


TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER
School of Nursing

VACCINES DURING THE CHILDBEARING YEAR
AN UPDATE


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DISCLOSURE

I have no financial, consulting, employment, or other business relationship with any vaccine manufacturers, vendors, organizations, or support groups.

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OBJECTIVES

UPON COMPLETION OF THIS PRESENTATION, YOU WILL BE ABLE TO


- Describe the timing & characteristics of common vaccines recommended during pregnancy and postpartum.
- Connect the timing, effectiveness, & safety of common vaccines in respect to the effect on the fetus.
- Create strategies for communicating with those who are vaccine hesitant of “anti-vaccine”.

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OUTLINE

- Introduction
- Vaccine Review
 - Types of vaccines
 - Trialing of vaccines
- Focus on the childbearing year
 - Rationale for immunization
 - Immune system in pregnancy
 - Timing, effectiveness, & safety of common vaccines in respect to the effect on the fetus or breastfeeding infant.
- Vaccine Hesitancy
 - Definition & scope
 - Strategies for communicating with those who are vaccine hesitant of "anti-vaccine".



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VACCINE REVIEW

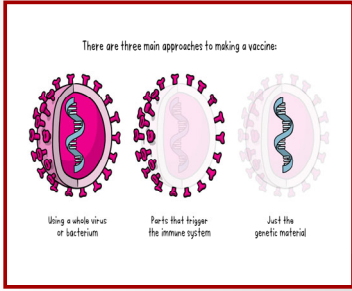
- Since Jenner's discovery of smallpox vaccine in 1796, vaccination has grown from live-virus to multiple categories and types.
- New types continue to be researched globally to combat emerging illnesses.
- Public health safety requires adequate trialing and follow-up surveillance.

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TYPES OF VACCINES: general categories

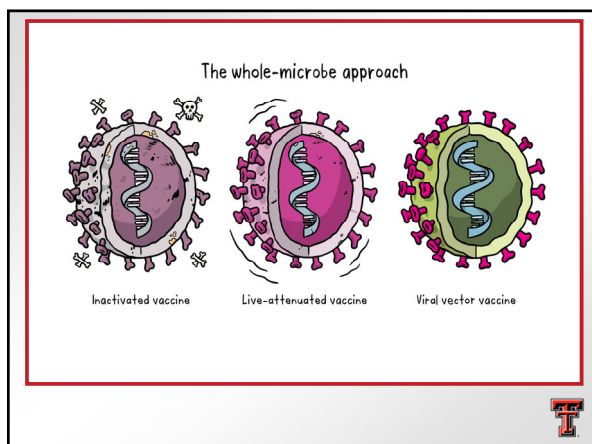
1. Whole pathogen
2. Subunits of pathogen
3. Nucleic acid

There are three main approaches to making a vaccine:



Using a whole virus or bacterium Parts that trigger the immune system Just the genetic material

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TYPES OF VACCINES: Whole Pathogen

TYPE	PROCESS	LIMITATIONS	EXAMPLES
Inactivated	Use bacteria or virus that has been inactivated with heat, chemicals, or radiation	Not as strong immunity; May need several doses or boosters over time	Havrix/Hep. A Flu shot Polio shot Rabies
Live, attenuated	Use bacteria or virus that has been attenuated (weakened) so as not to cause disease	May cause disease in immunosuppressed persons (e.g. pregnant)	MMR Varicella Smallpox Rota virus BCG Yellow fever


TYPES OF VACCINES: Whole Pathogen

TYPE	PROCESS	LIMITATIONS	EXAMPLES
Vector	Liquid or free-dried, large viruses (adenovirus, poxvirus) used as vectors; Gene(s) that encode the antigens of the pathogens are inserted into the large virus	Thrombotic thrombocytopenia;	J & J COVID only one in U.S. Ebola
EMERGING WHOLE PATHOGEN VACCINES			
Chimeric	In human trials; Combine genetic "backbone" of parent virus and the protein outer capsule of the target virus	TBD	Zika

The subunit approach




Only uses the very specific parts (the subunits) of a virus or bacterium that the immune system needs to recognize.




