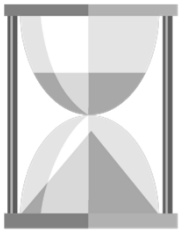

The Presentation will begin shortly, until then there will be no audio.

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Vaccine Preventable Diseases

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Outline

- Pertussis
- Influenza
- Measles
- Mumps
- Rubella
- Meningococcal Disease
- Chickenpox

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What is Pertussis?

- Coughing illness caused by bacteria *Bordetella pertussis*.
- Also called Whooping Cough after the characteristic whoop that results between coughing fits
- Symptoms can include cold-like symptoms, coughing fits, posttussive vomiting, whoop, apnea
- Cough will persist for at least 14 days

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Presentation and Complications

- Presentation Varies
  - Young infants may present with only apnea
  - Vaccinated individuals may have less severe illness
- Complications
  - The most common complication is Pneumonia
  - Infants may also suffer from seizures and encephalopathy
  - Death is rare but does occur. Most deaths are in unvaccinated infants.

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Clinical Case Definition

- A cough illness lasting at least 2 weeks with one of the following:
  - Paroxysms of Coughing
  - Posttussive vomiting
  - Inspiratory Whoop

  Without any other apparent cause, as reported by a healthcare professional.

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Case Classification

- Confirmed
  - A case of acute cough illness of any duration with a positive culture for *Bordatella Pertussis*
  - A case that meets the clinical case definition and is confirmed by PCR
  - A case that meets the clinical definition and is epidemiologically linked directly to a case confirmed by either culture or PCR
- Probable
  - Meets the clinical case definition but is not laboratory confirmed and is not epidemiologically linked to a laboratory confirmed case

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Phases of Pertussis

- Catarrhal Stage- lasts about 7-10 days
  - Typically patients suffer from cold-like symptoms and a mild cough
- Paroxysmal Stage- can last from 1-10 weeks
  - Characteristic symptoms of pertussis.
    - Paroxysms of Coughing
    - Cyanosis
    - Whoop
    - Posttussive Vomiting
    - Exhaustion from coughing
- Convalescent Stage- Can last from 4-21 days
  - Stage of gradual recovery
  - Less frequent coughing fits
  - Paroxysms may reoccur over months following recovery

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Diagnosis and Testing

- Acceptable methods of lab testing include PCR and Culture
- Culture is the gold standard but can be difficult
- PCR is most common method of laboratory diagnosis
- If Pertussis is suspected, appropriate antibiotics should be administered immediately and the patient should be advised to exclude themselves from group activities or settings

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Laboratory Testing

- Pertussis samples can be sent to the North Dakota Department of Health Laboratory
- Samples should be sent with a Laboratory Test Request Form with the requested information to the following address:

  Division of Microbiology
  2635 East Main Avenue
  Bismarck, ND 58504

- Currently the cost of a pertussis test is $51

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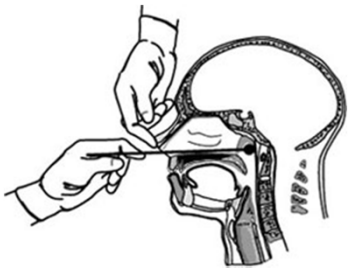
How to Obtain a Specimen for Pertussis Testing

- Ideally two swabs should be collected, one for PCR and one for Culture
- Swab for culture must be stored in a tube with Regan Lowe transport agar



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Transmission

- Pertussis is transmitted by aerosol droplets containing the bacteria
  - Transmission can also occur through contact with freshly contaminated articles but this is less common
- A person is most infectious from the Catarrhal Stage and the first 2 weeks after cough onset (21 days)
- Antibiotics can prevent transmission by killing the bacteria in respiratory secretions
  - 5 days of antibiotic therapy must be completed before a person is considered non-contagious

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Treatment

- Most common treatment is Azithromycin
- Other antibiotics that can be used include Erythromycin, Clarithromycin, and Trimethoprim-Sulfamethoxazole
- Treatment prevents transmission but does not affect symptoms unless given very early on in illness
- A person is no longer contagious after 5 days of appropriate antibiotic *OR* after 21 days of coughing

