LEARNING OBJECTIVES

- Discuss the importance of routine immunizations throughout a lifespan
- Identify how routine immunizations can prevent communicable disease outbreaks
- Discuss current guidance pertaining to COVID-19 vaccines and COVID-19 boosters
- Discuss recommended immunizations for children, teens, and adults
- Identify barriers that may lead to vaccine hesitancy
Deaths from infectious disease decreased tremendously worldwide during the 20th century. This decline contributed to an increase in life expectancy and drop in infant/child mortality rates.

- In 1900, 30.4% of all US deaths occurred in children >5
- In 1997, 1.4% of all US deaths occurred in children >5
- Public health initiatives such as improved sanitation and hygiene, discovering antibiotics, and implementation of universal childhood vaccine programs all played a major role increasing lifespans and virtually eradicating many preventable communicable diseases.
LEADING CAUSES OF DEATH IN THE UNITED STATES (2020)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Daily Death Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td></td>
</tr>
<tr>
<td>COVID-19</td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td></td>
</tr>
<tr>
<td>Chronic lower respiratory disease</td>
<td></td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td>Other diseases of the respiratory system</td>
<td></td>
</tr>
<tr>
<td>Malignant neoplasm</td>
<td></td>
</tr>
<tr>
<td>Suicide</td>
<td></td>
</tr>
<tr>
<td>Disseminated Intravascular coagulopathy</td>
<td></td>
</tr>
</tbody>
</table>

Vaccines save millions of lives each year
We now have vaccines that prevent 20 life-threatening diseases
Vaccines are one of the most cost-effective interventions that contribute to healthcare system efficiency
Vaccines are critical to the prevention and control of infectious-disease outbreaks
Lack of access to vaccines and vaccine hesitancy work to undermine past public health achievements and increase risk of death due to preventable diseases.

Vaccine Preventable
Disneyland Measles Outbreak, 2014
VACCINE PREVENTABLE MEASLES OUTBREAK

• 1/5/2015: The California Department of Public Health (CDPH) was notified about a suspected measles case. The patient was a hospitalized, unvaccinated child, aged 11 years with rash onset on 12/28/2014. Only notable travel history was to Disneyland.
• 1/5/2015: CDPH received reports of 4 additional suspected measles cases in California residents and 2 in Utah residents, all of whom reported visiting one or both Disney theme parks during December 17–20.
• 1/7/2015: 7 California measles cases had been confirmed.
• 2/11/2015: 125 cases with rashes occurring between 12/28/2014-2/8/2015 had been confirmed in US residents connected to the outbreak.

Source: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6406a5.htm

AMONG THE 110 CALIFORNIA PATIENTS:

• Among the 84 patients with known hospitalization status, 17 (20%) were hospitalized.
• Twelve of the unvaccinated patients were infants too young to be vaccinated.
• 28 out of 37 vaccine eligible individuals (67%) were intentionally unvaccinated because of personal beliefs, and one was on an alternative plan for vaccination.
• 18 were children (aged <18 years), and 10 were adults.

Source: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6406a5.htm

THE MMR VACCINE COULD HAVE PREVENTED THIS OUTBREAK

• Measles is so contagious that if one person has it, up to 90% of the people close that person will also become infected if they are not protected.
• Two doses of MMR vaccine are about 97% effective at preventing measles.
• One dose is about 93% effective.

Source: https://www.cdc.gov/measles/vaccination.html

Source: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6406a5.htm
COVID-19 VACCINES AND BOOSTERS

WHAT VACCINES ARE AVAILABLE?

SOURCE: NORTH DAKOTA DEPARTMENT OF HEALTH

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age Group</th>
<th>Dose</th>
<th>Primary Series</th>
<th>Booster Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfizer Pediatric</td>
<td>5 – 11 years old</td>
<td>0.2mL</td>
<td>2 doses (21 days apart)</td>
<td>N/A</td>
</tr>
<tr>
<td>Pfizer</td>
<td>12+ years old</td>
<td>0.3mL</td>
<td>2 doses (21 days apart)</td>
<td>All individuals 12+ years old should get a COVID-19 booster dose 5 months after completing their primary series.</td>
</tr>
<tr>
<td>Moderna</td>
<td>18+ years old</td>
<td>0.5mL</td>
<td>2 doses (28 days apart)</td>
<td>All individuals 18+ years old should get a half dose (0.25mL) COVID-19 booster dose 5 months after completing their primary series. Allows for mix-and-match booster option.</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>18+ years old</td>
<td>0.5mL</td>
<td>N/A</td>
<td>All individuals 18+ years old should get a COVID-19 booster dose 2 months after completing their primary series. Allows for mix-and-match booster option.</td>
</tr>
</tbody>
</table>