TYPES OF VACCINES: Subunit
(polysaccharide, conjugate, toxoid, recombinant)

TYPE	PROCESS	LIMITATIONS	EXAMPLES
Include only the components, or antigens that best stimulate the immune system		All may require boosters for ongoing protection	
Polysaccharide	Sugars form the outer coating of many bacteria	Inadequate immune response in infants	H. influenza, type b (Hib)
Conjugate	Sugar is conjugated (attached) to a protein antigen that improves recognizability by human body	Better immune response to bacteria	Hib Pneumococcal Meningococcal
Toxoid	Aimed at disease-causing proteins (toxins) secreted by bacteria. The antigen (toxoid) is a chemically inactivated toxin.		Diphtheria Tetanus




TYPES OF VACCINES: Subunit
(polysaccharide, conjugate, toxoid, recombinant)

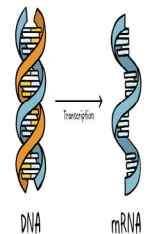
TYPE	PROCESS	LIMITATIONS	EXAMPLES
Include only the components, or antigens that best stimulate the immune system		All may require boosters for ongoing protection	
Recombinant	Genetic engineering: DNA from multiple sources are combined; 1970's: DNA code from Hep B created an antigen that was injected into yeast cells	Require adjuvants to stimulate and enhance effectiveness	Hep B HPV
EMERGING SUBUNIT TYPE			
Mosquito-virus early phase trials	Combination of 4 proteins from mosquito salivary glands elicit an immune response to mosquito saliva	TBD	Malaria Zika Dengue fever Chikungunya




The genetic approach (nucleic acid vaccine)



Use the genetic material for specific proteins - the DNA or RNA




DNA → Transcription → mRNA



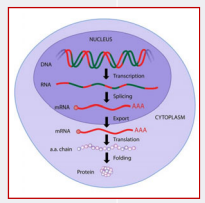
TYPES OF VACCINES: Nucleic Acid


TYPE	PROCESS	LIMITATIONS	EXAMPLES
DNA plasmid	<p>A small piece of DNA (a plasmid) carries gene-encoding proteins from the pathogen of interest; enables rapid manufacturing in a short time</p> <p>Have been studied for over 30 years</p>	<p>Historically inefficient in getting to antigen-specific cells;</p> <p>Delivery route problematic</p> <p>Less potent-- Requires higher doses than mRNA vaccines</p> <p>Some theoretical uncertainty about effect on human genes.</p>	<p>NONE IN US</p> <p>Only one approved in India in 11/2021 for COVID; Numerous others in clinical trials;</p> <p>Other trials ongoing for use for HIV, Cancer, ZIKA, TB, Alzheimers, MS etc.</p>

