

Going Viral: How Vaccine Myths Spread Faster Than Germs

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Disclosures

Faculty

Dr. Salam Kabbani, PharmD, faculty for this activity, has no relevant financial relationship(s) with ineligible companies to disclose.

Planners

None of the planners for this activity have any relevant financial relationships with ineligible companies to disclose.

OBJECTIVES

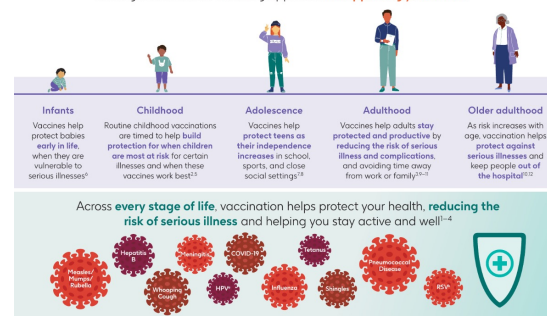
1. Identify common vaccine misinformation and misconceptions
2. Select appropriate evidence-based resources to support vaccine recommendations and address patient questions
3. Apply evidence-based principles when discussing vaccine safety
4. Utilize motivational interviewing techniques when addressing vaccine hesitancy
5. Select effective communication strategies for vaccine-hesitant patients

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Why Vaccination Matters

Vaccinations can protect you and your family¹⁻³

Getting vaccinated is a lifelong approach to supporting your health¹⁻⁵



GSK Why Vaccination Matters

Post-truth Era

Vaccine Misinformation and Disinformation

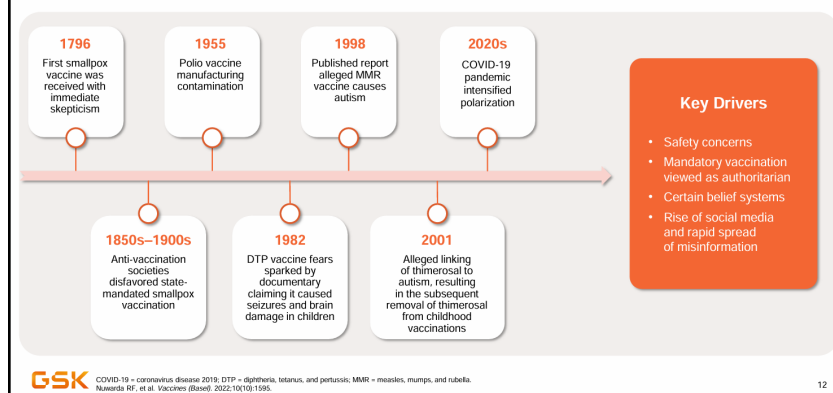
Definitions

"Post-truth" era: descriptor of current informational landscape

- Misinformation: false claims shared by people who believe them
- Disinformation: false claims intentionally spread to mislead
- Scientific discussion: legitimate evidence-based debate(s) about vaccine effectiveness, safety, scheduling, policy, or specific adverse events.

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Understanding the Root of Vaccine-Related Concerns Is Essential to Addressing Them Effectively

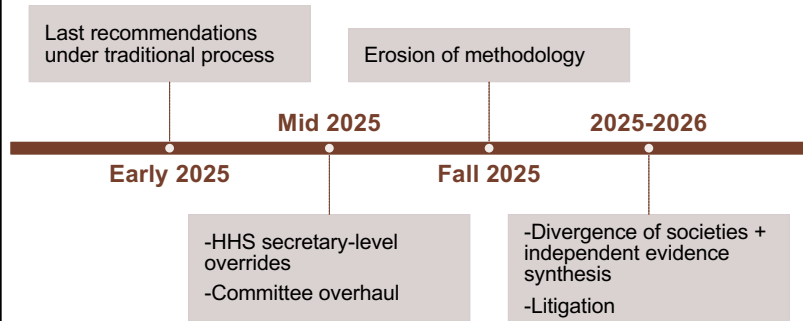


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Changes to US Vaccine Recommendation Process

CDC and ACIP Alternatives

Core Changes To US Vaccine Recommendation Process



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Alternatives to CDC and ACIP