When Fully Vaccinated:
- 2 weeks after 2nd dose
- 2 weeks after 2nd dose
- 2 weeks after 2nd dose
- 2 weeks after 1st dose

PREFERRED USE OF MRNA COVID-19 VACCINES

- As of 12/16/21, the CDC has revised language regarding the recommendations for the Johnson & Johnson COVID-19 vaccine:
  - Pfizer or Moderna (mRNA) COVID-19 vaccines and boosters are preferred over the use of the Johnson & Johnson COVID-19 vaccine and booster for all individuals 18 years and older.
  - J&J vaccines will continue to remain accessible for those with contraindications to mRNA vaccines, when mRNA vaccines are not accessible and the individual would otherwise go unvaccinated, or if an individual decides they want a J&J vaccine after being informed of the increased risk associated with Thrombosis with Thrombocytopenia (TTS) following a J&J vaccine.
  - TTS is a rare, but serious, condition involving blood clots and a low blood platelet count that’s been diagnosed in over 54 people who received the J&J vaccine as of December 2021.
    - 37 females and 17 males
    - 9 deaths
  - Patients still requesting J&J should be aware of the new guidance and given information about TTS.

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- Patients still requesting J&J should be aware of the new guidance and given information about TTS.
ENCOURAGE COVID-19 BOOSTER SHOTS!

- Recent data suggest COVID-19 primary series vaccinations become less effective over time at preventing infection or milder illness with symptoms.
- According to a UK technical briefing…
  - Booster doses of COVID-19 vaccine are 88% effective against hospitalization from Omicron infection.
  - However, effectiveness of two doses more than 25 weeks out is only 52%.
- Please urge patients 12 years and older to get boosted as soon as they are eligible.

INCREASE BOOSTER DOSE RATES IN YOUR COMMUNITY

Ways to increase COVID-19 booster rates
- Utilize your EMR system to know when patients are eligible for boosters
- Send reminder calls to eligible patients
- Consider partnering your facility with local public health to host COVID-19 vaccine and booster clinics
- Provide more convenient vaccination clinic hours
  - Weekends
  - Evenings

NEW CDC RECOMMENDED VACCINES AVAILABLE (2020 & 2021)
RECENT UPDATES TO ROUTINE IMMUNIZATION RECOMMENDATIONS

2020
- Administration change between Zostavax (subcutaneous injection) to Shingrix (IM deltoid injection) vaccine for use in prevention of Herpes Zoster “Shingles”

2021
- Adults 65 years of age or older AND adults ages 19 to 64 years with certain underlying medical conditions or other risk factors who have not previously received a Pneumococcal conjugate vaccine or whose previous vaccination history is unknown should receive a pneumococcal conjugate vaccine (either PCV20 or PCV15 and PPSV23 together)
- Universal Hepatitis B vaccination recommendation for all adults over the age of 19 years (previously only recommended to adults 18+ with certain risk factors). All adults previously unvaccinated should get vaccinated.

GENERAL ROUTINE IMMUNIZATION RECOMMENDATIONS FOR ALL AGES

- All vaccines can be administered at the same visit as all other vaccines.
- Grace period can be used when administering two of the same live vaccines (i.e., MMRs given four weeks minus 4 days apart).
- If giving MMR and Varicella not on the same clinic day, a grace period cannot be used.
- Doses administered up to 4 days before the minimum interval or age can be counted as valid.
- Does not apply to spacing between live vaccines (clarification)
- Never restart a series!
Routine childhood immunizations rates have decreased recently, this may be due to many factors:

- Vaccine misinformation
- Distrust in scientific community
- Disruption in wellness check ups due to pandemic
- Increased use of non-medical vaccine exemptions
- COVID-19 vaccine hesitancy could be leading to vaccine hesitancy for other preventable diseases

It is important to understand where parent's hesitancy is coming from while also being able to provide accurate facts. Please continue to remind parents of the importance of immunizations for children at all encounters.
ND CHILDCARE IMMUNIZATION REQUIREMENTS

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>2-3 Months</th>
<th>4-5 Months</th>
<th>6-7 Months</th>
<th>8-11 Months</th>
<th>12-17 Months</th>
<th>18-24 Months</th>
<th>2-5* Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Varicella</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HAV</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Rotavirus</td>
<td>3</td>
<td></td>
<td>2*</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hib</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>HBV</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>IPV</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PCV</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>DTaP/DT/T/TT/Td</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

2022-2023 ND K-12 SCHOOL IMMUNIZATION REQUIREMENTS

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Kindergarten – 6th grade</th>
<th>Grades 7-10</th>
<th>Grades 11-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTaP/DT/T/TT/Td</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IPV/OPV</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>MMR</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Varicella</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Meningococcal (MCV4)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tdap</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

