Vaccines and Control of a Global Pandemic

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Disclosures

- Quidel Corporation: In-kind support of CDC-funded research
  - Provision of rapid test analyzers and tests for influenza and SARS
- Elsevier Publishing: advisory board for PracticeUpdate Primary Care
- Medavera: Honoria for podcast on RSV
Learning Objectives

at the end of this presentation, participants will:

• Appreciate the role of vaccines in control of a global pandemic
• Identify recent updates of ACIP recommendations for adults
• Understand approaches to influenza prevention and control
• Apply best practices to enhance vaccine coverage in their practices
Synopsis

• The emergence and spread of SARS-CoV-2
  • Role of vaccine in pandemic response
• ACIP Adult Schedule
  • Recent updates
• Influenza in 2020, 2021 and beyond
  • Approaches to influenza prevention and control
• Standards of Immunization Practice
The SARS-CoV-2 Pandemic

Role of vaccines
Weekly SARS-CoV-2 Cases, Deaths and Vaccine Doses in the United States

“Desperate Learning”

“Hope for Control”

“Reality of Long-Term Adaptation”

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)
Percent of Wisconsin residents who have received at least one dose by county

The orange represents the population for whom the vaccine is authorized. The gray indicates the population under 12 years of age for whom the vaccines are not authorized.

Percent of Wisconsin residents who have received at least one dose

55.5%
3,233,643

https://www.dhs.wisconsin.gov/covid-19/vaccine-data.htm
Estimated Effects of the US COVID-19 Vaccination Program through June 2021...

- averted 279,000 deaths
- averted 1,250,000 hospitalizations
  - savings of ~$25 billion

Source: Alison Galvani, Seiyed M. Moghadam, and Eric C. Schneider, *Deaths and Hospitalizations Averted by Rapid U.S. Vaccination Rollout* (Commonwealth Fund, July 2021). [https://doi.org/10.26096/wmz2-mz32](https://doi.org/10.26096/wmz2-mz32)
SARS-CoV-2 Clade Replacement in the United States (September 2020 – August 2021)

https://nextstrain.org/ncov/gisaid/north-america?f_country=USA
Vaccine Benefits in the time of Delta

- 3-fold reduction in cases
- 4-fold reduction in hospitalization
- 11-fold reduction in deaths

July 2021: COVID-19 Cases, Hospitalizations, and Deaths Among Fully Vaccinated and Not Fully Vaccinated People

Last Updated: 8/18/2021

Fully Vaccinated
Per 100,000 Fully Vaccinated People

- 125.4 Cases
- 4.9 Hospitalizations
- 0.1 Deaths

Not Fully Vaccinated
Per 100,000 Not Fully Vaccinated People

- 369.2 Cases
- 18.2 Hospitalizations
- 1.1 Deaths

https://www.dhs.wisconsin.gov/covid-19/vaccine-status.htm
Vaccine Effectiveness  (adjusted VE with 95% confidence intervals):

- Pre-delta variant predominance:  91%  (81—96)
- Delta variant predominance:  66%  (26—84)
Vaccines are part of a Multifactorial Response of SARS-CoV-2 Defense
### Table 1: Recommended Adult Immunization Schedule by Age Group, United States, 2021

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19–26 years</th>
<th>27–49 years</th>
<th>50–64 years</th>
<th>≥65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza inactivated (IV) or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influenza recombinant (RNA)</td>
<td></td>
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<td></td>
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<tr>
<td>Influenza live, attenuated (LAIV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tetanus, diphtheria, pertussis (Tdap or TD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)</td>
<td>1 dose Tdap each pregnancy: 1 dose Td/Tdap for wound management (see notes)</td>
<td>1 dose Tdap, then Td or Tdap booster every 10 years</td>
<td>1 or 2 doses depending on indication (if born in 1957 or later)</td>
<td>2 doses</td>
</tr>
<tr>
<td>Varicella (VZV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoster recombinant (RZV)</td>
<td>2 doses if born in 1980 or later</td>
<td>2 doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human papillomavirus (HPV)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcal conjugate (PCV13)</td>
<td></td>
<td></td>
<td>27 through 45 years</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal polysaccharide (PPSV23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis A (HepA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B (HepB)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Meningococcal A, C, W, Y (MenACWY)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal B (MenB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemophilus influenzae type b (HiB)</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection.

Recommended vaccination for adults with an additional risk factor or another indication.

Recommended vaccination based on shared clinical decision-making.

No recommendation/Not applicable.