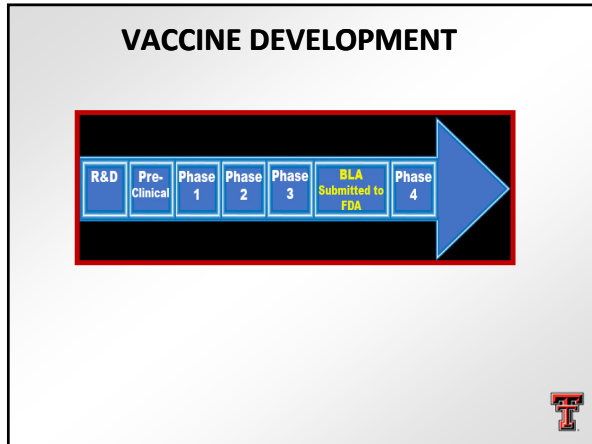


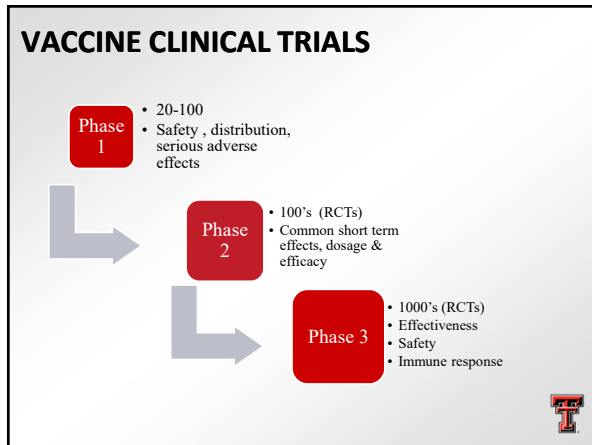
TYPES OF VACCINES: Nucleic Acid

TYPE	PROCESS	LIMITATIONS	EXAMPLES
mRNA	<p>mRNA enters cells and delivers message to create the SARS COV-2 harmless spike protein. Body activates B & T lymphocytes (creates antibodies) to this foreign body. mRNA has short lifespan; is broken down & leaves body within a couple of days.</p>	<p>Painful arm;</p> <p>Possible temporary myocarditis</p>	<p>COVID: Pfizer & Moderna</p>









FOCUS ON CHILDBEARING YEAR: Rationale

1. Focus on those with greater morbidity and mortality in the maternal, fetal, and newborn populations.
2. Cost-effective way of reducing “under-five” mortality
3. Pregnancy is an immunologically dynamic state

High estrogen levels may modify the immune response

May account for suboptimal responses to certain viral infections (flu, Hep.E, herpes simplex etc.)

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**FOCUS ON CHILDBEARING YEAR:
Pregnancy Changes**

Maternal immune system changes to tolerate the allogeneic fetus.

-Uterine immune cells produce local cytokines & angiogenetic factors to regulate :

1. *blastocyst implantation*
2. *placentation*
3. *acceptance of fetus*

Arora & Lakshmi (2021)

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WHY VACCINATE IN PREGNANCY?

Benefits of vaccinating pregnant women usually outweigh potential risks when

1. the likelihood of disease exposure is high
2. infection would pose a risk to the mother or fetus
3. the vaccine is unlikely to cause harm.

CDC. General recommendations on immunization: recommendations of the Advisory committee on Immunization Practices (ACIP). MMWR 2011; 60 (No. 2): 26.

ACIP* SPECIFIC VACCINE RECOMMENDATIONS

Vaccine-Specific ACIP Recommendations	
• Anthrax	• Japanese Encephalitis
• BCG	• Measles, Mumps and Rubella
• Cholera	• MMRV
• COVID-19	• Meningococcal
• Dengue	• Pneumococcal
• DTaP-IPV+Hib-HepB	• Polio
• DTaP/Tdap/Td	• Rabies
• Ebola	• Rotavirus
• Hepatitis A	• Smallpox (Vaccinia)
• Hepatitis B	• Typhoid
• Hib	• Varicella (Chickenpox)
• HPV	• Yellow Fever
• Influenza	• Zoster (Shingles)

*Advisory Committee on Immunization Practices
Available at <https://www.cdc.gov/vaccines/hcp/acip-recs/index.html>

COMMON U.S. VACCINES in REPRODUCTIVE YEARS

Covid-19	Meningococcal (MenB)
Hepatitis A	Pneumococcal conjugate (PCV13)
Hepatitis B	Pneumococcal polysaccharide (PPSV23)
Human Papillomavirus (HPV)	Polio (IPV)
Influenza (inactivated)	Tetanus, Diphtheria, & Pertussis (Tdap) & Tetanus & Diphtheria (Td)
Influenza (LAIV)	Varicella
Measles, Mumps, Rubella (MMR)	Zoster
Meningococcal (MenACWY or MPSV4)	

CDC. Guidelines for vaccinating pregnant women . Accessed 2/1/2022

ACOG RECOMMENDATIONS

June 2018 Table: Footnotes describe the types of vaccines and are available at <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/06/maternal-immunization>

Feb. 2020 Practice Advisory Update recommends COVID-19 mRNA vaccination for all, including pregnancy, postpartum, and breastfeeding