TWO, FOUR AND SIX MONTHS
## ROUTINE IMMUNIZATIONS FOR 2, 4, & 6 MONTHS

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Dose Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hepatitis B (HBV)</strong></td>
<td>3 doses. Usual schedule is 0 (at birth), 1 to 2, and 6 months</td>
</tr>
<tr>
<td><strong>Diphtheria, Tetanus and Pertussis (DTaP)</strong></td>
<td>Five doses before the age of 7, beginning at 2 months</td>
</tr>
<tr>
<td><strong>Inactivated Poliovirus (IPV)</strong></td>
<td>Four doses before the age of 7, beginning at 2 months</td>
</tr>
<tr>
<td><strong>Rotavirus (RV)</strong></td>
<td>Series of two (Rotarix®) or three (Rotateq®) oral doses, beginning at 2 months</td>
</tr>
</tbody>
</table>

## ROUTINE IMMUNIZATIONS FOR 12-18 MONTHS

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Dose Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pneumococcal (PCV13)</strong></td>
<td>4 doses spaced at least 4 weeks apart before 12 months of age</td>
</tr>
<tr>
<td><strong>Haemophilus influenzae type b (Hib)</strong></td>
<td>Hib vaccines are interchangeable. If a child receives different brands of Hib vaccine at 2 and 4 months of age, a third dose of either brand should be administered at 6 months of age to complete the primary series. Either vaccine may be used for the fourth (booster) dose</td>
</tr>
</tbody>
</table>

## ROUTINE IMMUNIZATIONS FOR 12-18 MONTHS

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Dose Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measles, Mumps, &amp; Rubella (MMR)</strong></td>
<td>Two doses of MMR vaccine are routinely recommended for all children, given at least 4 weeks apart</td>
</tr>
<tr>
<td><strong>Varicella “Chickenpox” (VAR)</strong></td>
<td>Minimum interval between doses of varicella vaccine for children younger than 13 years of age is 3 months, starting at 12 months with second dose at 4-6 years. History of disease exemption change: People should check with their doctor about whether they should get chickenpox vaccine if they have immune conditions in first-degree relatives (parents, siblings) that can be inherited (called immunodeficiencies).</td>
</tr>
<tr>
<td><strong>Hepatitis A (HepA)</strong></td>
<td>Minimum interval between first and second (booster) doses is 6 months, starting at 12 months old</td>
</tr>
</tbody>
</table>
FOUR TO SIX YEARS

**Diphtheria, Tetanus and Pertussis (DTaP)**
- The final dose in the series should be administered at age ≥ 4 years regardless of the number of previous doses
- Booster dose not necessary if the fourth dose of the primary series was given on or after the 4th birthday
- The minimum interval for the last two doses is 6 months

**Measles, Mumps, & Rubella (MMR)**
- 2nd dose in series should be administered between the ages 4-6 years

**Inactivated Poliovirus (IPV)**
- 4th dose in series should be administered between the ages 4-6 years
- The final dose in the series should be administered at age ≥ 4 years regardless of the number of previous doses

ROUTINE IMMUNIZATIONS FOR 4-6 YEARS

**ADOLESCENT IMMUNIZATION**
Meningococcal (MCV4)
- Conjugate vaccines: Menactra® (for ages 9 months – 55 years), Menveo® (for ages 2 months - 55 years for routine use), Menquadfi™ (for ages 2 years and older (New vaccine in 2021))

Meningococcal B (MenB)
- Series should be administered to persons 16 through 23 years of age with a preferred age of vaccination at 16 through 18 years.
  - Trumenba® (Pfizer) - 2 dose series, 6 months apart.
  - Bexsero® (GlaxoSmithKline) - 2 dose series, 2 months apart

Human Papillomavirus (HPV9)
- Those who initiate the HPV vaccine series before their 15th birthday and are immunocompetent only need two doses scheduled at least 6 months apart
- Patients who do not initiate the series until after they are 15 or who are immunocompromised will need three doses given at the regular HPV schedule of 0, 1, and 6 months.

### ROUTINE IMMUNIZATIONS FOR ADOLESCENTS 11-18 YEARS

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Primary Series</th>
<th>Booster Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 11 – 16</td>
<td>1 dose, preferably at age 11 or 12</td>
<td>At age 16 if primary dose at 11 or 12, or at age 16 – 18 if primary dose at 13 – 15. No booster needed if primary dose on or after age 16.</td>
</tr>
<tr>
<td>Ages 11 – 16 with HIV infection</td>
<td>2 doses, 2 months apart</td>
<td>2 doses, 2 months apart</td>
</tr>
<tr>
<td>People ages 2 – 55 with persistent complement deficiency or functional/anatomical asplenia</td>
<td>2 doses, 2 months apart</td>
<td>At the earliest opportunity of a 1-dose primary series administered, then every 5 years.</td>
</tr>
<tr>
<td>People 2 – 55 with prolonged increased risk for exposure*</td>
<td>1 dose</td>
<td>Children ages 2 – 6 years, after 3 years. People age 7 and older, after 5 years.</td>
</tr>
</tbody>
</table>

*Microbiologists routinely working with N. meningitidis and travelers to or residents of countries where meningococcal disease is hyperendemic or epidemic.