[https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html](https://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html)
Adult Vaccines in a Significantly Aging Population

http://www.pewresearch.org/next-america/#Two-Dramas-in-Slow-Motion
Preconception Care

Protecting children begins with vaccines for parents (moms and dads) before birth...

Preconception Vaccines: MMR, Varicella, COVID-19
Prenatal Immunization
for Healthy Moms and Infants

Influenza Vaccine
- Indicated for all moms
- Any trimester

Pertussis (Tdap)
- 27 to 36 weeks gestation

COVID-19*
- Indicated for all moms
- Any trimester

Maternal Influenza Vaccine Protects Infants

- RCT of 4193 mothers in Mali
  - VE for 1st 4 months of follow-up was **68%** (95% CI 35—85)
  - VE for five month period was **57%** (31—74)
  - VE of 6 month period was **33%** (95% CI 4—54)
  - No serious adverse events were related to vaccination

- Retrospective, birth registry study of all live births (n=28,255) in Nova Scotia between 2010 and 2014, with follow-up through March 2016
  - During a mean follow-up of 3.6 years, there were no significant associations between maternal influenza vaccination and childhood asthma, neoplasms, sensory impairment, infections in early childhood, or with urgent and inpatient health services utilization

MMR
(think about “pandemics” of measles and rubella)

- Measles eliminated from the U.S. in 2000 by vaccine
  2021: 2 cases in one state
  2020: 13 cases in 8 states
  2019: 1282 cases in 31 states
  2017: 120 cases in 15 states
  2016: 86 cases in 19 states.
  2015: 188 cases in 24 states

- Rubella eliminated from the U.S. in 2004 by vaccine
  eliminated from the Americas in 2015

Since March 2020, consider role of masking, distancing, and reduction of international travel
MenB

- Two vaccines for serogroup B meningococcal disease are licensed in the U.S.
  - Trumenba® (Pfizer)
    - 2 dose series given at 0 and 6 months
  - Bexsero® (Novartis)
    - 2 dose series given at 0 and ≥1 month
- Both licensed for use in people aged 10—25 years
- **Series must be completed**
  - with same vaccine as initial dose
    - vaccines contain very different antigens
Tdap

• All adults should receive Tdap
  • including age 65 and older

• Pregnancy
  • Administer Tdap between 27 and 36 weeks gestation
    • for each pregnancy
  • If not provided during pregnancy,
    • administer Tdap immediately postpartum

• Can be used for the decadal booster
• Can be used for wound management
Recombinant Zoster Vaccine (Shingrix)

- Indicated for adults aged $\geq 50$ years
  - ACIP is considering use for immunocompromised individuals age $\geq 19$ years
- 2 doses given 2–6 months apart
- Preferred over ZostaVax (no longer available)
  - higher protection from shingles
  - higher protection from post-herpetic neuralgia
  - better persistence/durability
    - 97.6% over first year
    - 84.7% over remaining 3 years for persons aged $\geq 70$ years
- May be given to people who have already received ZostaVax
PPSV23 Indications #1

All adults – 1 dose

Age ≥ 65 years - Everyone
PPSV23 Indications #2

Some adults – 2 doses

If < 65 years and with:

- chronic lung disease
  - including asthma
- chronic cardiovascular diseases
  - excluding HTN
- diabetes mellitus
- chronic liver diseases
  - cirrhosis
  - chronic alcoholism
- persons who smoke cigarettes

- functional or anatomic asplenia
  - sickle cell disease
  - splenectomy
- immunocompromising conditions including:
  - chronic renal failure
  - nephrotic syndrome
- cochlear implants
- cerebrospinal fluid leaks
- HIV
Revaccination with PPSV23
For everyone on the previous slide

one-time revaccination at age 65 if:
  vaccinated 5 or more years previously
    and
  less than 65 years at the time of primary vaccination
PPSV23 Indications #3

Very few adults – 3 doses

For persons age 19-64 years
with immunocompromising conditions including

- chronic renal failure or nephrotic syndrome
- functional or anatomic asplenia
  - (e.g., sickle cell disease or splenectomy)
- first revaccination after 5 years
- and one more revaccination at age 65 if:
  vaccinated 5 or more years previously
  and
  less than 65 years at the time of primary vaccination
Some adults

ACIP removed routine PCV13 recommendation for adults 65 years and older in June 2019