Vaccine*	Indicated During Every Pregnancy	May Be Given During Pregnancy in Certain Populations	Contraindicated During Pregnancy	Can Be Initiated Postpartum or When Breastfeeding or Both
Inactivated influenza	Y ⁽¹⁾			Y ⁽¹⁾
Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis (Tdap)	Y ⁽¹⁾⁽²⁾			Y ⁽¹⁾
Pneumococcal vaccines		Y ⁽³⁾		Y ⁽³⁾⁽⁴⁾
Meningococcal conjugate (MenACWY) and Meningococcal serogroup B		Y ⁽²⁾		Y ⁽²⁾
Hepatitis A	Y ⁽¹⁾			Y ⁽¹⁾
Hepatitis B	Y ⁽¹⁾⁽³⁾			Y ⁽¹⁾⁽³⁾
Human papillomavirus (HPV)**				Y ⁽¹⁾⁽³⁾⁽⁴⁾
Measles-mumps-rubella			Y ⁽¹⁾⁽²⁾⁽³⁾	Y ⁽¹⁾
Varicella			Y ⁽¹⁾⁽³⁾⁽⁴⁾	Y ⁽¹⁾

VACCINATION RATES in PREGNANCY: 2020-2021 Influenza & Tdap (n = 1975)


- Tdap: 53.5%
 - 70% provider initiated offer
 - Disparities: higher rates among whites than AA and Hispanics
- Influenza: 54.5%
 - 68% provider initiated offer
 - Disparities: higher rates among whites & Hispanics than AA
- Reasons for not receiving (only 30.7% had both)
 - Safety concerns
 - Education (not knowing why needed)
 - Not offered

CDC (2021)

COVID-19 VACCINATIONS: All Groups


COVID-19 STATE OF THE STATISTICS (February, 2022)				
TYPE OF DATA	WORLDWIDE	U. S.	TEXAS	U. S. PREGNANT (2/14/2022)
Cases	~425 million	~80 million	> 6.6 million	~174 thousand
Deaths	~ 6 million	> 1 million	~ 84 thousand	274 (~30,000 hosp.)
Vaccine Rate	~ 62% (j)*	~65% (j)**	~60% (j)**	>200,000 self-report; >16,000 in registry

*j = at least one dose; ** f = fully vaccinated
Source: Our World Data Bank 2/20/2022; CDC (2022), 2/20/2022




GENERAL GUIDELINES

- ❖ Fetal risk is theoretical
 - ❖ No evidence of risk
 - ❖ *Inactivated virus*
 - ❖ *Bacterial vaccines*
 - ❖ *Toxoids*
 - ❖ *Live, attenuated viruses*
 - ❖ *Live bacterial viruses*
 - ❖ Nonetheless, live vaccines are not recommended in pregnancy



GENERAL GUIDELINES: Preconception

- ❖ Counsel person to locate records and review
- ❖ Update vaccines
- ❖ Plan pregnancy to allow one month after receiving MMR or Varicella
- ❖ Complete HPV prior.



GENERAL GUIDELINES: Pregnancy

- ❖ COVID-19 & influenza if not done before
- ❖ Tdap in 3rd Trimester
- ❖ Halt HPV doses if not completed
- ❖ Other vaccine recommendations depend on individual factors and risk exposure (e.g. travel, occupational, previous conditions)
- ❖ No known fetal risk from passive immunization of pregnant women with immune globulin preparations.



GENERAL GUIDELINES: Breastfeeding

- ❖ Live-virus, inactivated, recombinant, subunit, polysaccharide, conjugate and toxoids pose no risk for mother or baby. (CDC)
- ❖ Rubella might be excreted in breastmilk, but does not infect infant. In rare case it might, is well-tolerated because virus is attenuated. (CDC)
- ❖ To date, mRNA COVID-19 is safe and IgG & IgM antibodies higher in breastmilk of women who have breastfed for 24 months. (Girardi & Brenner, 2022)



DIPHTHERIA, TETANUS, PERTUSSIS

- DPT, DTwP, DTaP, Tdap ?????
- **DPT/DTwP:** live, inactivated Bordetella pertussis (aka “whole cell”), full dose of diphtheria & tetanus toxoids
- **DTaP:** full dose of diphtheria & tetanus toxoids; full dose of pertussis subunits (aka “acellular”)
- **Tdap:** full dose of tetanus toxoid; reduced dose of diphtheria toxoid and acellular pertussis



Tdap


Public Health Issue

Waning global immunity to pertussis

Purpose of Prenatal Administration

Maximize maternal antibody response


Maximizes passive antibody transfer to the infant



Tdap Effectiveness

- Reduces risk of infant (0-3 mo.) pertussis by 78%.
- Reduces infant hospitalizations for pertussis by 90%.
- Current research does not show a negative impact on infants ability to mount their own response to Tdap later....continuing to be studied.

