovalbumin in the 2011-12 flu vaccine because all products will contain less than 0.6 micrograms per dose;
 - Patients with egg allergy should be observed for 15 minutes after vaccination; and
 - vaccine providers should be equipped and trained to handle anaphylactic emergencies
 - Do not use LAIV (Flumist)

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2018 - 2019: LAIV update

- Is back out on the market
- Await efficacy data

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CDC 2019 Antiviral Recommendations

- Children younger than 2 years
- Adults 65 years and older
- people with chronic pulmonary (including asthma), cardiovascular (except hypertension alone), renal, hepatic, hematological (including sickle cell disease), and metabolic disorders (including diabetes mellitus), or neurologic and neurodevelopment conditions (including disorders of the brain, spinal cord, peripheral nerve, and muscle, such as cerebral palsy, epilepsy [seizure disorders], stroke, intellectual disability, moderate to severe developmental delay, muscular dystrophy, or spinal cord injury)

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<https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm>

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CDC 2019 Antiviral Recommendations

- People with immunosuppression, including that caused by medications or by HIV infection
- Women who are pregnant or postpartum (within 2 weeks after delivery)
- People younger than 19 years old who are receiving long-term aspirin- or salicylate-containing medications
- American Indians/Alaska Natives
- People who are extremely obese (i.e., body mass index is equal to or greater than 40)
- Residents of nursing homes and other chronic care facilities.

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<https://www.cdc.gov/flu/professionals/antivirals/summary-clinicians.htm>

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Baloxavir marboxil (Xofluza)

- Indication:
 - Treatment of acute, uncomplicated influenza in patients aged ≥ 12 years who have been symptomatic for no more than 48 hours
- Class:
 - Polymerase acidic (PA) endonuclease inhibitor
 - Inhibits influenza virus replication

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Wright, 2020 25

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Baloxavir marboxil

- Dosage:
 - 20 mg and 40 mg dosages available
 - Weight based:
 - 40 kg to < 80 kg: Single dose of 40 mg
 - ≥ 80 kg: 80 mg dose
 - With or without food
 - Avoid co-administration with dairy products, calcium-fortified beverages, polyvalent cation-containing laxatives, antacids, or oral supplements

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Wright, 2020 26

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Efficacy

- Primary endpoint of both trials was:
 - Time to alleviation of symptoms,
 - Time when all seven symptoms (cough, sore throat, nasal congestion, headache, feverishness, myalgia, and fatigue) had been assessed by the subject as none or mild for a duration of at least 21.5 hours
 - Results Trial 1: 50 hours vs. 78 hours (placebo)
 - Results Trial 2: 54 hours vs. 80 hours (placebo)
 - Also looked at oseltamivir comparison: No difference between oseltamivir and baloxavir marboxil

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Wright, 2020 27

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Baloxavir marboxil

- Warnings and precautions:
 - Limited data on pregnancy and lactation
- Contraindications:
 - Known hypersensitivity to one of the ingredients

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Wright, 2020 28

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Baloxavir marboxil

- Side effects:
 - Diarrhea (3%), bronchitis (2%), nasopharyngitis (1%), headache (1%) and nausea (1%)
- Advantages
 - Unique mechanism of action
 - Single dose, oral medication
 - Targets influenza A and B, including those resistant to oseltamivir and avian strains

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Well-tolerated Wright, 2020 29

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Baloxavir marboxil

- Competition:
 - Oseltamivir
- Cost:
 - \$150.00
 - Have found coupons on-line for no more than \$30.00

https://www.gene.com/download/pdf/xofluza_prescribing.pdf accessed 01-02-2019 Wright, 2020 30

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2020

- Likely to be a delay in vaccines again
- Similar to what we have experienced this year
- 2020: Quadrivalent High Dose Influenza

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Measles

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Measles

- Measles was declared eliminated (absence of continuous disease transmission for greater than 12 months) from the United States in 2000.

What happened?