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Treatment

Antibiotic	Infants (< 6 months of age)	Infants (≥ 6 months of age) and Children	Adults
Azithromycin*** (Zithromax®)	< 1 month: Recommended agent. 10 mg/kg/day in a single dose for 5 days 1-5 months: 10 mg/kg/day in a single dose for 5 days	10 mg/kg in a single dose on day 1 then 5 mg/kg per day on days 2-5 (Max 500mg)	500 mg in a single dose on day 1 then 250 mg per day on days 2-5
Erythromycin (E-mycin®, Eryc®, EryTab®)	< 1 month: Not preferred, associated with IHPS.* 1-5 months: 40-50 mg/kg per day in 4 divided doses for 14 days	40-50 mg/kg/day PO, in 4 divided doses for 14 days (Max 2 g/day)	2 g per day in 4 divided doses for 14 days
Clarithromycin (Biaxin®)	< 1 month: Not recommended 1-5 months: 15 mg/kg/day in 2 divided doses for 7 days	15 mg/kg/day PO in 2 divided doses for 7 days (Max 1 g/day)	1 g per day in 2 divided doses for 7 days
Trimethoprim-Sulfamethoxazole (Bactrim™, Septra®)	<2 months: Contraindicated 2-5 months: TMP 8 mg/kg/day, SMZ 40 mg/kg/day in 2 divided doses for 14 days	TMP 8 mg/kg/day, SMZ 40 mg/kg/day in 2 divided doses for 14 days	TMP 320 mg/day, SMZ 1600 mg/day in 2 divided doses for 14 days

SMZ = sulfamethoxazole, should not be given to pregnant women near term, nursing mothers, orinfants < 2 months of age
TMP = trimethoprim, should not be given to pregnant women nearterm, nursing mothers, or infants < 2 months of age

Source: Centers for Disease Control and Prevention. Recommended Antimicrobial Agents for Treatment and Postexposure Prophylaxis of Pertussis. MMWR 2005;54 (No. RR-14):10.

*Infantile hypertrophic pyloric stenosis.

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Reporting and Exclusion

- A person should be excluded from activities as soon as pertussis is even suspected
- Pertussis is contagious from the onset of symptoms until the duration of the cough has reached 21 days or until they have completed 5 days of antibiotic therapy
- Pertussis is a reportable condition
  - Pertussis positive lab results should be reported to Disease Control
  - MD Diagnosis of Pertussis should also be reported
- Reporting can be done by completing an online disease report card or by calling disease control

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Pertussis Surveillance

- Disease Control Investigates each case of Pertussis
- Collect information on each case
- Report cases to CDC
- Follow-up on exposed close contacts
- Help schools notify parents of exposure
- Make recommendations for chemoprophylaxis

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Childhood Vaccination

- DTaP
  - Approved for ages 6 weeks-6 years
    - Series of 4 doses at 2,4,6 and 15-18 months with an additional booster at 4-6 years of age
      - The fourth dose may be given as early as 12 months if 6 months have elapsed since the last dose
  - Evidence of waning immunity
    - High rates of pertussis among adults and adolescents over the age of 10
- Dtap is a required immunization for both school and childcare attendance

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Adult and Adolescent Vaccination

- Tdap – 2 brands
  - According to ACIP, both Adacel and Boostrix can be used for anyone over 7 years of age
  - One time dose
  - Booster to childhood DTaP vaccination
- Can also be used to catch up unimmunized individuals
  - 1 dose of Tdap followed by 2 doses of Td
- Tdap is a required school immunization
  - Students should have received Tdap upon middle school entry

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Newer Recommendations

- ACIP recommended that women receive a dose of Tdap during each pregnancy
  - Rationale is that protective antibodies will be passed on the fetus
  - Optimal time for vaccination is 27-36 weeks
- ACIP has recommended both brands of Tdap be used in ages 7 and older if they have not been fully vaccinated with DTaP.
- There is no minimum interval between Td and Tdap