- American Academy of Family Physicians (AAFP)
- American Academy of Pediatrics (AAP)
- American College of Obstetricians and Gynecology (ACOG)
- Infectious Diseases Society of America (IDSA)

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Common Vaccine Claims

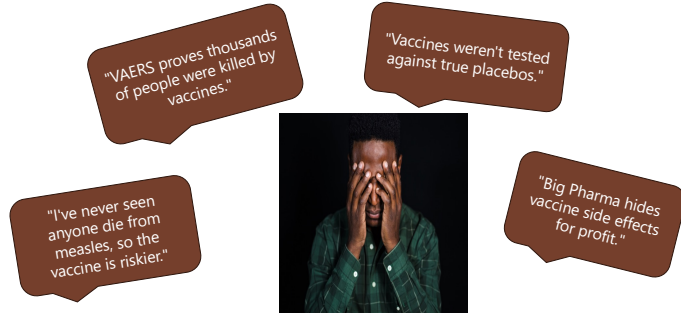
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Common Claims Pharmacists hear



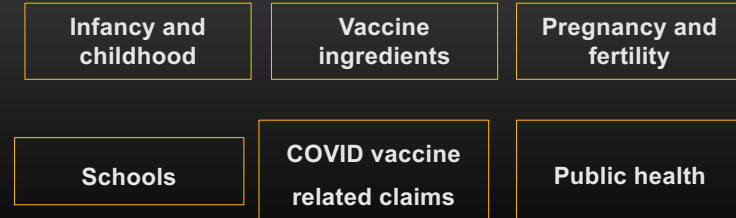
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Common Claims Pharmacists hear



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Common Vaccine Misinformation Categories On Social Media



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Pregnancy and fertility related vaccine myths	Evidence from the literature
Vaccines cause miscarriages	- Systematic review and meta-analysis: 21 studies, n=150K women - Same miscarriage rate regardless of COVID vaccine receipt - Matched cohort study: >18K vaccinated women in Scotland - No link between COVID vaccine and miscarriage or ectopic pregnancy - Kharbanda et al: observational study evaluating boosters in early pregnancy - n= >100K pregnancies; 6-19 weeks' gestation - No increase in miscarriage - Hui et al: multicenter cohort study of COVID-19 vaccination during pregnancy - n=32,536 births analyzed: 53.4% vaccinated vs. 47.6% unvaccinated women - Reduction in stillbirth and preterm birth - No negative impact on fetal growth or development

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Pregnancy and fertility related vaccine myths	Evidence from the literature
Vaccines cause infertility	- Systematic review and meta-analysis: 29 studies - No scientific proof of link between COVID vaccines and infertility in men or women - Vaccine antibodies do not attack placenta protein syncytin-1 - COVID infection can temporarily lower sperm count in men - COVID vaccine: - No damage to sperm count or motility - No harm to egg supply (ovarian reserve) or female hormone levels
Vaccinated mothers harm infants through breast feeding	- Systematic review of 30 manuscripts: - No serious side effects in breastfed babies of vaccinated mothers - Beneficial: protective COVID antibodies passed to babies from breast milk - Moms should not "pump and dump" post vaccination - ACOG + Society for Maternal-Fetal Medicine: recommend vaccination for breastfeeding mothers

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August 26-30 // Wichita, KS

"Infections will be milder in healthy kids"

Wang et al.

- South Plains region of West Texas Measles Outbreak 2025; n=325

- Hospitalized patients: 18.5% (n=60)
 - Unvaccinated or unknown status: 100%
 - No underlying medical conditions: 88.9%
 - Pneumonia + hypoxia: 70%
 - ICU admission: 7.4% (n=4)
 - Death: n=1

Shang et al.