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Measles



- January 1–August 24, 2013
 - Increase in reported measles cases within United States
 - Total of 159 cases of measles were reported during this period
 - Most cases were in persons who were unvaccinated (131 [82%]) or had unknown vaccination status (15 [9%])

Wright, 2020
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6236a2.htm> accessed 12-27-2013

34

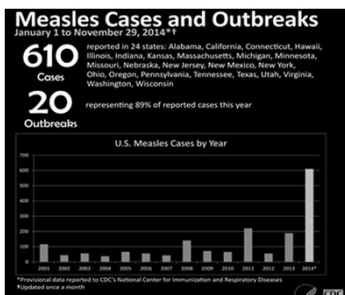
2014

- As of May 13, 2014, CDC has logged 187 cases of Measles (2013 – total was 189)
- Largest outbreak is occurring in Ohio
 - Unvaccinated travelers bringing measles back from Philippines
 - Philippines: 26,000 cases thus far
 - 40 Ohio cases in Knox county which is home to large population of Amish

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www.usatoday.com accessed 05-13-2014 35

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Measles: As of November 2014



<http://www.cdc.gov/measles/cases-outbreaks.html> accessed 12-27-2014 36

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Measles: As of May 1, 2015

- 169 cases to date in the United States
 - Majority are unvaccinated children
 - Many of these are linked to amusement park in California
 - Identified in 20 states and the District of Columbia

www.cdc.gov accessed 05-27-2015

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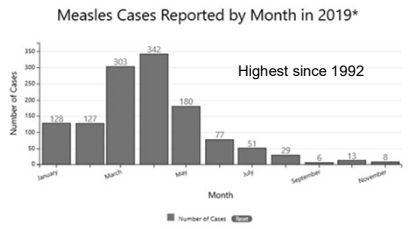
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Record Number: 2019

Measles Cases in 2019

From January 1 to December 5, 2019, 1,276* individual cases of measles have been confirmed in 31 states. CDC will now be updating these data monthly.



<https://www.cdc.gov/measles/cases-outbreaks.html> accessed 12-15-2020

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Why is this occurring?

- In a given year, more measles cases can occur for any of the following reasons:
 - an increase in the number of travelers who get measles abroad and bring it into the U.S., and/or
 - further spread of measles in U.S. communities with pockets of unvaccinated people

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CDC Vaccine Recommendations

- All persons aged ≥ 6 months without evidence of measles immunity who travel outside the United States should be vaccinated before travel with 1 dose of MMR vaccine for infants aged 6–11 months and 2 doses for persons aged ≥ 12 months, at least 28 days apart
- Routine MMR vaccination is recommended for all children at age 12–15 months, with a second dose at age 4–6 years.

Wright, 2020
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6236a2.htm> accessed 12-27-2013

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Need to Consider: The Three C's

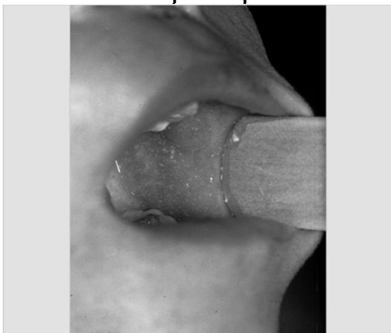
- Cough
- Coryza
- Conjunctivitis
- Fever (up to 105)
- Koplick spots
- Photophobia
- Erythematous, disseminated, coalescing rash

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Koplik Spots



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<http://www.immunize.org/photos/measles-photos.asp>

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What about contagion?

- Patients are considered to be contagious from 4 days before to 4 days after the rash appears
- Rash appears about 14 days after the illness begins
- It is the most contagious of all of the infectious diseases
 - 9 out of 10 exposed will develop the disease if not protected
 - Measles remains in the air for 2 hours after person has left the area

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<https://www.cdc.gov/measles/hcp/index.html> 43

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Complications

- Otitis media, pneumonia, laryngotracheobronchitis, and diarrhea
- One out of every 1,000 measles cases will develop acute encephalitis, which often results in permanent brain damage
- One or two out of every 1,000 children who become infected with measles will die from respiratory and neurologic complications
- Subacute sclerosing panencephalitis (SSPE) is a rare, but fatal degenerative disease of the central nervous system characterized by behavioral and intellectual deterioration and seizures that generally develop 7 to 10 years after measles infection.