+ If the person remains at increased risk.
ADULTS ARE BEHIND ON ALL CDC RECOMMENDED VACCINES

- Significant catch up will be required
- Vaccination rates for adults ages 65+ dropped by 83% in 2020 compared to 2019
- Vaccination rates for adults ages 19-49 declined by more than 60% in 2020 compared to 2019
- Teens and adults missed an estimated 26 million doses of CDC recommended vaccines during the COVID-19 pandemic

Human Papillomavirus (HPV9)
- HPV vaccine is not routinely recommended for everyone ages 27 – 45, but if a provider feels that a patient is at risk and should have it or if a patient requests the vaccine, then the provider can administer it.
- 3 dose series at 0, 1-2 months, 6 months

Tetanus (Tdap)
- Booster every 10 years
- All pregnant women should receive a dose of Tdap during each pregnancy regardless of immunization history (to pass antibodies to baby prior to the baby’s eligibility for DTaP)

Shingles (SHINGRIX®)
- Two doses, separated by two months
- Licensed for use in those 19 years and older
- Recommended for use in immunocompromised individuals 18 years and older.

Pneumococcal (PCV20, PCV15 and PPSV23)
- Adults 65 years of age or older AND adults ages 19 to 64 years with certain underlying medical conditions or other risk factors who have not previously received a pneumococcal conjugate vaccine OR whose previous vaccination history is unknown should receive a pneumococcal conjugate vaccine (either PCV20 or PCV15).
- If PCV15 is used, this should be followed by a dose of PPSV23
OTHER ADULT VACCINES

Varicella
- Healthcare workers
- Twinrix®
- Hepatitis A/B combination vaccine
- Administer at 0, 1 and 6 months

Hepatitis A
- International travel
- HIV infection

Hepatitis B
- NEW UPDATE 2021
- UNIVERSAL Hepatitis B vaccinations recommended for all adults over the age of 19 years

Meningococcal
- College freshmen
- Lab workers working with Neisseria meningitidis
- Travel to certain countries
- HIV Infection (MCV4 only)

MMR
- College students are required to have documentation of 2 doses in North Dakota
- Healthcare workers should have proof of immunity
- General public is considered immune if born prior to 1957

INFLUENZA IMMUNIZATIONS

ANNUAL FLU VACCINES
- Annual flu vaccines are recommended for people 6 months and older with few exceptions
- Co-administration of flu vaccines with other routine immunizations or the COVID-19 vaccine is safe and effective
- Despite the many benefits offered by flu vaccination, only about half of Americans get an annual flu vaccine.
- The flu continues to cause millions of illnesses, hundreds of thousands of hospitalizations and tens of thousands of deaths. Many more people could be protected from flu if more people got vaccinated.
BARRIERS TO ACCESS & VACCINE HESITANCY

- Including but not limited to...
  - The COVID-19 pandemic has created disruptions in childhood wellness visits and adult annual check-ups where routine immunizations are traditionally administered
  - Limited rural access to health care providers and clinics
  - Lack of transportation
  - Cultural or religious beliefs
  - Lack of parental health education involving the importance of routine immunizations
  - Increased use of telehealth visits during the pandemic are not a solution to comprehensive routine care visits
  - Socioeconomic challenges such as food insecurity for example can lead patients opting for food over the cost of routine health visits

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8147259/
INCREASING ACCESS

- Offer convenient immunization services.
- Establish immunization standing orders for adults, adolescent, and childhood immunizations.
- Offer immunization only appointments.
- Expand immunization services to include family members.

ADDRESSING VACCINE HESITANCY

Vaccine Hesitancy: delay in acceptance or refusal of vaccines despite availability of vaccination services (WHO)

- Be understanding of the concerns your patient may have about vaccinations.
- Be prepared to provide patients with accurate facts regarding vaccine safety and efficacy.
- Let patients make their own personal health decisions after being educated on the benefits/risks of routine immunizations.

THANK YOU!
ARE THERE ANY QUESTIONS?
Please feel free to reach out to me or the NDDoH Immunization team with any additional questions regarding routine immunizations.

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POST-TEST

- Post-test
- Nurses interested in continuing education credit, visit
  https://ndhealth.co1.qualtrics.com/jfe/form/SV_5z0b5iZ7AfVojyu
- Successfully complete the five-question post-test to receive your certificate
- Credit for this session available until February 9, 2022
- This presentation will be posted to our website: www.ndhealth.gov/immunize