- USA Pediatric Influenza Deaths 2010-2016; n=675

- Median age: 6YO [IQR: 2-12]
- Average annual incidence highest in the following order:
 - Age < 6 months
 - Age 6-23 months
- Age ≥ 6 months: n=477; 69% unvaccinated
- 65% of children died within 7 days after symptom onset

- 50-50 split: presence or absence of pre-existing conditions
- Children without vs. with pre-existing conditions:
 - Younger: median 5 vs. 8 YO
 - Less vaccinated: 27% vs. 36%
 - Pre-hospital death: 77% vs. 48%
 - Shorter illness: 4 vs. 7 days
- Conclusion: infants < 6 months have highest influenza mortality rates amongst pediatrics

Measles: immune amnesia + increased risk of secondary infection

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"Children Were Healthier Before Vaccines "

- German KiGGS Survey: lifetime prevalence of vaccine-preventable diseases significantly higher in unvaccinated kids
- Vaccines= less infections
 - Less risk of weakened immune system + immune amnesia
- No evidence of immune "overload" or increased non-targeted infections

Vaccine preventable diseases occur **less often today** than they did in the past¹⁵

Impact of routine childhood vaccinations in the United States

Based on effects of routine childhood vaccination among children born between 1994 and 2003.

508 MILLION illnesses prevented¹

Roughly 1.5 times the entire US population

1.1 MILLION lives saved²

Or about the number of people living in San Jose, California

32 MILLION hospitalizations avoided³

That's about the population of the entire state of Texas

When fewer people get vaccinated, diseases we once prevented can return⁴

Talk with a Healthcare Professional (HCP) if you have any questions about your health. The information provided does not take the place of discussing health concerns with your HCP.

- ASK which vaccines are recommended for you and your family.
- SHARE any questions or concerns.
- MAKE a plan that fits your needs.

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Alleged outcome	Best evidence	Result
Immune "overload"/more non-targeted infections	Vaccine Safety Datalink nested case-control, 944 children	Mean cumulative antigen exposure through 23 mo: 240.6 (cases) vs 242.9 (controls); mOR 0.94 (0.84–1.07)
All-cause mortality	VSD cohort, 312,388 children; on-schedule vs undervaccinated	2.28 vs 2.57 deaths/100,000 person-yr; IRR 1.29 (0.33–4.99)
Autism	Danish nationwide cohort, 657,461 children	Adjusted HR 0.93 (0.85–1.02); no clustering, no susceptible subgroup
Autism (pooled)	Meta-analysis, 1.26 million cohort children	OR 0.99 (0.92–1.06); MMR OR 0.84; thimerosal OR 1.00

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Alleged outcome	Best evidence	Result
IBD DM1 Asthma Eczema	Hay fever Leukemia Demyelinating disease	Cochrane MMR/MMRV review (up to ~1–2 million children per outcome)
		No association for any
Chronic conditions	Systematic review of 34 alleged AEFIs	Vaccines not shown to cause: MS Asthma Diabetes SIDS Epilepsy Chronic fatigue Chronic urticaria
Serious AEFIs	AHRQ-methodology systematic review, 338 studies	High-strength evidence of no increased autism risk with MMR No increased diabetes risk Few associations overall

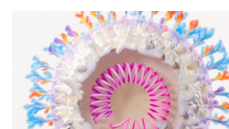
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Adverse event	Vaccine(s)	Approximate rate
Anaphylaxis	All vaccines	~1.31 per million doses (range 1 per 100,000–1,000,000); MMR ~1.25/100,000, DTaP ~0.36/100,000
Febrile seizures	MMR, influenza, PCV, MMRV	~3.92 per 100,000 (children 3–5 mo); MMR ~1 per 1,150–1,700 doses; MMRV ~1 per 2,300–2,600 (first dose, ages 12–23 mo)
Immune thrombocytopenic purpura (ITP)	MMR	~1–3 per 100,000; attributable risk ~1 per 25,000–40,000 doses within 6 wk (self-limiting; lower than risk from natural infection)
Guillain-Barré syndrome	Influenza (adults); RZV	~1–3 per million doses; RZV ~3 per million (adults ≥65)
Syncope	Any injected vaccine	~4.4–14.1 per 100,000
Intussusception	Rotavirus	~1.5 per 100,000 doses

Adverse event	Vaccine(s)	Approximate rate
Myocarditis/pericarditis	COVID-19 (mRNA)	~1–3 per 100,000 doses in adolescents
Disseminated varicella infection Hepatitis Herpes zoster Meningitis/encephalitis	Varicella (live)	Rare/very rare; disseminated infection and hepatitis occur in immunodeficient individuals for whom the vaccine is contraindicated; zoster from vaccine- strain reactivation
Encephalitis	Measles component	Very rare
Deltoid bursitis	Any (improper injection technique)	Rare; immunization error–related
Arthralgia/arthritis (mild, acute, transient — not chronic)	Rubella component	Common in adult women; not chronic

Hepatitis B



Hepatitis B Vaccination in Newborns and Infants

What is Hepatitis B?

