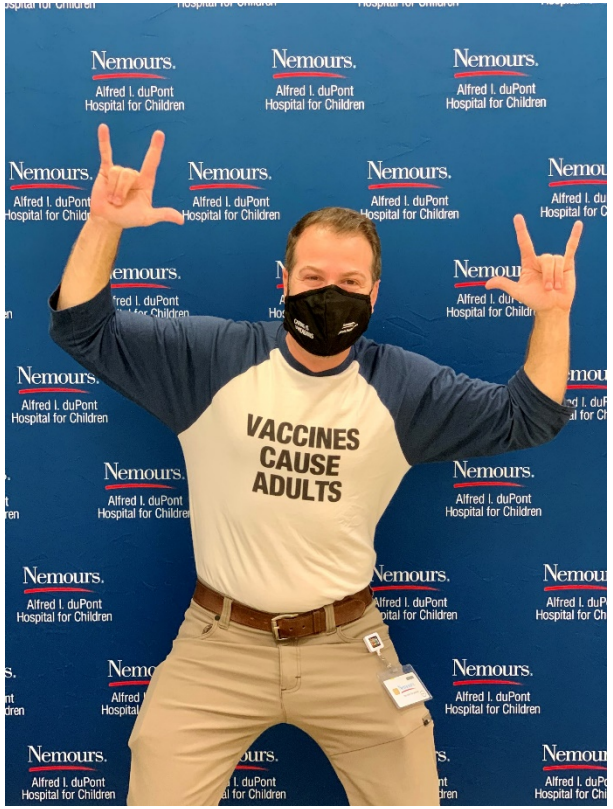
Vaccine Confidence & Hesitancy: How did we get here? Where do we go next?

Jonathan Miller, MD FAAP
Medical Director of Value-Based Care
Interim Chief Value Officer
Chief of Primary Care

NEMOURS CHILDREN'S HEALTH

Disclosure

- I have no financial interest or other relationship with any manufacturer of any commercial products which may be discussed at this activity, but I will discuss a bunch of commercial products (indiscriminately, I hope)
- I am a passionate advocate for vaccination!



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Case Vignette

- 12mo boy presents for well child check-up
- Review of vaccine record shows that he has never received any vaccines
- Both parents are present and express the family's adamant opposition to all vaccines
  - Against their religious beliefs, do not give specifics
  - Do not trust Big Pharma
  - Concerned about autism, multiple sclerosis, mercury, aluminum, fetal tissue
  - Prefer naturopathic options
- How do you handle this family?!?
  - As a provider? As a medical system? As a society?

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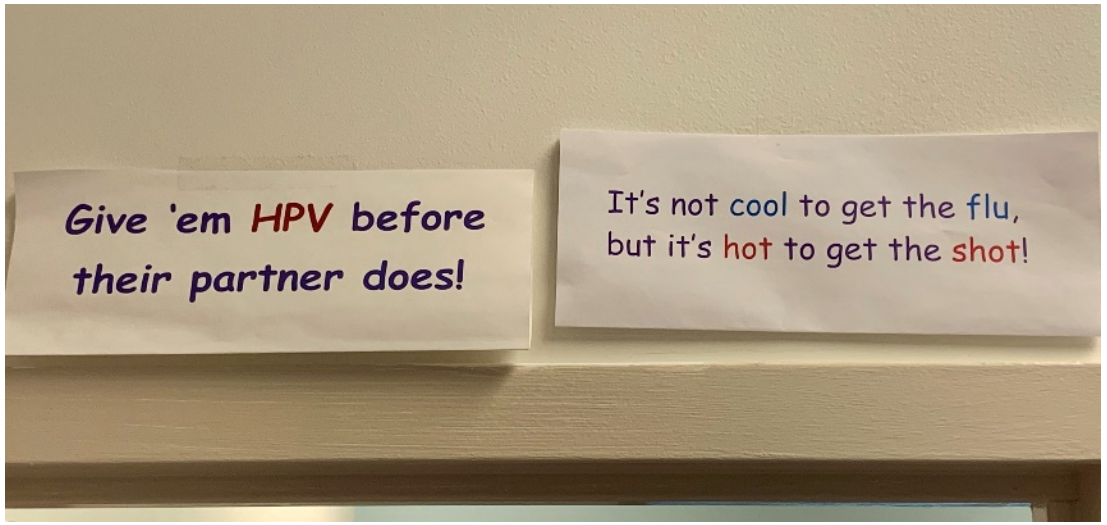
Case Vignette #2