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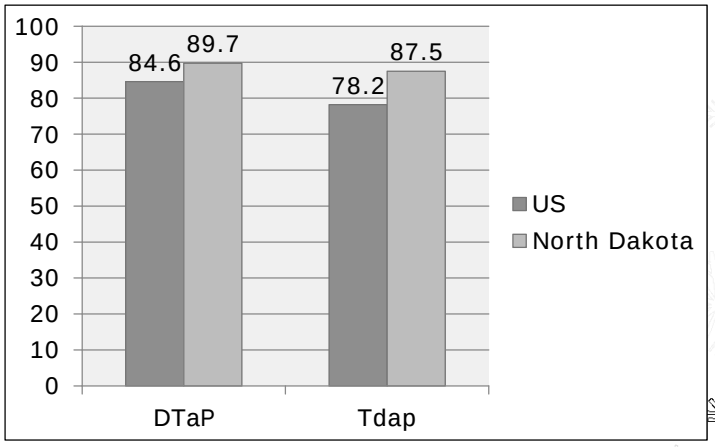
Vaccination Rates in North Dakota and the United States



* According to the National Immunization Survey (NIS)

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Big Year for Pertussis

- Highest number of pertussis cases in US since 1959(40,000).
- Highest number of pertussis cases in North Dakota since 2004 (757)
- North Dakota had more than triple the number of cases in 2011(70).
- Rates:
  - **United States: 12.97/100,000 people**
  - North Dakota: 31.14/100,000 people
    - 27 counties in North Dakota had a least one case of pertussis
      - Ward county: 88.96/100,000 people
      - Burleigh County: 25.25/100,000
      - Cass County: 19.03/100,000
      - Grand Forks County: 19.5/100,000

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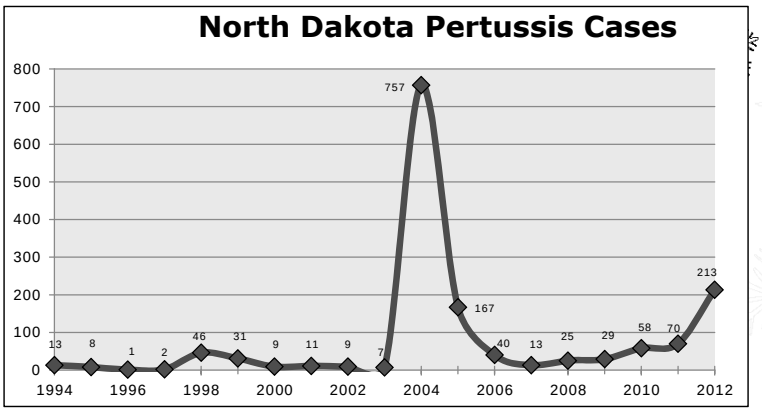
Pertussis in North Dakota



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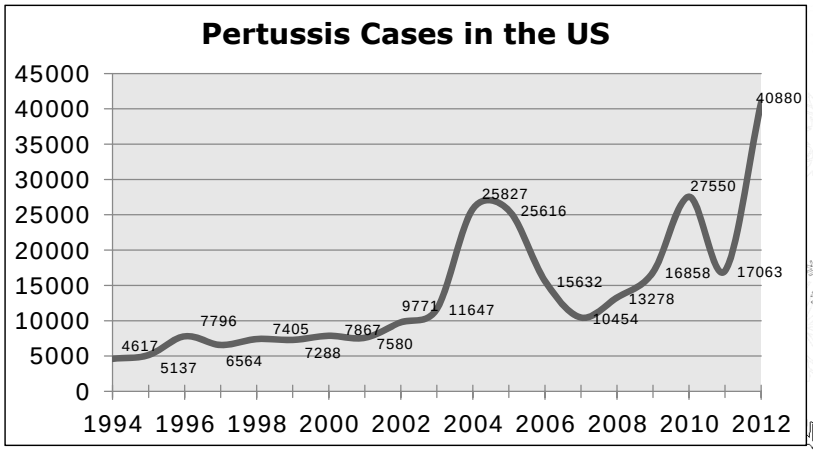
Pertussis in the United States