Disease

- Hepatitis B is a **vaccine-preventable disease** that is caused by **viral infection in the liver**¹
- Hepatitis B can be an **acute illness**, or it can become a **chronic infection** associated with serious complications such as liver cancer, cirrhosis, and premature death¹

Clinical Features

- Most adults with chronic hepatitis B **do not have symptoms**¹
- Up to 50% of adults are **unaware that they are infected** and capable of infecting others^{3,4}
- Most adults will recover from hepatitis B infection, while **infants are at the greatest risk** for progressing to chronic infections⁴

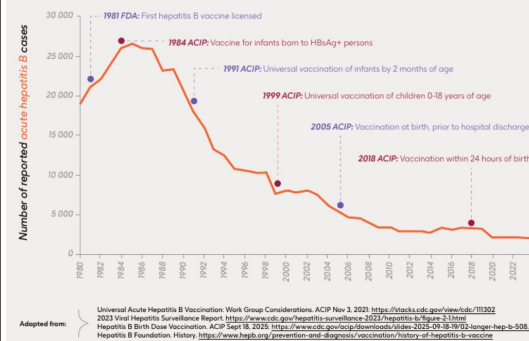
GSK Hepatitis B Vaccination in Newborns and Infants.



Hepatitis B related vaccine myths	Hepatitis B facts
"Babies don't have sex" "This vaccine is just for hospitals to make profits"	- Highly infectious: - Exposure of percutaneous, mucosal, or non-intact skin to: infectious blood, semen, and/or other body fluids - Perinatal transmission from birth parent - Household and/or community exposure to unvaccinated individuals - E.g. of exposures: nail clippers and toothbrushes - May live up to seven days on surfaces
Benefits of the hepatitis B vaccine in infants	Risks of the hepatitis B vaccine in infants
- Prevention of acute hepatitis B infection - Prevention chronic hepatitis B infection - Prevention of risks associated with hepatitis B infection	- Injection site reactions + mild systemic reactions - Anaphylaxis: 1.1 cases per million vaccine doses

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Evolution of Infant Hepatitis B Vaccination Recommendations and Burden of Acute Hepatitis B in the United States



- 2025 CDC/AAP: hepatitis B vaccine recommended for all newborns⁷⁸
- Since 1991, the universal hepatitis B birth dose has prevented more than 500,000 childhood infections, reduced infant hepatitis B cases by 95%, and prevented ~90,100 childhood deaths⁹

GSK Hepatitis B Vaccination in Newborns and Infants.

Immune System Overload

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Infants and Vaccination

Vaccines work best when delivered at specific ages when a child's immune system is best suited to learn and develop the strongest response to various vaccines, as well as when they most need protection¹

Infants possess highly capable immune systems, and are theoretically able to handle thousands of vaccines simultaneously²

Beginning at birth, infants are exposed to bacteria containing thousands of immunological components as part of everyday life; the 150 components in vaccines are negligible in comparison³



Theoretically, only 0.1% of the immune system would be needed to respond if 11 vaccines were given to an infant at one time⁴

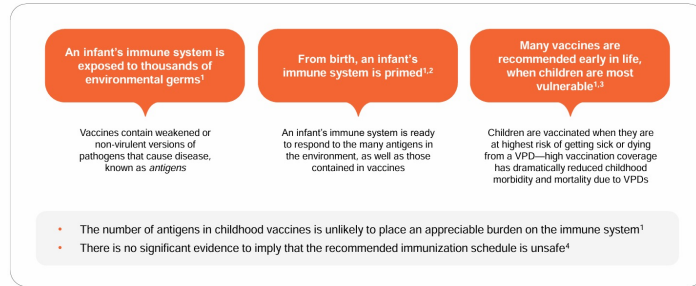


Infants have robust immune systems; vaccines use only a fraction of their capacity¹⁻⁴