- Shared Decision-making
- Pneumococcal vaccine naïve elders
  - PCV13, followed by PPSV23, 12 months later
- Prior PPSV23 recipients at age 65+
  - PCV13 at least one year after the most recent PPSV23
- When an additional dose of PPSV23 is indicated
  - additional dose 12 months after PCV13
  - and at least 5 years after most recent dose of PPSV23
PCV13

Immunocompromised adults

ACIP recommends routine use PCV13 for adults 19 years and older with:

- immunocompromising conditions
- functional or anatomic asplenia
- cerebrospinal fluid (CSF) leaks
- cochlear implants

PCV13 is administered in addition to PPSV23

- vaccine naïve individuals
  - PCV13 followed by PPSV23 at least 8 weeks later
- previously been vaccinated with PPSV23
  - PCV13 one or more years after the last PPSV23 dose
Coming Soon:
PCV15
PCV20
Hepatitis B vaccine

HBV vaccine is routinely recommended for diabetics

• age 19 through 60
  • DM associated with 2-fold increased risk of hepatitis B
• at time of diagnosis for new diabetics
  • as soon as feasible
  • routine 2-dose or 3-dose schedule depending on vaccine

HBV vaccine recommended, using shared clinical decision-making, for diabetics aged >60 years

• Non-significant 45% increase in risk
Hepatitis B and Hepatitis A vaccine
Travel Considerations

Under “Travel in countries with high or intermediate endemic hepatitis A,” text has been added for the accelerated Twinrix schedule: “HepA-HepB combination vaccine or Twinrix may be administered on an accelerated schedule of 3 doses at 0, 7, and 21–30 days, followed by a booster dose at 12 months.”
Influenza in 2021 and beyond

We do not know what’s in store for 2021/2022

Very little “natural boosting” of global population from March 2020 onward

Incredible role of public health measures

Importance of seasonal influenza vaccine for everyone age ≥ 6 months

- that includes all adults!

- challenges with administration of COVID-19 vaccines (primary series) and potential administration of booster does of COVID-19 vaccines

- co-administration (influenza and COVID-19) is acceptable
Influenza in Wisconsin went away with closing of K-12 schools in March 2020.
Influenza down-under: Australia

Influenza-associated pediatric deaths

<table>
<thead>
<tr>
<th>Season</th>
<th>No. Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-2018</td>
<td>188</td>
</tr>
<tr>
<td>2018-2019</td>
<td>144</td>
</tr>
<tr>
<td>2019-2020</td>
<td>199</td>
</tr>
<tr>
<td>2020-2021</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: [http://www.cdc.gov/flu/weekly/](http://www.cdc.gov/flu/weekly/)
Wisconsin Influenza Vaccination: the good news…

SEASONAL INFLUENZA VACCINATION
Percentage of Wisconsin residents who received one or more doses of influenza

Increasing utilization

the bad news…

Disparities

INFLUENZA VACCINE
(CURRENT ACIP RECOMMENDATIONS)

- Routine annual influenza vaccination is **recommended for all persons** aged ≥6 months who do not have contraindications.

- **No preferential recommendation** is made for one influenza vaccine product over another for persons for whom more than one licensed, recommended, and appropriate product is available.
INFLUENZA VACCINE AND SARS-COV-2
(CURRENT ACIP RECOMMENDATIONS)

- The 2020–21 influenza season will coincide with the continued or recurrent circulation of SARS-CoV-2.
- Influenza vaccination of persons aged ≥6 months to reduce prevalence of illness caused by influenza will reduce symptoms that might be confused with those of COVID-19.
- Prevention of and reduction in the severity of influenza illness and reduction of outpatient illnesses, hospitalizations, and intensive care unit admissions through influenza vaccination also could alleviate stress on the U.S. health care system.
Balancing considerations regarding the unpredictability of timing of onset of the influenza season and concerns that vaccine-induced immunity might wane over the course of a season, vaccination is recommended to be offered by the end of October.
COVID-19 vaccines and other vaccines may now be administered without regard to timing. This includes simultaneous administration of COVID-19 vaccine and other vaccines on the same day, as well as coadministration within 14 days.

If multiple vaccines are administered at a single visit, administer each injection in a different injection site.
INFLUENZA VACCINE - WHAT’S NEW
(CURRENT ACIP RECOMMENDATIONS)

- **Fluzone High-Dose Quadrivalent (HD-IIV4)**
  In November 2019, FDA licensed Fluzone High-Dose Quadrivalent (HD-IIV4) for persons aged ≥65 years.