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<https://www.cdc.gov/measles/hcp/index.html> 44

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September 2019

- Philippines:
 - Two cases of polio – 19 years after it was declared eradicated

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Diagnosis

- Detection of measles-specific IgM antibody in serum and measles RNA by real-time polymerase chain reaction (RT-PCR) in a respiratory specimen
- Healthcare providers should obtain both a serum sample and a throat swab (or nasopharyngeal swab) from patients suspected to have measles
- Urine samples may also contain virus, and when feasible to do so, collecting both respiratory and urine samples can increase the likelihood of detecting measles virus

<https://www.cdc.gov/measles/hcp/index.html> accessed 12-15-2020

Wright, 2020

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Recommendation

- People who are born during or after 1957 who do not have evidence of immunity against measles should get at least one dose of MMR vaccine.
- Exposed individuals
 - Either administer MMR vaccine within 72 hours of initial measles exposure, **or** immunoglobulin (IG) within six days of exposure. Do **not** administer MMR vaccine and IG simultaneously, as this practice invalidates the vaccine

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Pertussis: Preventable but Persistent

"There is a relative lack of awareness among health-care providers that pertussis immunity from natural infection or childhood vaccination wanes 5-8 years after the last booster dose. This leaves adolescents and adults vulnerable to pertussis infection, and those infected can transmit risk of life-threatening disease to young infants."⁴

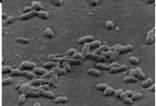
Reference: 1. Healy CM, et al. *Vaccine*. 2009;27(41):5599-5602.

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Pertussis: Highly Communicable, Frequently Overlooked

- Acute respiratory tract infection caused by *Bordetella pertussis* (gram-negative aerobic bacillus)¹
- Highly communicable (90%-100% secondary attack rate among susceptibles)^{2,3}
- Morbidity in all ages, especially infants^{1,2}
- The cause of 13%-17% of cases of prolonged cough in adolescents and adults⁴



Epic of Scanning Photo Researchers, Inc.

References: 1. Centers for Disease Control and Prevention (CDC). *MMWR*. 2005;55(RR-14):1-16. 2. CDC. *MMWR*. 2006;55(RR-17):1-37. 3. Long SS. Pertussis (*Bordetella pertussis* and *Bordetella parapertussis*). In: Kliegman RM, et al, eds. *Textbook of Pediatrics*. 18th edition. Philadelphia, PA: Saunders Elsevier;2007:1178-1182. 4. Cherry JD. *Pediatrics*. 2005;115(5):1422-1427.

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Pertussis

- 7 – 10 day incubation period
- Range of 4 – 21 days but can be as long as 42 days

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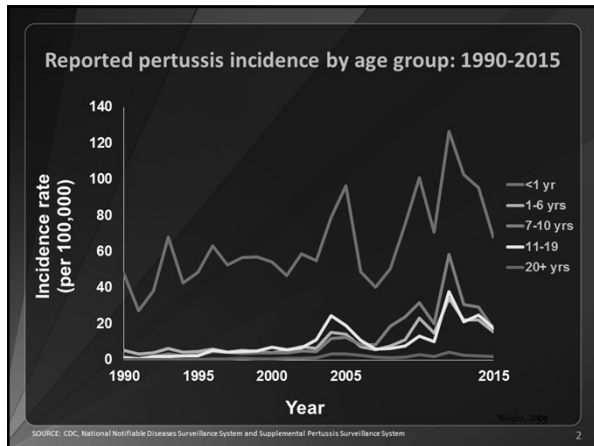
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Pertussis