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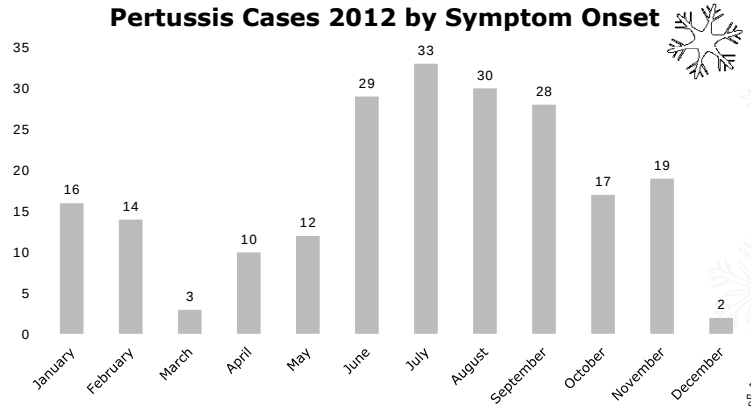
Epi-Curve for ND Pertussis Cases



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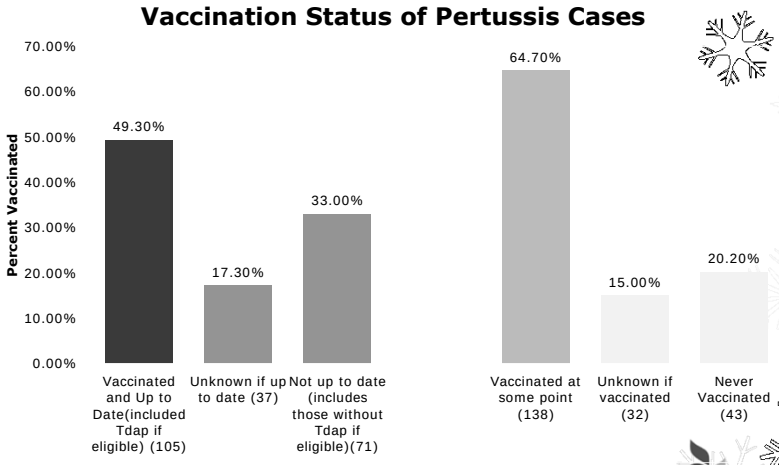
Vaccination Status Among ND Pertussis Cases



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Why was there such a high number of cases this year?

- Incidence of pertussis usually peaks every 3-5 years
- Waning immunity from childhood pertussis vaccines
- Increased recognition of pertussis by physicians
- Better diagnostic testing of pertussis
- Increased reporting of pertussis cases

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Influenza

- An acute respiratory disease caused by influenza viruses
- Symptoms typically include fever, body aches, dry cough, headache, and fatigue.
- Definitive diagnosis requires both symptoms and laboratory confirmation.

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This Year's Vaccine

2012-13 trivalent vaccine virus strains

- **A/California/7/2009 (H1N1)-like**
- A/Victoria/361/2011 (H3N2)-like
- B/Wisconsin/1/2010-like.

- It is recommended that children over the age of 6 months be vaccinated
- It is also recommended that healthcare workers and those in contact with children should be vaccinated

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Inactivated Vaccines for Flu

- Intramuscular
  - Standard flu shot
  - Some brands approved for people 6 months or older.
  - Age indications vary by brand
- Intradermal
  - Approved for people 18 to 64 years of age
  - Lower dose but produces same immune response at IM
- High Dose
  - Indicated for adults 65 years and older
- A new quadrivalent vaccine has been approved and should be available for next year's flu season

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Live Vaccine for Flu

- Flumist
  - Approved for ages 2-49
  - Live attenuated influenza vaccine
  - Healthy people who are not pregnant may receive
  - People who have frequent contact with immuno-compromised individuals should not receive flumist.

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High Risk for Developing Flu-Related Complication

- Pregnant Women
- Children under the age of 5
- Adults over the age of 65
- Native Americans and Alaskan Natives

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High Risk for Developing Flu-Related Complication

- Also those with the following health conditions:
  - Asthma
  - Neurological and neurodevelopmental conditions
  - Chronic lung disease
  - Heart disease
  - Blood Disorders
  - Endocrine Disorders
  - Kidney Disorders
  - Liver Disorders
  - Metabolic Disorders
  - Weakened Immune System
  - People younger than 19 receiving long-term aspirin therapy
  - People who are morbidly obese