- 11yo girl presents for sports physical
- Review of vaccine record shows she is due to Tdap, HPV, Menactra, and Influenza
- Her mother would like Tdap and Menactra, but does not want HPV because it is not “required,” and doesn’t want the flu vaccine because everyone in their family gets sick after the flu shot
  - You look for a wall to bang your head against
- How do you handle this family?



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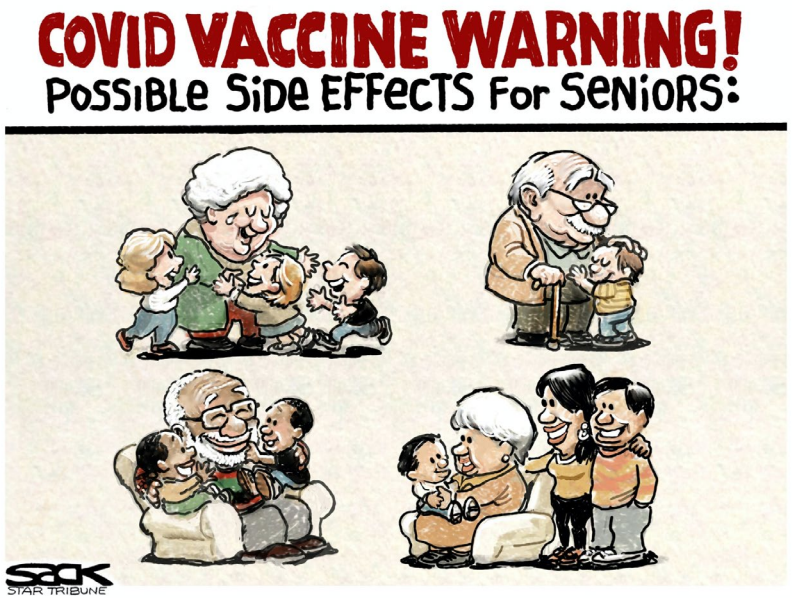
Case Vignette #3

- 7yo girl comes to your office for a follow-up visit for ADHD
- After masterfully managing her pharmacotherapy, you encourage the family to give her the COVID-19 vaccine
- Both parents reveal that they have gotten the vaccine themselves, but do not want to give it to their daughter
  - Concern that the vaccine was not studied long enough to understand long-term complications
  - Concern about fertility
  - Concern about myocarditis
- How do you handle this family?



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Objectives

- Review the recommended childhood immunization schedule
- Understand common and uncommon side effects of vaccines
- Discuss vaccine confidence, hesitancy, and refusal
- Discuss the impact of the COVID-19 pandemic on vaccine confidence and hesitancy
- Illustrate ways to improve vaccine confidence
- Review research on COVID-19 hesitancy in Delaware

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Table 1 Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2021

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2). School entry and adolescent vaccine age groups are shaded in gray.

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Hepatitis B (HepB)	1st dose	◄---- 2nd dose ----►			◄---------- 3rd dose ----------►												
Rotavirus (RV): RV1 (2-dose series), RV5 (3-dose series)			1st dose	2nd dose	See Notes												
Diphtheria, tetanus, acellular pertussis (DTaP <7 yrs)			1st dose	2nd dose	3rd dose			◄---- 4th dose ----►				5th dose					
Haemophilus influenzae type b (Hib)			1st dose	2nd dose	See Notes		◄- 3rd or 4th dose, See Notes -►										
Pneumococcal conjugate (PCV13)			1st dose	2nd dose	3rd dose		◄---- 4th dose ----►										
Inactivated poliovirus (IPV <18 yrs)			1st dose	2nd dose	◄---------- 3rd dose ----------►							4th dose					
Influenza (IIV)					Annual vaccination 1 or 2 doses								Annual vaccination 1 dose only				
or													or				
Influenza (LAIV4)											Annual vaccination 1 or 2 doses		Annual vaccination 1 dose only				
Measles, mumps, rubella (MMR)					See Notes		◄---- 1st dose ----►					2nd dose					
Varicella (VAR)							◄---- 1st dose ----►					2nd dose					
Hepatitis A (HepA)					See Notes		2-dose series, See Notes										
Tetanus, diphtheria, acellular pertussis (Tdap ≥7 yrs)														Tdap			
Human papillomavirus (HPV)														See Notes			
													*				
Meningococcal (MenACWY-D ≥9 mos, MenACWY-CRM ≥2 mos, MenACWY-TT ≥2years)			See Notes											1st dose		2nd dose	
Meningococcal B														See Notes			
Pneumococcal polysaccharide (PPSV23)											See Notes						