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► Multiple Vaccinations in Children



VPD = vaccine-preventable disease
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School and public health related vaccine myths	Evidence from the literature
Measles isn't dangerous	- Measles can lead to: - Pneumonia - Encephalitis - Long-term sequelae - Death
If vaccines work, mandates wouldn't be necessary	Vaccines work when herd immunity achieved
Infectious diseases were eliminated because of sanitation	- Drastic decline in measles post-vaccine introduction support vaccine success, not sanitation alone - Declines in childhood vaccinations causing resurgence of measles and other vaccine-preventable diseases - Proof that vaccination coverage is pivotal for disease control - Many vaccine preventable diseases are spread person-to-person, not via water or sewage systems: - Measles, polio, pertussis, Hib

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Herd Immunity Myth or Real?

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Herd Immunity

- Well-defined epidemiologic principle with a simple formula: the share of people who need to be immune to stop spread = $1 - 1/R_0$
- Used for decades to set vaccination targets
- The more contagious a germ (higher R_0), the more people must be immune

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Immunity Levels	- Different for different diseases - Contagiousness varies => threshold varies - Measles ($R_0 \approx 12-18$) needs ~92-95% immunity; COVID (early $R_0 \approx 2-3$) needs ~50-67%.
Indirect Protection	- Enough people must be vaccinated - Real-world study: 177 communities during Israel's COVID vaccine rollout - Every 20-percentage-point increase in vaccination=> twofold drop in positive tests in unvaccinated under-16 group
Community Protection	- Vaccine introduction => sharp fall in disease incidence in: vaccine-ineligible infants, older adults, unvaccinated people - Under-vaccinated clusters drive measles and pertussis outbreaks 2-22x higher outbreak risk in communities with higher vaccine exemption/refusal rates

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Declining herd immunity impact:

Herd protection= fragile

- Requires high sustained coverage for reliable spread interruption
- Measles: ~95%-97% two-dose coverage achieved by age 5 and maintained
- Small drops in coverage can be enough to lose it

Local geographic gaps

- National averages can mask dangerous clusters
- Local pockets below vaccine threshold can spread outward

Actively happening with measles

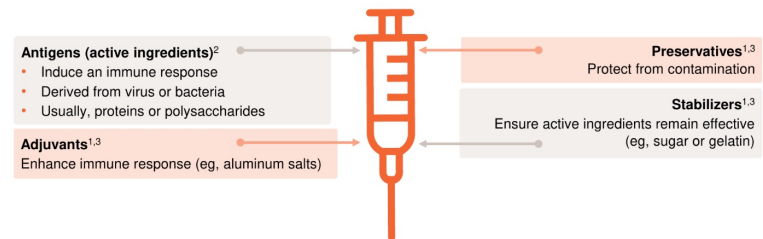
- USA:
 - 2000: eradicated
 - 2025: vaccine rates 92.5% => 2,284 cases
- Globally: 2021: ~9M cases + 128K deaths

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Vaccine Components

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Breaking Down the Components of Vaccines¹⁻³



¹ WHO. Vaccine Ingredients. <https://www.who.int/communication/basics/vaccine-ingredients/index.html>. Published April 29, 2021. Accessed March 24, 2026. ² Oxford Vaccine Group. Vaccine Ingredients. <http://uk.vox.org.uk/vaccine-ingredients>. Published May 26, 2022. Accessed March 24, 2026. ³ FDA. Common ingredients in FDA-approved vaccines. <https://www.fda.gov/vaccines-blood-biologics/safety-availability/biologics-common-ingredients-fda-approved-vaccines>. Published January 12, 2024. Accessed March 24, 2026. ⁴ CDC. Developing Safe and Effective Vaccines. <https://www.cdc.gov/vaccines/imz/developing/about-developing-safe-effective-vaccines.html>. Published August 9, 2024. Accessed March 24, 2026.