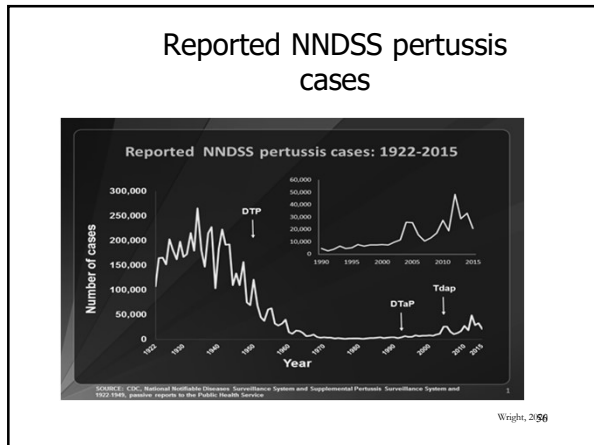
- Attaches itself to the cilia of the respiratory epithelial cells, producing toxins which paralyze the cilia
- Causes inflammation in the respiratory tract
- Decreases ability to clear respiratory secretions

www.cdc.gov/pertussis/clinical/disease-specifics.html accessed 08-29-2011
Wright, 2020

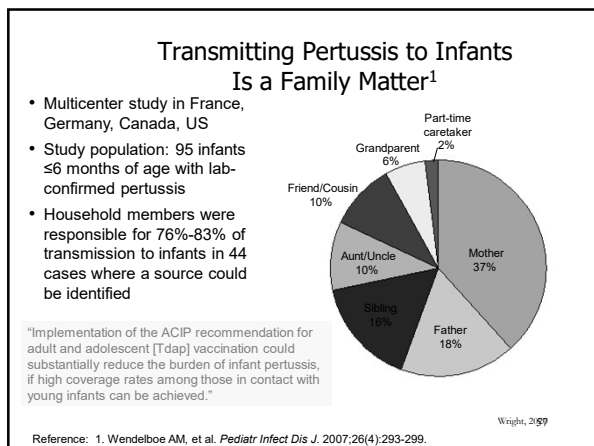
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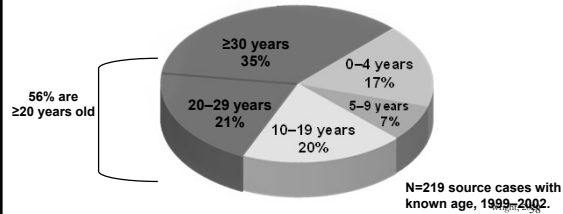


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Transmission to Infants—Rationale for CDC Recommendations

Although the source of pertussis in infants is often unknown, adult close contacts are an important source when a source is identified.

Age of Source Among Infants Aged <12 Months



Bigard KM, et al. *Pediatr Infect Dis J*. 2004;23:985-989.

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Hospital Transmission of Pertussis

Location	Index Case	Secondary Cases
Minnesota, 2005 ¹	Unknown	122 cases (64 cases in healthcare personnel)
Texas, 2004 ²	Healthcare worker	11 newborns
Washington, 2004 ³	ED physician (hospital A)	5 cases among staff and visitors (hospital A)
	Respiratory therapist (hospital B)	3 cases among nurses (hospital B)
Pennsylvania, 2003 ^{4,5}	Infant	17 symptomatic cases in healthcare workers
Louisiana, 2004 ⁶	Infant*	3 infants diagnosed with pertussis

*The source believed to be an adult hospital worker or visitor.

1. Leekha S, et al. *Infect Control Hosp Epidemiol*. 2009;30:467-473. 2. CDC. *MMWR*. 2008;57(22):600-603. 3. Baggett HC, et al. *Infect Control Hosp Epidemiol*. 2007;28:537-543. 4. CDC. *MMWR*. 2005;54:54-59. 5. Calugar A, et al. *Clin Infect Dis*. 2006;42:981-988. 6. Vranken P, et al. *Am J Infect Control*. 2006;34:550-554.