Range of recommended ages for all children

Range of recommended ages for catch-up immunization

Range of recommended ages for certain high-risk groups

Recommended based on shared clinical decision-making or
*can be used in this age group

No recommendation/ not applicable

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Table 2 Recommended Catch-up Immunization Schedule for Children and Adolescents Who Start Late or Who Are More than 1 month Behind, United States, 2021

The table below provides catch-up schedules and minimum intervals between doses for children whose vaccinations have been delayed. A vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Use the section appropriate for the child's age. **Always use this table in conjunction with Table 1 and the notes that follow.**

Vaccine	Minimum Age for Dose 1	Minimum Interval Between Doses			
		Dose 1 to Dose 2	Dose 2 to Dose 3	Dose 3 to Dose 4	Dose 4 to Dose 5
Children age 4 months through 6 years					
Hepatitis B	Birth	**4 weeks**	**8 weeks *and* at least 16 weeks after first dose.** Minimum age for the final dose is 24 weeks.		
Rotavirus	6 weeks Maximum age for first dose is 14 weeks, 6 days.	**4 weeks**	**4 weeks** Maximum age for final dose is 8 months, 0 days.		
Diphtheria, tetanus, and acellular pertussis	6 weeks	**4 weeks**	**4 weeks**	**6 months**	**6 months**
Haemophilus influenzae type b	6 weeks	**No further doses needed** if first dose was administered at age 15 months or older. **4 weeks** if first dose was administered before the 1st birthday. **8 weeks (as final dose)** if first dose was administered at age 12 through 14 months.	**No further doses needed** if previous dose was administered at age 15 months or older. **4 weeks** if current age is younger than 12 months ***and*** first dose was administered at younger than age 7 months ***and*** at least 1 previous dose was PRP-T (ActHib, Pentacel, Hiberix) or unknown. **8 weeks *and* age 12 through 59 months (as final dose)** if current age is younger than 12 months ***and*** first dose was administered at age 7 through 11 months; OR if current age is 12 through 59 months ***and*** first dose was administered before the 1st birthday ***and*** second dose was administered at younger than 15 months; OR if both doses were PRP-OMP (PedvaxHIB, Comvax) ***and*** were administered before the 1st birthday.	**8 weeks (as final dose)** This dose only necessary for children age 12 through 59 months who received 3 doses before the 1st birthday.	
Pneumococcal conjugate	6 weeks	**No further doses needed** for healthy children if first dose was administered at age 24 months or older. **4 weeks** if first dose was administered before the 1st birthday. **8 weeks (as final dose for healthy children)** if first dose was administered at the 1st birthday or after.	**No further doses needed** for healthy children if previous dose was administered at age 24 months or older. **4 weeks** if current age is younger than 12 months and previous dose was administered at <7 months old. **8 weeks (as final dose for healthy children)** if previous dose was administered between 7–11 months (wait until at least 12 months old); OR if current age is 12 months or older and at least 1 dose was administered before age 12 months.	**8 weeks (as final dose)** This dose only necessary for children age 12 through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
Inactivated poliovirus	6 weeks	**4 weeks**	**4 weeks** if current age is <4 years. **6 months (as final dose)** if current age is 4 years or older.	**6 months** (minimum age 4 years for final dose).	
Measles, mumps, rubella	12 months	**4 weeks**			
Varicella	12 months	**3 months**			
Hepatitis A	12 months	**6 months**			
Meningococcal ACWY	2 months MenACWY-CRM 9 months MenACWY-D 2 years MenACWY-TT	**8 weeks**	See Notes	See Notes	
Children and adolescents age 7 through 18 years					
Meningococcal ACWY	Not applicable (N/A)	**8 weeks**			
Tetanus, diphtheria; tetanus, diphtheria, and acellular pertussis	7 years	**4 weeks**	**4 weeks** if first dose of DTaP/DT was administered before the 1st birthday. **6 months (as final dose)** if first dose of DTaP/DT or Tdap/Td was administered at or after the 1st birthday.	**6 months** if first dose of DTaP/DT was administered before the 1st birthday.	
Human papillomavirus	9 years	**Routine dosing intervals are recommended.**			
Hepatitis A	N/A	**6 months**			
Hepatitis B	N/A	**4 weeks**	**8 weeks *and* at least 16 weeks after first dose.**		
Inactivated poliovirus	N/A	**4 weeks**	**6 months** A fourth dose is not necessary if the third dose was administered at age 4 years or older and at least 6 months after the previous dose.	A fourth dose of IPV is indicated if all previous doses were administered at <4 years or if the third dose was administered <6 months after the second dose.	
Measles, mumps, rubella	N/A	**4 weeks**			
Varicella	N/A	**3 months** if younger than age 13 years. **4 weeks** if age 13 years or older.			