CDC (2017)




Tdap Timing

When: 27—36 wks. Gestation

Repeat every pregnancy

Consider single dose for those in close contact (e.g. other parent, siblings, grandparents)



Tdap FAQs

Why 27-36 wks? ... Why not give postpartum?

1. *Maximizes maternal antibody response*
2. *Maximizes passive antibody transfer to infant.*
3. *Most vulnerable infant period is 0-3 months & takes 2 wks. To start developing antibodies.*
4. *Breastmilk has not been found to be protective against pertussis.*



Tdap FAQs

Why give every pregnancy?

Pertussis immunity begins to wane quickly: within 2-4 months.

Why consider other family/close contacts?

Cocooning decreases chances of exposure. It is believed that most early infant exposures to pertussis are from family members with waning immunity.

(CDC)



Getting your whooping cough vaccine in your 3rd trimester... helps protect your baby from the start.

Outbreaks of whooping cough are happening across the United States. This disease can cause your baby to have coughing fits, gasp for air, and turn blue from lack of oxygen. It can even be deadly. When you get the whooping cough vaccine (also called Tdap) during your third trimester, you'll pass antibodies to your baby. This will help keep him protected during his first few months of life, when he is most vulnerable to serious disease and complications. Talk to your doctor or midwife about the whooping cough vaccine.

www.cdc.gov/whoopingcough



INFLUENZA

"Influenza is more likely to cause severe illness in pregnant people than in people of reproductive age who are not pregnant. Changes to the immune system, heart, and lungs during pregnancy make people more susceptible to influenza severe enough to cause hospitalization throughout pregnancy and up to two weeks postpartum. Influenza also may be harmful for the developing baby. A common influenza symptom fever may be associated with neural tube defects and other adverse outcomes for a developing baby. Parental vaccination also can help protect a baby from influenza after birth (because antibodies are passed to a developing baby during pregnancy)."

CDC (2022). Flu and Pregnancy

"Most severe during the last three months of pregnancy."

Arora & Lakshmi (2021)



Types of Flu Vaccines: LAIV

- Live attenuated influenza vaccine (LAIV) is contraindicated in pregnancy.
- Flumist® Quadrivalent
- Intranasal route



Types of Flu Vaccines: Inactivated-Historical

(Arora & Lakshmi, 2021) (CDC, 2021)

- Inactivated influenza vaccine (IIV): IM or intradermal
- Inactivated monovalent non-adjuvanted pandemic influenza vaccine
- Inactivated monovalent adjuvanted H1N1 pandemic influenza vaccine (MF59, AS03, & aluminum phosphate adjuvanted). **AS03-adjuvanted H1N1 2009 vaccine produces a protective antibody response in 93% of pregnant women.**
- Trivalent vaccine: type A (H1N1), type A (H3N2), & type B
- Recombinant influenza vaccine (RIV) (trivalent): IM only




Types of Flu Vaccines: Inactivated-CURRENT (CDC, 2021)

2021-2022: ALL FLU VACCINES ARE QUADRIVALENT

Added a second B type

Recombinant quadrivalent & cell-culture based are egg free


- 1. Flucelvax® quadrivalent*
- 2. Flublok® quadrivalent*



Adverse Effects of Flu Vaccine

- Local reactions most common (20%)
- Allergic reactions very rare
- Guillaine Barre syndrome low in general population, but have a greater likelihood of developing it IF have a history....Post-licensure safety monitoring has found no association between GB & LAIV

Arora & Lakshmi (2021)



Results of CDC's 2016-2017 internet panel survey of pregnant women

Half of pregnant women protect themselves and their babies against flu. Time to bump it up!

With only half of pregnant moms getting their flu shot, too many remain unprotected.

Flu shots help protect pregnant women and their babies from potentially serious flu illness during and after pregnancy.