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October 2010 – ACIP Recommendations

- Interval has been removed for time between Td and Tdap
- Also – Tdap may now be given (off-label) to individuals 7 years of age (as a catch up) for children not immunized

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February 2012

- All individuals 65 years of age and older
- Should receive Tdap

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New 2013

- Tdap with each pregnancy between 27 and 36 weeks of the pregnancy
- Regardless of interval and previous vaccination with Tdap

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October 2019

- **Tdap may now be used for revaccination every 10 years**

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Meningococcal Disease

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Statistics

- In the United States, approximately 4,100 cases of bacterial meningitis occur annually
- Approximately 500 deaths annually each year between 2003 and 2007

<http://www.cdc.gov/meningitis/bacterial.html>
accessed 12-30-2012

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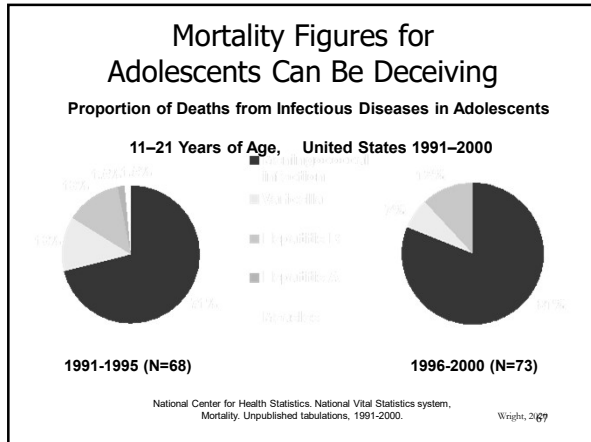
Meningococcal Disease

- Often serious, this rapidly progressing infection leaves little time for diagnosis and treatment
- Early meningococcal disease can present with symptoms similar to common viral illnesses, making diagnosis difficult¹
- *Neisseria meningitidis* is now the most prevalent etiologic agent of bacterial meningitis among children and adolescents 2 to 18 years of age in the US²

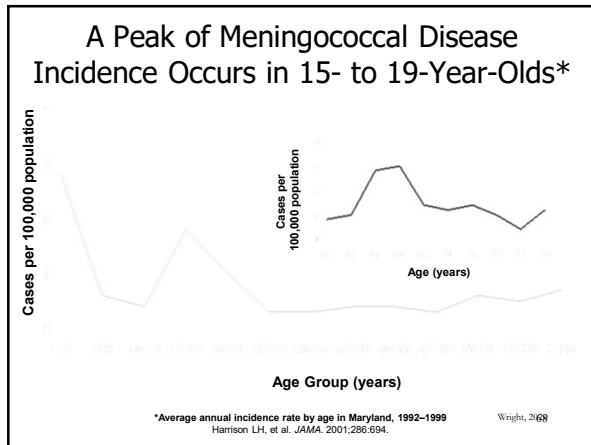
Wright, 2066

1. Grandoff DM, et al. In: Vaccines. 4th ed. 2004:959. 2. Schuchat A, et al. N Engl J Med. 1997;337:970.

66



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Surviving Meningococcal Disease

<p>Meningococcemia</p> <ul style="list-style-type: none"> • Skin scars from necrosis • Limb loss from gangrene <ul style="list-style-type: none"> • Renal failure • Septic arthritis • Pneumonia • Epiglottitis • Pericarditis 	<p>Meningitis</p> <ul style="list-style-type: none"> • Spastic quadriplegia • Hearing loss • Cerebral infarction • Cortical venous thrombophlebitis • Cerebral edema • Cranial nerve palsies • Mental retardation <ul style="list-style-type: none"> • Hemiparesis
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Up to 40% fatality rate 3% to 10% fatality rate