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Table 3 Recommended Child and Adolescent Immunization Schedule by Medical Indication, United States, 2021

Always use this table in conjunction with Table 1 and the notes that follow.

VACCINE	INDICATION										
	Pregnancy	Immunocompromised status (excluding HIV infection)	HIV infection CD4+ count[1]		Kidney failure, end-stage renal disease, or on hemodialysis	Heart disease or chronic lung disease	CSF leak or cochlear implant	Asplenia or persistent complement component deficiencies	Chronic liver disease	Diabetes
			<15% and total CD4 cell count of <200/mm³	≥15% and total CD4 cell count of ≥200/mm³						
Hepatitis B										
Rotavirus		SCID[2]								
Diphtheria, tetanus, and acellular pertussis (DTaP)										
Haemophilus influenzae type b										
Pneumococcal conjugate										
Inactivated poliovirus										
Influenza (IIV)										
or										
Influenza (LAIV4)						Asthma, wheezing: 2–4yrs[3]				
Measles, mumps, rubella	*									
Varicella	*									
Hepatitis A										
Tetanus, diphtheria, and acellular pertussis (Tdap)										
Human papillomavirus	*									
Meningococcal ACWY										
Meningococcal B										
Pneumococcal polysaccharide										

Vaccination according to the routine schedule recommended

Recommended for persons with an additional risk factor for which the vaccine would be indicated

Vaccination is recommended, and additional doses may be necessary based on medical condition. See Notes.

Not recommended/ contraindicated—vaccine should not be administered.

*Vaccinate after pregnancy.

Precaution—vaccine might be indicated if benefit of protection outweighs risk of adverse reaction

No recommendation/not applicable

1 For additional information regarding HIV laboratory parameters and use of live vaccines, see the *General Best Practice Guidelines for Immunization*, "Altered Immunocompetence," at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html and Table 4-1 (footnote D) at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html.

2 Severe Combined Immunodeficiency

3 LAIV4 contraindicated for children 2–4 years of age with asthma or wheezing during the preceding 12 months

Additional information

COVID-19 Vaccination

ACIP recommends use of COVID-19 vaccines within the scope of the Emergency Use Authorization or Biologics License Application for the particular vaccine. Interim ACIP recommendations for the use of COVID-19 vaccines can be found at www.cdc.gov/vaccines/hcp/acip-recs/.