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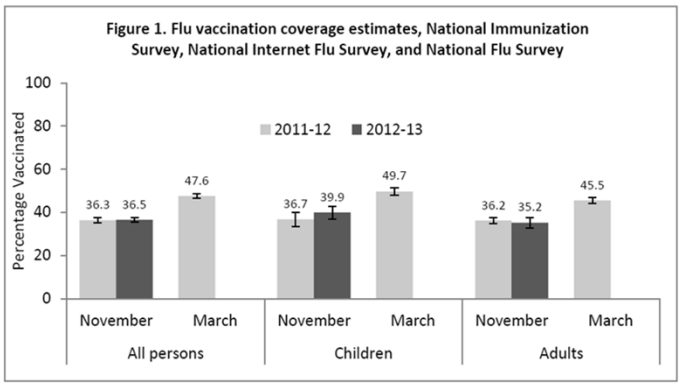
Flu Vaccine Coverage

Data sources: National Immunization Survey and National Internet Flu Survey, November 2012



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Last year's flu season

- 1487 reported cases in the 2011-2012 flu season
- 45 novel H1N1 cases
- The largest number of cases were reported in the 1-5 age group (264)
- 31% of cases occurred in children under the age of 10
- Peak of the flu season occurred the week of February 27, 2011 with 266 cases.

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This Flu Season So Far…

- **1079** Total Influenza Cases
- **52** Hospitalizations
- **10** LTC Outbreaks
- **1** Death
- The week of December 22,2012 had over **400** cases
- May experience peak earlier than usual this year

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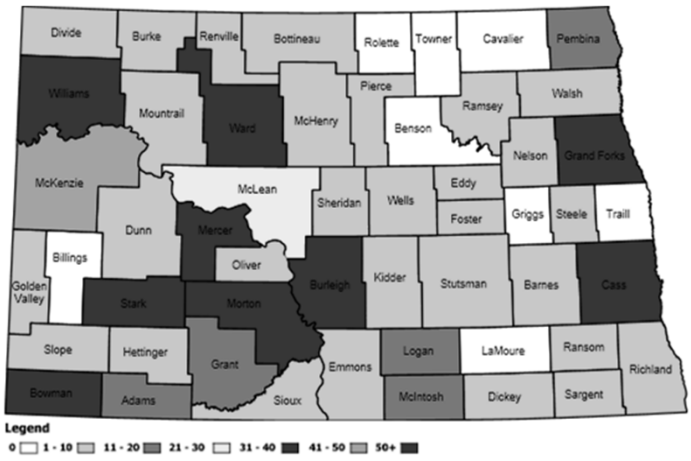
This Flu Season So Far…



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Current Flu Season in the U.S.

- Most cases of flu this season are type A (504)
- Overall, this year's vaccine provides protection against most of the circulating flu viruses
- 99.3% of the 281 H3N2 influenza viruses tested have been characterized as A/Victoria/361/2011-like
- 100% of 2009 H1N1 viruses tested were characterized as A/California/7/2009-like
- 68.7% of the 115 influenza B viruses tested so far this season have been characterized as B/Wisconsin/1/2010-like

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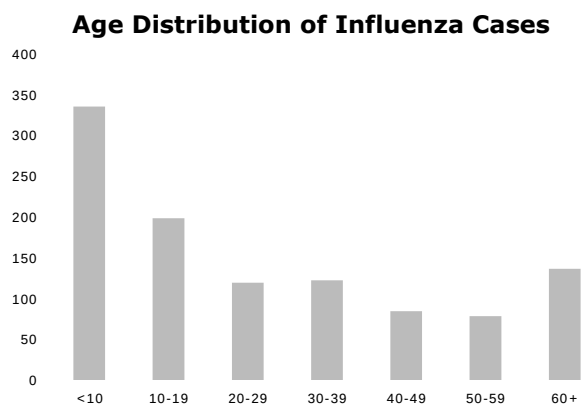
Age Distribution of Cases in North Dakota



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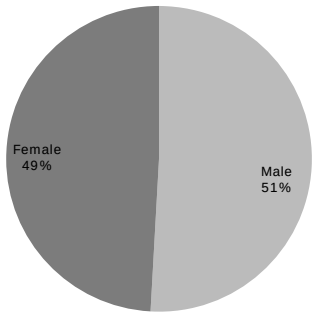
Gender Distribution of Cases in North Dakota