1. Granoff DM, et al. In: Vaccines. 4th ed. 2004:959. 2. Feltek JM, et al. Arch Dis Child. 2001;85:6. 3. Erickson L, De Wals P. Clin Infect Dis. 1998;26:1159. 4. Erickson L, et al. Clin Infect Dis. 2001;33:737. 5. Munford RS. In: Harrison's Principles of Internal Medicine. 2001:927. Wright, 269

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Severe Late-Stage Meningococcal Infection in a 15-Year-Old Boy



Reprinted with permission from Schoeller T, Schmutzhard E. *N Engl J Med.* 2001;34:1372. Wright, 2020

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Meningococcal Disease Is Serious but Preventable in Adolescents and Young Adults

Maryland Residents Diagnosed With Invasive Meningococcal Disease, January 1, 1990 to December 31, 1999

	All Ages n/Total (%)	<15 Years n/Total (%)	15–24 Years n/Total (%)
Fatal Cases	40 / 294 (13.6%)	5 / 109 (4.6%)	16 / 71† (22.5%)
Potentially Vaccine- Preventable	193 / 257* (75.1%)	64 / 94 (68.1%)	53 / 64‡ (82.8%)

*Serogroup information was not available for all cases
 †P = 0.004, <15 yrs vs 15–24 yrs
 ‡P = 0.04, <15 yrs vs 15–24 yrs
 Harrison LH, et al. *JAMA.* 2001;286:694. Wright, 2020

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ACIP Recommendations – October 2010

- ACIP recommends routine vaccination of adolescents with MCV4 beginning at age 11 through 12 years at the pre-adolescent vaccination visit, with a booster dose at age 16 years.
- For adolescents vaccinated at age 13 through 15 years, a one-time booster dose should be given 3 to 5 years after the first dose
- If given at 16 years or older, no booster

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MCV4 - 2012 Update

- First year college students up through age 21 years who are living in residence halls should be vaccinated if they have not received a dose on or after their 16th birthday
- Revaccinate adults every 5 years at high risk (complement deficiencies and functional/anatomic asplenia)

<http://www.cdc.gov/meningitis/bacterial.html> accessed 12-30-2012

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Additional Vaccine

- *Neisseria meningitidis* Group B
- Indications:
 - Age 10 – 25 years of age
 - Trumenba: Three doses:
 - Day 0, day 2 months and day 6 months
 - NOW AVAILABLE: 2 DOSE SERIES day 0 and day 6 months
 - Bexsero: Two doses
 - Day 0 and day 1 month
- Indications:
 - CDC: Ideal time to administer: 16-18 years of age

Wright, 2014

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Human Papillomavirus (HPV): Disease Awareness

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HPV

- One vaccine now available
 - HPV 9

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HPV 9

- Protection:
 - 90% reduction in cervical, vaginal and vulvar cancer
 - 90% reduction in genital warts
 - 78% reduction in anal cancers
 - Beginning to see reduction in oral-pharyngeal SCC
- Same approvals as HPV4
- Do NOT revaccinate with HPV9
- May finish series with HPV 9 if not completed

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HPV Vaccine

- Series of 2 - 3 injections depending upon age of first injection
 - Day 0, day 1 - 2 months, and day - 6 months
 - Day 0 and day 6 months
- .5 ml injection IM injection into deltoid
- Schedule
 - If first dose given between 9 and 14 years of age, two dosage series (day 0 and day 6 months)
 - If first dose is given between 15 and 26 years of age, three dose series (d 0, d 1-2 months,⁸¹d

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Latest Studies

- The HPV vaccine has cut HPV infections by up to 90% in the past 10 years
- 187 million doses of the vaccine administered in 130 countries around the world
- No increase in autoimmune conditions in vaccinated individuals

<https://sciencealert.com/the-HPV-vaccine-has-halved-cervical-cancer-rates-in-the-past-10-years> accessed 11-01-2017 Wright, 2022