During the 2016-2017 flu season, an estimated 50% of pregnant women in the U.S. protected themselves and their babies from flu by getting a flu shot. While this is a significant improvement since the years before the 2009 pandemic, about half of pregnant women and their babies, still remain unprotected from influenza.

We can do better. All pregnant women need flu shots to protect themselves and their babies.



If you're pregnant, a flu shot is recommended at any time during your pregnancy:

- can reduce your risk of getting sick from flu
- can protect your baby from flu for several months after birth

Pregnant women also need a flu shot except if they have a medical condition. Talk to your doctor.

Get vaccinated to protect yourself and your baby.

www.cdc.gov/flu/protect/vaccine/pregnant.htm




COVID-19 DISEASE

Compared to non-pregnant persons, COVID-19 infection during pregnancy is associated with increased risk of following:

- Maternal severe illness
- Intensive care unit admission
- Mechanical ventilation
- Death
- Preterm birth, & possibly stillbirth
- Thromboembolic disease
- Hypertensive disorders
- Cesarean delivery

(ACOG; CDC; Girardi & Bremer, 2022; Stafford et al, 2021)



COVID-19 DISEASE

- Higher risk for those with comorbidities (diabetes, obesity, advanced maternal age, and cardiovascular disease).
- Higher rate of infection and death in certain racial/ethnic groups.
- Rare (2-3%) vertical transmission with minimal persistent neonatal infection

(ACOG; Stafford et al, 2021)



COVID-19 VACCINE TYPES

- ACOG: mRNA (Pfizer & Moderna) preferred
- CDC: all acceptable (including Johnson & Johnson viral vector)



COVID-19 VACCINE TIMING

- Give as soon as possible to increase antibodies
- Can give anytime
- Full series with booster, according to current schedule.



COVID VACCINE SAFETY CONCERNS THAT HAVE BEEN RAISED

- Menstruation and fertility
 - *Increased cycle length*
 - *Decreased fertility: Spike protein similar to syncytin-1 protein involved in implantation and placentation*
 - *mRNA accumulation in the ovaries*
- Pregnancy
 - *Infection*
 - *Complication due to acute or chronic placental insufficiency*
 - *Increased pregnancy loss*



COVID VACCINE SAFETY CONCERNS THAT HAVE BEEN RAISED

- Poor Newborn Outcomes
 - *Teratogenicity from maternal fever after vaccine*
 - *Preterm birth or stillbirth*
- Safety of Breastfeeding



STATE OF THE COVID VACCINE SCIENCE (Girardi & Bremer, 2022)

- **Menstruation & fertility**
 - *CYCLE LENGTH: Temporary, one day increase in menstrual cycle in a small number of the >72 million females who have received a vaccine.*
 - *FERTILITY: Hypothetical cross-reactivity protein issue: only share 4 amino acids. Studies report no antibodies bind to syncytin.....If this did occur, though, would cause sterility by natural antibodies from the disease as well as the vaccine—which has not been reported.*
 - *ACCUMULATION IN OVARIES: Low biodistribution found in ovaries & testes. No performance in animal studies on female mating performance, fertility or any ovarian/uterine parameters*



STATE OF THE COVID VACCINE SCIENCE (Girardi & Bremer, 2022)

- **Menstruation & fertility (continued)**
 - *Human studies have found no effect on ovarian follicular function.*
 - *In study of frozen embryo transfer, no effect on embryo implantation or early development.. Post-infection and post-vaccine studied (Pfizer & Moderna)*
- CONCLUSION: NO SCIENTIFIC EVIDENCE THAT THE COVID-19 VACCINE HAS DELETERIOUS EFFECTS ON FEMALE FERTILITY.**




STATE OF THE COVID VACCINE SCIENCE (Girardi & Bremer, 2022)

- **Infection**
 - *Vaccine associated with lower odds of severe COVID-19 in pregnancy.*
 - *Less like to get COVID-19*
- **Complications from acute/chronic placental insufficiency**
 - *Histologic exam of placentae show no increased incidence of insufficiency*
 - *Not associated with increased pregnancy or delivery complications*



STATE OF THE COVID VACCINE SCIENCE (Girardi & Bremer, 2022)

- **Pregnancy loss**
 - *No additional risk of spontaneous abortion with preconception or early pregnancy vaccination.*
 - *Self-reported losses: can not know all data and rate is consistent with general population*
- **Newborns**
 - *TERATOGENICITY from maternal fever: studies reveal mild fever to date, not the high fever that would cause teratogenicity*
 - *No concerns found to date; may actually be protective*
- **Breastfeeding**
 - *Protective antibodies in breastmilk, increased with breastfeeding longevity.*



Protect yourself and your baby from COVID-19. Get vaccinated.