- Consult relevant ACIP statements for detailed recommendations at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For information on contraindications and precautions for the use of a vaccine, consult the *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html and relevant ACIP statements at www.cdc.gov/vaccines/hcp/acip-recs/index.html.
- For calculating intervals between doses, 4 weeks = 28 days. Intervals of ≥4 months are determined by calendar months.
- Within a number range (e.g., 12–18), a dash (–) should be read as "through."
- Vaccine doses administered ≤4 days before the minimum age or interval are considered valid. Doses of any vaccine administered ≥5 days earlier than the minimum age or minimum interval should not be counted as valid and should be repeated as age appropriate. **The repeat dose should be spaced after the invalid dose by the recommended minimum interval.** For

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Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2021

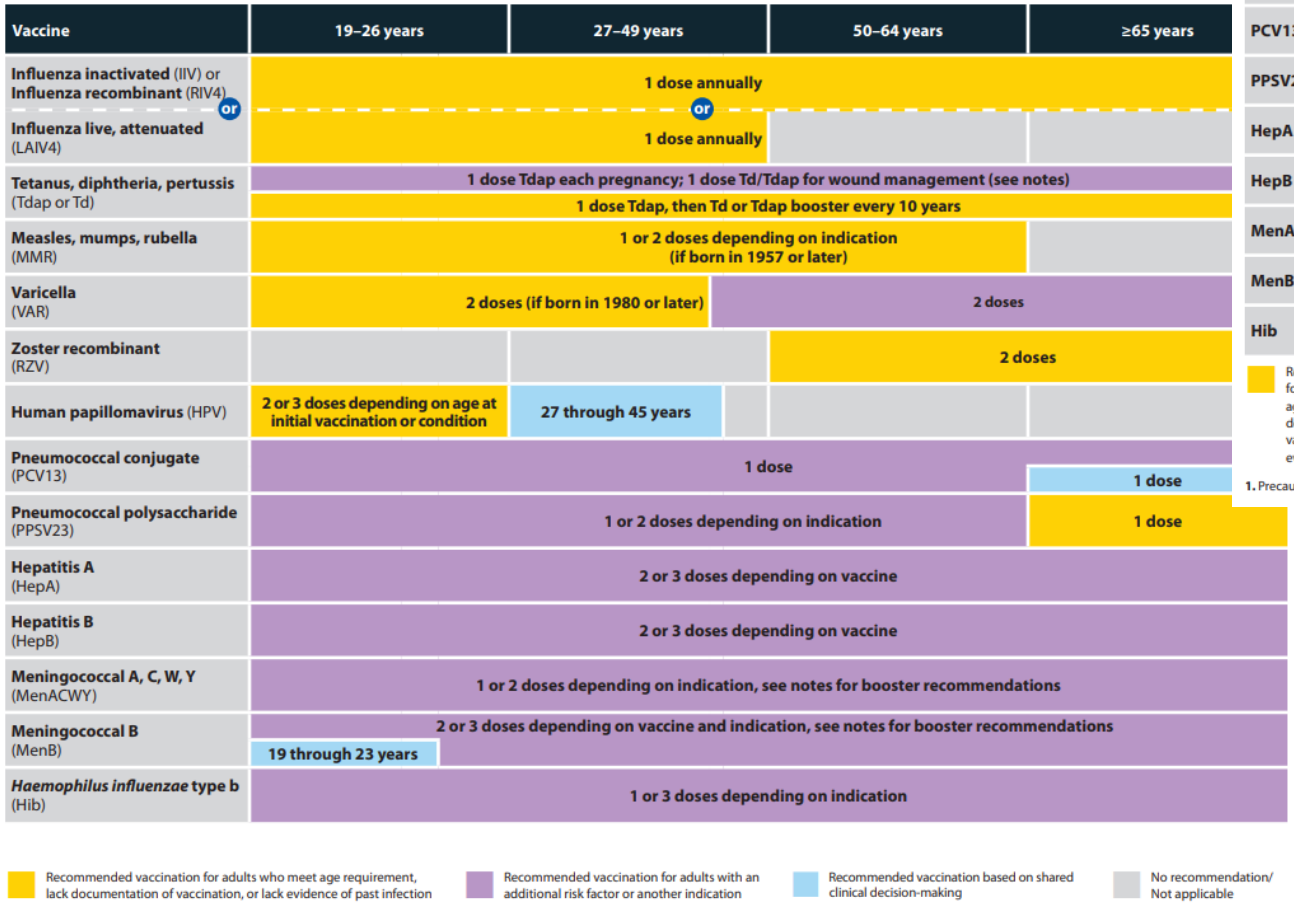
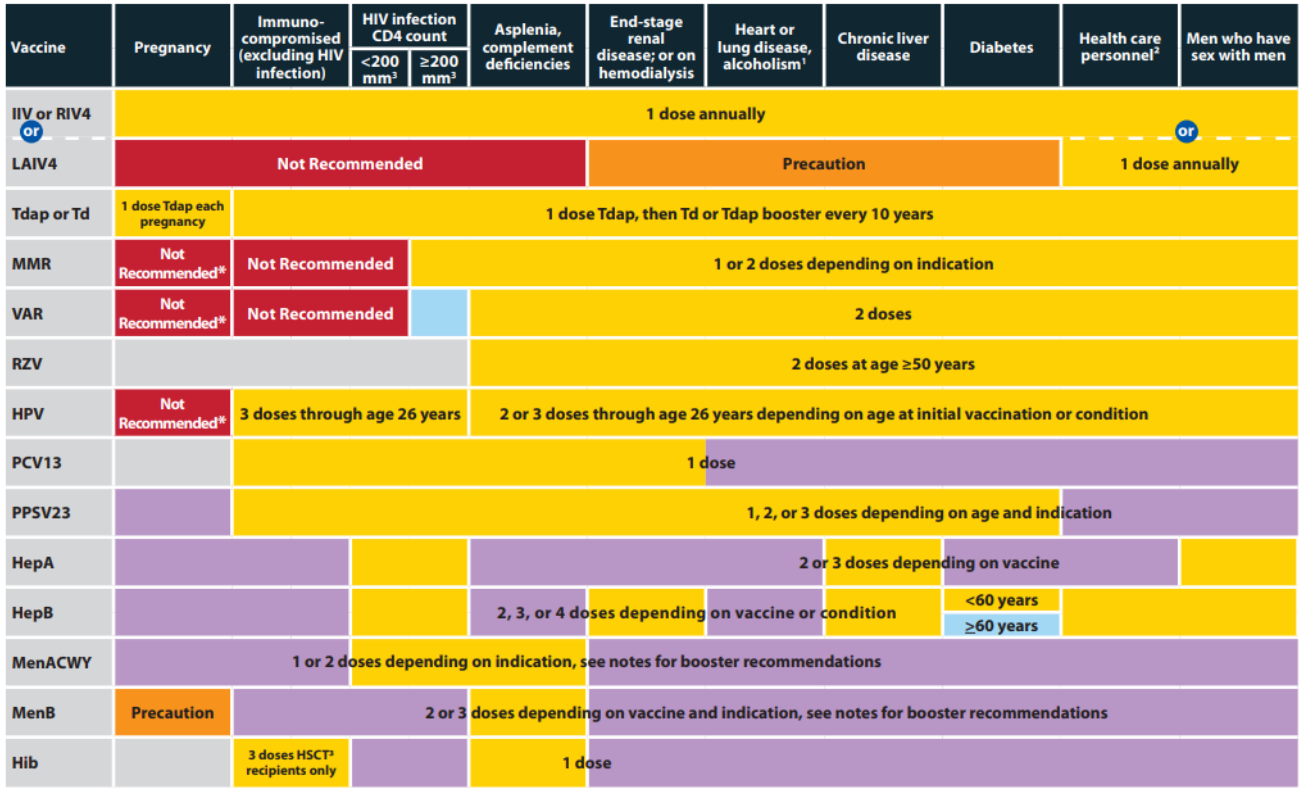