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Latest Studies

- Rate of Australian youths with juvenile-onset recurrent respiratory papillomatosis, a rare, chronic respiratory disease caused by mother-to-child transmission of human papillomavirus type 6 or 11, declined from 0.16 per 100,000 people in 2012 to 0.02 per 100,000 in 2016,
- Researchers attribute this to the success of a nationwide quadrivalent HPV immunization program
The Journal of Infectious Diseases, news release, Nov. 9, 2017 accessed 11-21-2017

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Exciting News

- Approved and recommended
- Expanded age: 27 – 45 years of age
- Men and women

<https://www.curetoday.com/articles/fda-grants-priority-review-to-gardasil-9-for-expanded-age-indication> accessed 07-04-2018

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Opioid epidemic

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Hepatitis B

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Hepatitis B Vaccination

- Hepatitis B vaccination should be administered to:
 - Unvaccinated adults with diabetes mellitus who are aged 19 through 59 years
 - Hepatitis B vaccination may be administered at the discretion of the treating clinician to unvaccinated adults with diabetes mellitus who are aged ≥ 60 years
 - Administration of the hepatitis B vaccine series should be completed as soon as feasible after diabetes is diagnosed

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6050a4.htm?s_cid=mm6050a4_w accessed 12-20-2012

Wright, 2017

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Hepatitis B Vaccination

- Reasons for vaccination:
 - Risk posed by an increased need for assisted blood-glucose monitoring in LTC facilities, the likelihood of experiencing chronic sequelae if infected with HBV, and the declining immunologic responses to vaccines that are associated with frailty, a geriatric syndrome characterized by decreased physiologic reserve and increased vulnerability, leading to early mortality in older

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6050a4.htm?s_cid=mm6050a4_w accessed 12-20-2012

Wright, 2018

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Additional Recommendations

- Hepatitis B series
 - All individuals with liver disease
 - Including fatty liver, cirrhosis, alcoholic liver disease
 - All individuals with ALT or AST > 2 x upper limits of normal

<http://www.aafp.org/news/health-of-the-public/20161026acipocmtg.html> accessed 03-01-2017

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Hepatitis C

- 2016: 41,200 acute hepatitis C cases
- 2016: 2.4 million people in the United States are living with hepatitis C virus infection
- HCV infection becomes chronic in approximately 75%–85% of cases
 - All individuals born between 1945 – 1965 should be screened
 - All injection drug users or those with history

<https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#a2>

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Hepatitis A: October 2018

- All persons aged 1 year and older who experience homelessness should be routinely immunized against Hepatitis A

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Miscellaneous

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STARI

- A rash similar to the rash of Lyme disease has been described in humans following bites of the lone star tick, *Amblyomma americanum*
 - Transmitted via the lone-star tick
- The rash may be accompanied by fatigue, fever, headache, muscle and joint pains.
- This condition has been named southern tick-associated rash illness (STARI)
- Treated with doxycycline

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Alpha-Gal Meat Allergy

- May be linked to the lone star tick
 - Significant evidence that the lone star tick can inject the alpha-gal carbohydrate molecule into the human upon tick bite, thereby leading to an excessive production of IgE antibodies
- Alpha-gal allergy is a syndrome that was first described in 2009 as a delayed anaphylaxis to red meat
- Occurs about three to eight hours after eating red meat
 - Can resolve over 1 – 5 years

<https://www.columbia-lyme.org/alpha-gal-meat-allergy> 94

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Rocky Mountain Spotted Fever

- Rapidly progressing disease
- Can be fatal within days if not diagnosed
- Generally within 1-5 days after tick bite
- Symptoms:
 - Early: fever, headache, n/v, abdominal pain, hand edema
 - Later symptoms – pink macular rash which spreads and can involve palms/soles, confusion, organ failure, petechial rash

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Rocky Mountain Spotted Fever

- Diagnosis:
 - IFA for immunoglobulin IgG R. rickettsia antigen; acute and convalescent sample separated by 2-4 weeks
- Treatment:
 - Begin treatment immediately, even if no testing able to be completed
 - Doxycycline: AAP says able to use this in children of all ages for RMSF
 - 100 mg bid for adults until 3 days after fever subsides
 - Children < 45 kg – 2.2 mg/kg to a max of 100 mg bid
 - Pregnant women: must discuss benefits and risks