- **Flua Quadrivalent (aIV4)**
  In February 2020, FDA licensed Flua Quadrivalent (aIV4) for persons aged ≥65 years. Flua Quadrivalent contains the oil-in-water emulsion adjuvant MF59.
### Available Adult Influenza Vaccines for 2021/2022

<table>
<thead>
<tr>
<th>Dose</th>
<th>Platform</th>
<th>Valency</th>
<th>Adjuvant</th>
<th>Age</th>
<th>Manufacturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Egg</td>
<td>Quad</td>
<td>-</td>
<td>All adults</td>
<td>4</td>
</tr>
<tr>
<td>Standard</td>
<td>Cell culture</td>
<td>Quad</td>
<td>-</td>
<td>All adults</td>
<td>1</td>
</tr>
<tr>
<td>High</td>
<td>Egg</td>
<td>Quad</td>
<td>-</td>
<td>≥65 years</td>
<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>Egg</td>
<td>Quad</td>
<td>+</td>
<td>≥65 years</td>
<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>Egg</td>
<td>Tri</td>
<td>+</td>
<td>≥65 years</td>
<td>1</td>
</tr>
<tr>
<td>Recombinant</td>
<td>High</td>
<td>Quad</td>
<td>-</td>
<td>All adults</td>
<td>1</td>
</tr>
<tr>
<td>Live Attenuated</td>
<td>Live Attenuated</td>
<td>Quad</td>
<td>-</td>
<td>18 - 49 years</td>
<td>1</td>
</tr>
</tbody>
</table>
Vaccines are part of a Multifactorial Response of Influenza Defense
Best Practices
Gaps in Attitude

Survey of 954 primary care physicians
  • General Internists (79% response rate) / Family Physicians (62% response rate)

For a 67 year-old patient how important is…

Gaps in Access: the Medical Home

U.S. coverage rates for insured persons aged ≥65 years

Value of the Medical Home

- A medical home is associated with a 10-40% increase in immunization rates
- Improvements for children and adults
- Effects persist even when vaccines are universally available and costs are covered
- Coverage rates are better for generalist continuity providers than specialists

Gaps due to Disparity

U.S. coverage rates whites and blacks aged ≥65 years

Standards of Adult Immunization Practice
National Vaccine Advisory Committee (NVAC) 2013
Standards of Adult Vaccine Practice

ASSESS immunization status of all your patients at every clinical encounter

• Stay informed.
• Get the latest CDC recommendations for immunization of adults.
• Implement protocols and policies to ensure that patients' vaccine needs are routinely reviewed and patients get reminders about vaccines they need.
Standards of Adult Vaccine Practice

Strongly RECOMMEND vaccines that patients need

- Share tailored reasons why vaccination is right for the patient.
- Highlight positive experiences with vaccination.
- Address patient questions and concerns.
- Remind patients that vaccines protect them and their loved ones against a number of common and serious diseases.
- Explain the potential costs of getting sick.
COVID-19 Vaccines
Communication is Key!

Talking to Patients about COVID-19 Vaccines
- Many people have questions about COVID-19 vaccines
- Start COVID-19 vaccine conversations early

Engaging in Effective COVID-19 Vaccine Conversations
- As patients’ most-trusted source of information on vaccines, you play a critical role in helping patients understand the importance of COVID-19 vaccination

Answering Patients’ Questions
- Many patients have similar questions about COVID-19 vaccines. Prepare for these common questions

https://www.cdc.gov/vaccines/covid-19/hcp/talking-to-patients.html
Standards of Adult Vaccine Practice

ADMINISTER needed vaccines or REFER your patients to a vaccination provider

• Offer the vaccines you stock.
• Refer patients to providers in the area that offer vaccines that you don’t stock.
Standards of Adult Vaccine Practice

DOCUMENT vaccines received by your patients

- Participate in your state's immunization registry. Help your office, your patients, and your patients' other providers know which vaccines your patients have had.
- Follow up. Confirm that patients received recommended vaccines that you referred them to get from other immunization providers.
Wisconsin’s Gem
https://www.dhs.wisconsin.gov/immunization/wir.htm
Quick Review Points

Vaccines will help us get out of the SARS-CoV-2 Pandemic
  • but it will take more than vaccines alone

Adult vaccines are Safe and Effective

Influenza is away on vacation
  • it will return, so prepare by vaccinating as soon as vaccine arrives

Follow the Standards of Immunization Practice
  • Assess, Recommend (and communicate), Administer, & Document
Contact: Jon Temte, MD/PhD

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