- COVID-19 vaccination is recommended for people who are pregnant, breastfeeding, trying to get pregnant now, or might become pregnant in the future.
- The benefits of receiving a COVID-19 vaccine outweigh any known or potential risks of vaccination during pregnancy.
- There is currently no evidence that any vaccines, including COVID-19 vaccines, cause problems trying to get pregnant.
- COVID-19 vaccination in people who are pregnant or breastfeeding builds antibodies that might protect their baby.

Ask your provider about the COVID-19 vaccine.

 cdc.gov/coronavirus 

VACCINE HESITANCY



One of Our Top 10 Global Health Problems

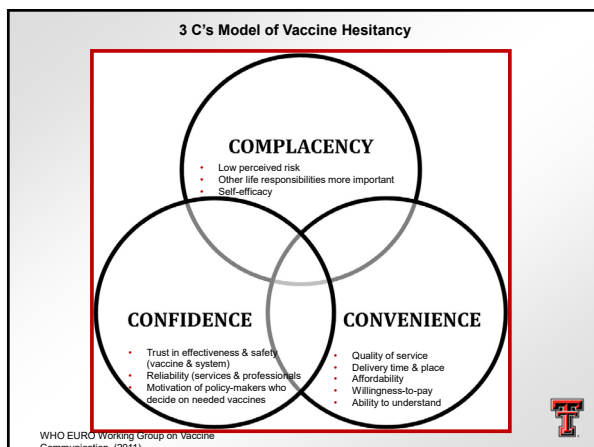
“Vaccine hesitancy threatens to reverse progress made in tackling vaccine-preventable diseases.” WHO, 2019 

VACCINE HESITANCY

- **DEFINITION: Delay in acceptance or refusal of vaccine despite availability of vaccination services.**
- Complex and context-specific, varies across time, place, & vaccines.
- Influenced by factors of complacency, convenience, & confidence.
- Different from anti-vaccination activism

SAGE Working Group on Vaccine Hesitancy. (2015).

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VACCINE CRITICS: 3 groups

1. Activists who are against vaccines
2. Support groups for those considered to be victims of vaccines
3. Political parties trying to gain backing for their cause from social groups or a religion

- *Those in groups 2 & 3 rarely produce new arguments, but they do diffuse their views wider and frame arguments in a wider worldview.*
- *Those who actively criticize in public are often motivated by profit.*

WHAT DETERMINES IF ONE IS VACCINE HESITANT

- Education & socio-economic status DO NOT influence
- **CONTEXTUAL INFLUENCES**
Historic, socio-cultural, environmental, health system
- **INDIVIDUAL/GROUP INFLUENCES**
Personal perception of vaccine; the social/peer environment
- **VACCINE/VACCINATION-SPECIFIC**

SAGE Working Group on Vaccine Hesitancy. (2015).

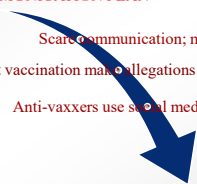


COMMUNICATION: A TOOL FOR INFLUENCING

- If inadequate, can negatively influence uptake & lead to hesitancy

POOR COMMUNICATION PLAN

Scare communication; mixed messaging
 Groups against vaccination make allegations
 Anti-vaxxers use social media & politicians to mis-inform



POOR UPTAKE OF VACCINE



COMMUNICATION EXAMPLES

1998: Wakefield article in Lancet: false data; author had received ~500,000 pounds from a law firm claiming association with autism & vaccination. (Meta-analysis of >1.2 million children found no relationship)

1999: Reason for minimizing thimersol in some U.S. vaccines poorly communicated. Led to hesitancy and refusal.