Table 2 Recommended Adult Immunization Schedule by Medical Condition and Other Indications, United States, 2021



1. Precaution for LAIV4 does not apply to alcoholism. **2.** See notes for influenza; hepatitis B; measles, mumps, and rubella; and varicella vaccinations. **3.** Hematopoietic stem cell transplant.

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Efficacy

- Most vaccines have >90% efficacy
  - <5% non-responders to Hepatitis B
  - Polio and Measles >99%
  - Varicella 98%
- Vaccines are imperfect
  - DTaP not as immunogenic as DTP was, waning immunity is significant concern
  - Mumps <90%
  - Influenza varies yearly depending on similarity between vaccine viruses and those circulating, as well as on the age and immunocompetence of the recipients; often 30-70%

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Side Effects

- Vaccines are safe.
- Local reactions
  - Pain
  - Bleeding or bruising
  - Redness or swelling
  - Lump at site of injection
- Systemic reactions
  - Fever
  - Crying/crankiness
  - Fatigue/sleepiness
  - Poor appetite
  - Myalgia/arthralgia
  - Headache
  - Syncope (adolescents)
  - Rash (measles or varicella)

- Rare Reactions
  - Anaphylaxis
  - Febrile seizures
  - Others
    - Brachial neuritis (DTP)
    - Hypotonic-hyporesponsive syndrome (DTP)
    - Vaccine-Associated Paralytic Poliomyelitis (OPV)
    - Intussusception (Rota)
    - Transient Thrombocytopenia (MMR)
    - Herpes Zoster (VZV)
    - Guillain-Barré Syndrome (Adult flu)
    - Myocarditis (COVID-19)
  - NOT AUTISM

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Measles, Mumps, Rubella

- Found in MMR and MMRV, live attenuated, SQ
- Efficacy/Effectiveness
  - Measles
    - Antibodies develop in 95-98% after first dose and is lifelong, but up to 5% lose protection over time
    - After two doses, >99% develop serologic evidence of immunity
  - Mumps: post-licensure data show effectiveness of 78% after one dose and 88% after two doses
  - Rubella: one dose confers long-term immunity in >90%
- Recommended for two doses, typically given at 12-15mo and again at 4-6yo
  - Can be given at 6-11mo for international travel

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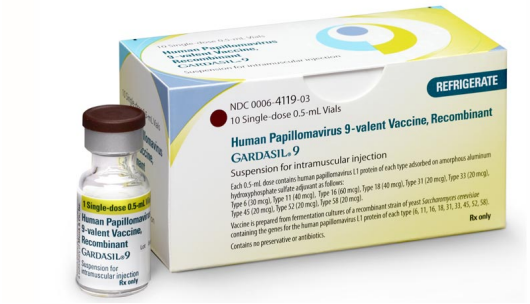
Human Papillomavirus

- Found in one vaccine in US, IM
  - 9-valent (HPV9) for types 6, 11, 16, 18, 31, 33, 45, 52, 58 for 9-26yo
  - No longer available: Quadrivalent (HPV4)
- Immunogenicity
  - >97% of recipients develop HPV antibodies
- Efficacy
  - Highly effective at preventing cervical cancers, genital warts, anal cancer/precancer
  - Impact on oropharyngeal cancers not yet known
  - In US, prevalence of vaccine-type HPV decreased ~60% in 14-19yo girls within first 6 yrs after HPV vaccination program began in 2006
  - Offers no protection against HPV acquired prior to immunization
- In June 2020, FDA approved new indication: for prevention of oropharyngeal and other head and neck cancers (based on effectiveness for anogenital disease)



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Influenza

- Two forms of vaccine
  - Inactivated Influenza Vaccine (IIV), previously IM or intradermal, available in trivalent (IIV3) and quadrivalent (IIV4) formulations; now just IM and IIV4
  - Live-Attenuated Influenza Vaccine (LAIV), intranasal, only quadrivalent
    - Was not available for use during 2016-17 and 2017-18 seasons due to poor effectiveness against the H1N1 component, but came back in 2018-19
- Strains selected for inclusion in the seasonal influenza vaccine may vary yearly based on the anticipated predominant influenza strains expected to circulate in the US in the upcoming season
  - The quadrivalent formulation for 2021-22 includes two antigenically distinct lineages of influenza B viruses (Victoria and Yamagata) as well as influenza A (H3N2) and A (H1N1)
    - The influenza A H3N2 and H1N1 components are new in 2021-22
    - In 2020-21, the H3N2, H1N1, and B Victoria components were new
    - In 2019-20, the H3N2 and H1N1 components were new
    - In 2018-19, the H3N2 and B Victoria components were new
    - In 2017-18, the H1N1 component was new