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Measles

- Measles is characterized by a prodrome of fever and malaise, cough, coryza (cold-like symptoms), and conjunctivitis, followed by a maculopapular rash.
- The illness is usually mild or moderately severe; however, measles can result in complications such as pneumonia, encephalitis and death.
  - Only 1 confirmed case in North Dakota (2011) since 1987
  - 1 suspect case also occurred in 2011
- There were 55 cases of measles in the U.S. in 2012
  - 220 cases in 2011

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Measles Case Definition

- **Confirmed:**
  - **Laboratory confirmation**
    - **Positive serology for IgM, Significant rise in measles antibody level, Isolation of measles virus from a clinical specimen or a positive PCR for Measles**

      OR

    - **Must be linked to a confirmed case and experience a generalized rash lasting over 3 days, a temperature over 101 °F and experience either a cough, coryza or conjunctivitis.**
- **Probable:**
  - **If no other diagnosis is suspected then all of the following symptoms must be present: Generalized rash lasting ≥3 days, Temperature ≥101°F,Cough, coryza, or conjunctivitis**

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Mumps

- An acute viral disease caused by Paramyxovirus.
- Over the last 5 years
  - 7 confirmed cases
  - 2 probable cases
  - 10 suspect cases
- The U.S. saw 199 cases of mumps in 2012
  - 404 cases in 2011
- Very broad case definition

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Mumps

Characterized by:

- Swollen glands in front of and below the ear or under the jaw (parotitis)
- Fever
- Headache
- Earache
- Possible painful swelling of the testicles in men (orchitis)
- Possible swelling of the ovaries in women, which may cause abdominal pain

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Mumps Case Definition

- Confirmed: A positive mumps laboratory confirmation for mumps virus with RT-PCR or culture in a patient with an acute illness characterized by any of the following:
  - Acute parotitis or other salivary gland swelling, lasting at least 2 days, aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, mastitis, pancreatitis
- Probable: acute parotitis or other salivary gland swelling lasting at least 2 days, or orchitis or oophoritis unexplained by another more likely diagnosis, in:
  - A person with a positive test for serum anti-mumps igm antibody, or
  - A person with epidemiologic linkage to another probable or confirmed case or linkage to a group/community defined by public health during an outbreak of mumps.
- Suspect: Parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis, or A positive lab result with no mumps clinical symptoms (with or without epidemiological linkage to a confirmed or probable case).

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Rubella

- A viral illness caused by a togavirus of the genus *rubivirus*
- Characterized by a mild, maculopapular rash.
- Only 1 case in North Dakota in the last 5 years
- Occurred in 2008
- 8 cases occurred in the U.S. in 2012
  - 4 cases in 2011

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Rubella Symptoms

- Rubella is characterized by:
  - Fever
  - Maculopapular rash
    - Starts on face and generalizes
  - General ill feeling
  - Lymphadenopathy or swelling behind ears or back of neck

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Rubella Case Definition

- Confirmed:
  - A case with or without symptoms who has laboratory evidence of rubella infection OR
  - An illness characterized by all of the following: Acute onset of generalized maculopapular rash; and Temperature greater than 99.0° F, Arthralgia, arthritis, lymphadenopathy, or conjunctivitis and Epidemiologic linkage to a laboratory-confirmed case of rubella.
- Probable:
  - no other diagnosis, an illness characterized by all of the following: acute onset of generalized maculopapular rash, and temperature greater than 99.0° F or 37.2° C, arthralgia, arthritis, lymphadenopathy, or conjunctivitis; and lack of epidemiologic linkage to a laboratory-confirmed case of rubella, noncontributory or no serologic or virologic testing.
- Suspected:
  - Any generalized rash illness of acute onset that does not meet the criteria for probable or confirmed rubella or any other illness.