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Enterovirus D-68

- Enterovirus:
 - Associated with common cold
 - Common in summer and fall
 - Started appearing August 2014 when children presented with more severe respiratory infections, many of whom were hospitalized
 - Not a new virus, but seems to be more common and more severe

www.cdc.gov accessed 10-13-2014 Wright, 2020

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Enterovirus – D68

- From mid-August to October 10, 2014, CDC or state public health laboratories have confirmed a total of 691 people in 46 states and the District of Columbia with respiratory illness caused by EV-D68
- Testing:
 - nasopharyngeal and oropharyngeal swabs are preferred
- Treatment: aggressive asthma treatment
 - Prednisone and albuterol

www.cdc.gov accessed 10-13-2014 Wright, 2020

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Acute Flaccid Myelitis

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Acute Flaccid Myelitis

- Since 2014, most patients with AFM (more than 90%) had a mild respiratory illness or fever consistent with a viral infection before they developed AFM (CDC started tracking in 2014)
- Coxsackievirus A16, EV-A71, and EV-D68 found in the spinal fluid of four of 542 confirmed cases
- In 2014, 120 children in the US developed flaccid myelitis

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Acute Flaccid Myelitis

- Incubation period: 6 – 20 days
- Paralysis: 11 – 17 days; but depending upon etiology can be as soon as 2 days and as long as 12 weeks
- Diagnosis: MRI – spinal cord lesions in the gray matter; pleocytosis of 5 cells/mm³
- Treatment: admission, antivirals and supportive care
 - Corticosteroids, IVIG – little evidence to support

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Breaking News

- Philippines – first case of Polio just diagnosed by WHO this past week

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Enterovirus D68

- Recent increase in Netherlands (June – July 2016)
 - 8 adults and 17 children
 - Severe respiratory symptoms
 - 13 children required ICU management
 - 1 acute flaccid myelitis
 - No specific treatment

https://wwwnc.cdc.gov/eid/article/23/1/16-1313_article accessed 12/17/2016

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Rotavirus Vaccine

- **Rotavirus vaccine**
 - Linked to lower rates of type 1 diabetes
 - 33% less likely to develop type 1 diabetes later in life than those who weren't vaccinated
 - Studied looked at 1.5 million infants in the US between 2001 and 2017

<https://www.nature.com/articles/s41598-019-44193-4> accessed 06-29-2019

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Great Resource



<https://www.contagionlive.com/outbreak-monitor>

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Great Resource

Category	Disease	Outbreak Name	Location	Total Cases	Total Deaths	Source
Skin & Soft Tissue Diseases	Acute Flaccid Myelitis	Acute Flaccid Myelitis 2019	Tennessee	2	0	Enterovirus A71 and Acute Flaccid Myelitis
Skin & Soft Tissue Diseases	Measles	Illinois Measles Outbreak	Illinois	4	0	More Exemptions and Less Vaccination: The 2 Factors Driving US Measles Outbreaks
Skin & Soft Tissue Diseases	Measles	Texas Measles Outbreak	Texas	8	0	More Exemptions and Less Vaccination: The 2 Factors Driving US Measles Outbreaks
Skin & Soft Tissue Diseases	Measles	Washington State Measles Outbreak	Multnomah County, Oregon	4	0	Travel-Associated Measles Outbreaks On the Rise in US
Skin & Soft Tissue Diseases	Measles	Rockland County, NY Measles Outbreak	Rockland County, NY	138	0	More Exemptions and Less Vaccination: The 2 Factors Driving US Measles Outbreaks
Zoonotic & Vector-borne	Hedgehog Salmonella	Hedgehog Salmonella	Massachusetts	4	0	CDC Announces Salmonella Outbreak

<https://www.contagionlive.com/outbreak-monitor>

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Thank you for your time and attention.

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