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Additional Details of Common Vaccine Ingredients

	Example ¹	Purpose ¹	Sources of Natural Exposure ^{1,2}	Key Facts ³
Adjuvants	Aluminum	Enhances the immune response to the vaccine	- Drinking water¹ - Infant formula¹ - Antacids, buffered aspirin, antiperspirants¹	- People ingest an estimated 7 mg to 9 mg of aluminum every day; infants ingest 7 mg to 117 mg in their diet during the first 6 months of life - The quantity of aluminum in vaccines is comparatively very low
Preservatives	Thimerosal	Prevents contamination	No natural exposure²	- Thimerosal (ethylmercury) differs from methylmercury (sourced from fish), which causes mercury poisoning - Ethylmercury is eliminated from the body much more rapidly than methylmercury, and is much less likely to cause harm
Stabilizers	Gelatin	Helps stabilize the vaccine after manufacturing	- Jell-O®¹ - Naturally, in human body¹	Although the incidence of anaphylaxis to gelatin is extremely low (~1 case per 2 million doses), people with known gelatin allergies should avoid gelatin-containing vaccines
Trace Components	Formaldehyde	Inactivates viruses and toxins during manufacturing	- Fruit¹ - Household carpets and upholstery¹ - Naturally, in human body¹	- All humans have detectable quantities of natural formaldehyde in their circulation - The quantity of formaldehyde found in an infant's circulation is estimated to be between 10-fold to 220-fold the amount in any individual vaccine



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COVID mRNA vaccine myths	Evidence from the literature
This is gene therapy	- Gene therapy: permanently changes/replaces genes - Vaccine does not do this, it gives "instructions" - mRNA vaccine: short set of instructions for cells to make spike protein for immunity "Instructions" broken down within 10-20 days - Spike protein gone within ~one week
Causes turbo cancer	"Turbo cancer": made up term - No increase in cancer rates - Vaccine cannot biologically cause cancer
Changes your DNA	- DNA contained in cell nucleus => mRNA does not enter - Cell "shreds" the mRNA after it reads the instructions - Vaccine cannot mechanistically become part of your genes

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COVID mRNA Vaccine Myths	Evidence from the literature
Contains microchips	- Impossible to be implanted through a vaccine - Rumor source: statement from Bill Gates: "eventually, we will have some digital certificates to show who has recovered or been tested recently or when we have a vaccine who has received it" - This statement was twisted by a Biohackinfo conspiracy site "Bill Gates will use microchip implants to fight CoV"
Contains aborted fetal tissue	- Fetal cell lines used at various stages of vaccine and drug development: do not contain cells from aborted fetuses - COVID mRNA vaccines DO NOT contain fetal cells or proteins derived from fetal cell lines - Janssen viral-vector vaccine: proteins produced by PER.C6 in final preparations (fetal cell line) - Cell lines are decades-old and continuously propagated NOT ongoing sources of fetal tissue - Most major religions have provided statements that vaccine use is ethically acceptable

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Vaccine Monitoring

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Monitoring Vaccine Safety

Post-Licensure Monitoring and Surveillance Programs for Vaccine Safety¹

VAERS	VSD	PRISM	CISA
Vaccine Adverse Event Reporting System	Vaccine Safety Datalink	Post-licensure Rapid Immunization Safety Monitoring	Clinical Immunization Safety Assessment Network
Data monitoring of required reporting that detects new or rare vaccine adverse events, increases in rates of known adverse reactions, and patient risk factors for types of adverse reactions	Using databases developed through CDC partnerships with large, integrated health plans, the VSD evaluates rare and serious adverse events following vaccination	Active vaccine safety surveillance through a cooperative effort between the FDA and four healthcare and insurance organizations analyzes potential safety signals and evaluates safety issues in targeted groups	Conducts high-quality clinical research to improve the understanding of post-vaccination adverse events at the individual patient level

- In addition to efficacy studies, vaccines undergo 10–15 years of safety evaluations before they are licensed for use by the FDA^{1,2}
- Post-licensure, there are several vaccine safety monitoring programs in the United States that closely assess vaccine safety¹