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Vaccine

- MMR vaccine is available for both Children and Adults
- The recommended schedule is a dose at 12-15 months of age and another dose at 4-6 years
- If a person did not receive their childhood vaccines for Measles, Mumps and Rubella; they can receive the vaccine as an adult
- MMRV is also available and protects against Chickenpox in addition to Measles, Mumps, and Rubella
- MMR is a required vaccine for school and childcare attendance

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Meningococcal Disease

- Bacterial meningitis
- Caused by *Neisseria meningitidis*
- Meningococcal illness characterized by:
  - Fever
  - Headache
  - Vomiting
  - Stiff neck
  - Rash

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Neisseria Meningitidis

- In the last 5 years:
  - 13 confirmed cases (6 in 2008)
  - 1 probable case
    - 4 cases were strain B
    - 3 cases were strain C
    - 5 cases were strain Y
    - 2 cases were unknown strains
- Very serious
  - All age mortality is ~10%
  - Adolescent mortality is ~25%
- Not usually associated with outbreaks
- MCV4 vaccine covers strains A,C,Y,W-135
  - Two conjugate vaccines now available
  - Should be administered at ages 11-12 with a booster at 16

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2012 Meningococcal Vaccine Requirement

- Starting in Fall 2012 meningococcal vaccine is required for entry into ND colleges
  - Includes requirement for booster dose after age 16
  - Documentation of immunity under Policy 506.1.2 means: (a) evidence of at least one dose of meningococcal conjugate vaccine in the five years prior to enrollment or (b) evidence of two doses of meningococcal conjugate vaccine administered at age 10 or older and at least eight weeks apart.

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Guidelines for Catch-Up

- Not recommended to begin series if person is over the age of 21
- Booster not recommended if person is over the age of 22
- Minimum interval is 8 weeks, although 3-5 years is preferred
- If first dose is given at the age of 16 or older, no booster is needed

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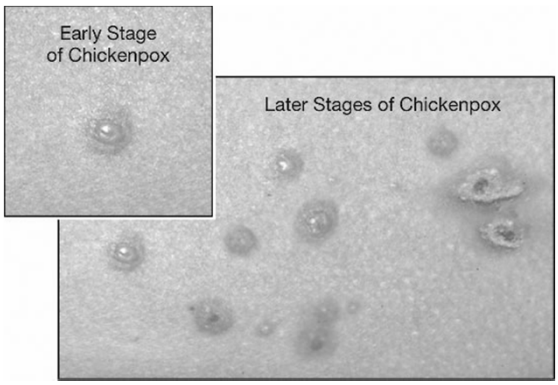
Chickenpox



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Chickenpox

- Characterized by rash which typically consists of 250-500 lesions
- Low grade fever
- Can become more serious if lesions become infected with bacteria or if the central nervous system is involved
- Tends to be more severe in infants, adolescents and adults as opposed to young children

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Clinical Case Definition

- Clinical Case Definition: an illness with acute onset of diffuse maculopapulovesicular rash without other apparent cause
- Confirmed: a case that is laboratory confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or a probable case.
- Probable: A case that meets the clinical case definition, is not laboratory confirmed, and is not epidemiologically linked to another probable or confirmed case.

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Chicken Pox

- Reportable condition
  - As mandated by North Dakota law, any incidence of this disease shall be reported to the North Dakota Department of Health.
- In 2012 North Dakota documented 22 confirmed cases and 16 probable cases
  - Often not reported
- Exclusion Criteria
  - Should be excluded until all blisters have dried into scabs and no new blisters have started for 24 hours
  - Usually takes 5-6 days

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Varicella Vaccine

- Routine vaccinations at 12-15 months of age
- Second dose at 4-6 years of age
- Minimum interval is 3 months for children under the age of 13
- Doses given to children over the age of 13 should be separated by 4 to 8 weeks
- Varicella vaccine available as well as MMRV
  - Varicella approved for 12 months and older
  - MMRV only approved for 12 months-12 years
  - Both live attenuated vaccines

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Questions

Type your question into either of the chat windows at your right.

After the presentation, questions may be sent to:

Amy Schwartz	amschwartz@nd.gov
Abbi Pierce	apierce@nd.gov
Molly Howell	mahowell@nd.gov
Janna Pastir	jlpastir@nd.gov
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This presentation will be posted to our website:
www.ndhealth.gov/immunize

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Evaluation and Post-test

- Post-test
  - Nurses interested in continuing education credit, visit www.ndhealth.gov/immunize/posttest/
  - Successfully complete the five-question post-test to receive your certificate
  - **Credit for this session is only available until January 16, 2012**

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