Etzioni-Friedman (2021) & Etzioni & CDC (2020)



COMMUNICATION EXAMPLES: Past Decade

1. Allegations of correlation between autoimmune manifestations and vaccination.

Several rare anecdotal reports, but not found in large-scale studies.

2. “Autoimmune/inflammatory syndrome induced by adjuvants” (aluminum)

Study (n=18,000) found lower rate of autoimmune disorders among those who underwent allergic immunotherapy, which contains aluminum

Etzioni-Friedman (2021) & Etzioni & CDC (2020)

MEDIA COMMUNICATION

1. Media “balance” (presenting both sides) influences audience’s perception of safety.

- ✓ *Negatively impacts vaccine intentions*
- ✓ *Gives false impression that there is no scientific consensus of safety & efficacy*

2. Internet/social media users more likely to be hesitant

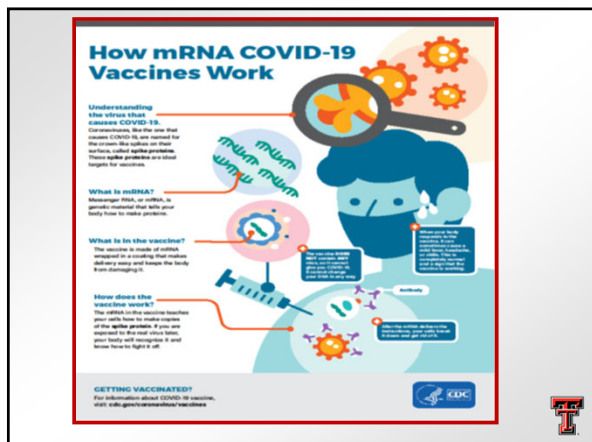
Search engines compound exposures based on previous search patterns: blurs boundaries of quality information



PROVIDER COMMUNICATION

- MDs & RNs most trusted source.
- ✓ *BUT, tend to refrain from consults & the hesitant feel alienated because of this.*
- ✓ *5-50 fold increase in vaccine acceptance if offered/encouraged by provider*
- ✓ *More likely to recommend if have awareness & knowledge of the vaccine.*
- ✓ *Confidence & willingness to recommend increased with societal & colleague support.*
- ✓ *Most agree on importance, but feel overworked and have inadequate training to discuss.*
- CAM providers: ideal consultation visits





STRATEGIES (1)

Enhancing Vaccine Uptake

- Go beyond the knowledge deficit approach
- Use risk communication strategies that capitalize on heuristics
- Dispel associations of adverse effects with vaccines
- 3 step approach for critics:
 - Identify technique being used
 - Identify the topic
 - Respond by naming the technique and relating it to the topic being raised

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STRATEGIES (2)

- If someone continues to refuse after an explanation, respect their decision, document in health record, and continue to offer again at each visit. Do not discharge from the practice.
- Mandatory policies are saved for situations when there is an increase in vaccine hesitancy and refusal. Does not address the underlying causes of hesitancy and refusal.

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STRATEGIES (3)

Three Step Approach for Critics

- STEP 1: Identify technique being used
 - *Conspiracy theory*
 - *Reference to fake experts*
 - *Selectivity in evidence used to criticize (i.e. cherry-picking studies)*
 - *Impossible expectations (i.e. 100% safety)*
 - *Misrepresentations or false logic*

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STRATEGIES (4)

Three Step Approach for Critics

- STEP 2: Identify the topic
 - *Distrust in health authorities & providers*
 - *Low threat of disease*
 - *Lack of vaccine effectiveness*
 - *Unsafe vaccine*
 - *Alternatives to vaccine*

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STRATEGIES (5)

Three Step Approach for Critics

- STEP 3: Respond using one of the following key messages in Step 1 with one in Step 2:
 - *Unmask the technique being used*
 - *Relate it to the topic being raised*
- THIS 3 STEP APPROACH HAS BEEN SHOWN TO MITIGATE THE INFLUENCE OF A SCIENCE DENIER AND DOES NOT BACKFIRE.

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