CDC = Centers for Disease Control and Prevention; CISA = Clinical Immunization Safety Assessment Network; FDA = US Food and Drug Administration; PRISM = Post-licensure Rapid Immunization Safety Monitoring; VAERS = Vaccine Adverse Event Reporting System; VSD = Vaccine Safety Datalink.
 1. World AP. Immunization T. CDC. Chapter 4: Vaccine Safety. <https://www.cdc.gov/vaccines/imz/downloads/immunization/t4-vaccine-safety.pdf>. Published April 2, 2024. Accessed March 30, 2025. 2. CDC. How Vaccines Are Developed and Approved for Use. <https://www.cdc.gov/od/oc/media/pressroom/stories/2014/s140801a.html>. Published August 16, 2014. Accessed March 30, 2025.



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Motivational Interviewing and Navigating Vaccine Hesitancy

Motivational Interviewing

- Communication style that facilitates changes in attitudes and behaviors surrounding vaccine hesitancy

Empathetic	Patient-centered	Collaborative
Curious	Respectful	Maintains autonomy

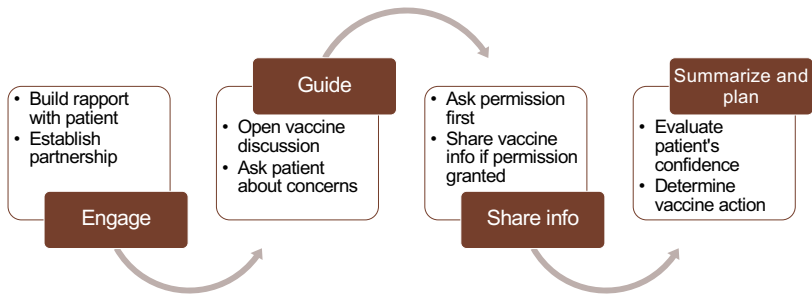
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Core skills of motivational interviewing: OARS

Open-ended questions	Affirmation	Reflections	Summarizing
• Explore experiences and perspectives • Understand patient's point of view	• Provide positive affirmations regarding past vaccine efforts	• Show empathy and acknowledge concerns • Complex reflection: repeat what you think patient means	• Confirm understanding • Reinforce key points

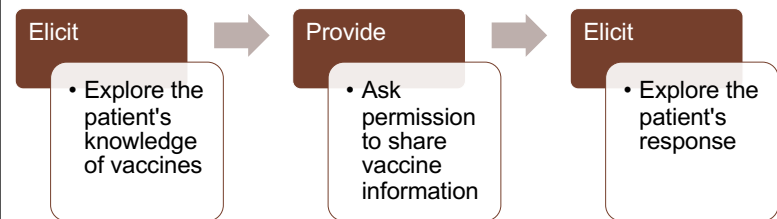
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Discussion Roadmap



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"Elicit-Provide-Elicit" Strategy



*Helpful strategy to further explore vaccine concerns the patient has

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Interactive Case

Role Playing a Patient and Pharmacist
Vaccine Hesitancy Scenario

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Step 1 : Engage

**Establish a partnership to build rapport with the patient.
What are some questions you can ask the patient to engage them?**

- How is your day going?
- It's nice to see you again. What have you been up to since the last time you were here?
- What are your current health priorities? Can you tell me why these are important to you?

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Step 2: Guide

Open a discussion about vaccines and concerns the patient may have. What are some questions you can ask the patient to guide them?

- What do you know already about X vaccine?
- I see that you are due for your shingles vaccine today. Can you tell me about your past vaccine experiences?
- I want to address your concerns. What are some specific things you've heard about vaccines?

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Step 3: Share information

Ask them for permission to share information. What are some ways you can ask the patient for permission?

- I'd like to take a few minutes to talk to you about vaccines. Are you okay with that?
- Could I provide you with some information, based on what you just shared with me?
- Would it be okay if I share some facts about X vaccine with you at this time?

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Step 4: Summarize and Plan

Assess patient's willingness to get vaccinated, then determine an action plan



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