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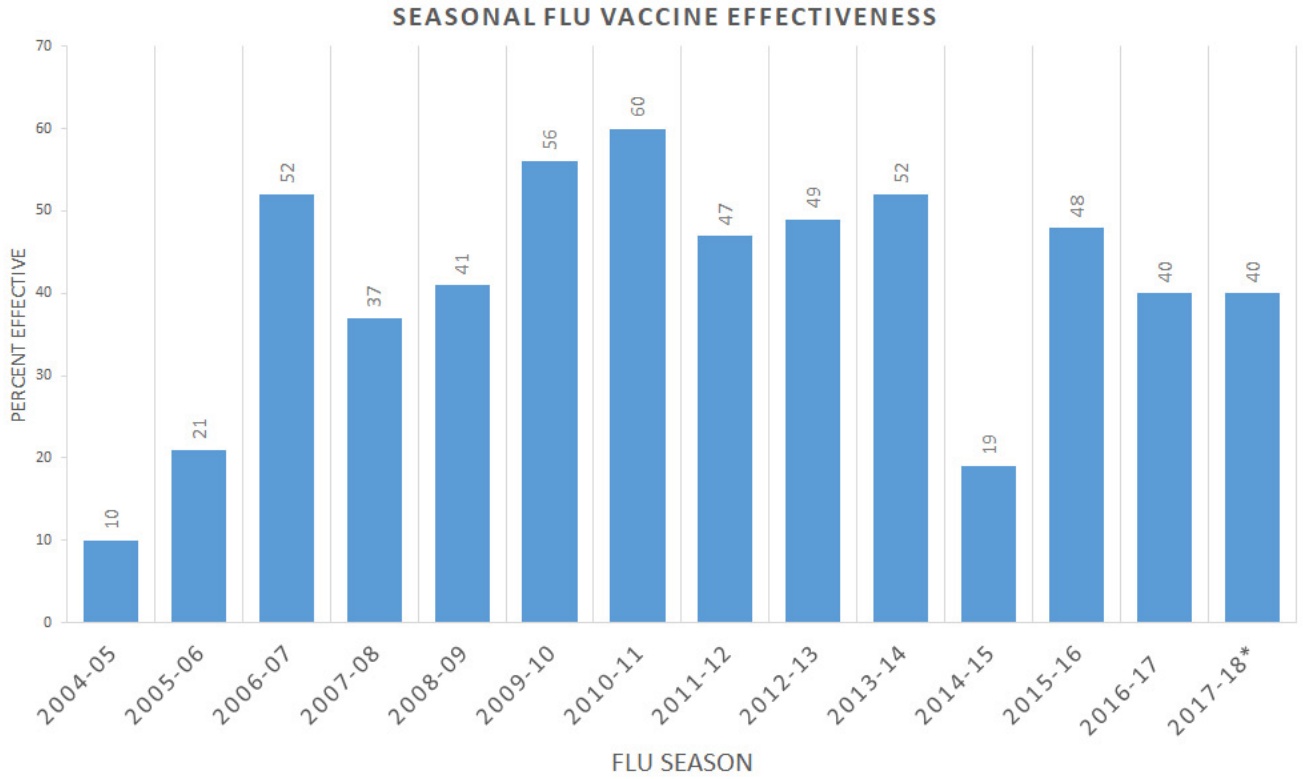
Influenza

- Efficacy/Effectiveness
  - Varies yearly depending on similarity between vaccine viruses and those circulating, as well as on the age and immunocompetence of the recipients
  - Influenza vaccine typically provides better protection against H1N1 and B strains than H3N2
    - In 2018-19, effectiveness was 29%
    - In 2019-20, 39% against all flu; 30% against H1N1; 45% against B/Victoria
  - Antibody titers wane up to 50% of their original levels 6 to 12 months after immunization



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COVID-19

- Found in three vaccines authorized by the FDA for emergency use in the US (as of 8/6/21): Pfizer-BioNTech, Moderna, and Janssen
  - Mechanism
    - Pfizer and Moderna utilize mRNA to encode the spike protein
    - Janssen uses an Adenovirus vector
  - Differences
    - Pfizer: two formulations
      - 12 years and up, 2 shots three weeks apart
      - 5-11 years, 2 shots three weeks apart
    - Moderna: 18 years and up, 2 shots four weeks apart
    - Janssen: 18 years and up, 1 shot
  - Booster: all three vaccines now recommended for booster in 18+ population
  - Efficacy
    - Pfizer: 95%
    - Moderna: 94.1%
    - Janssen: 66% moderate/severe disease, 85% severe/critical
  - Side effect profile similar to flu: pain at injection site, fatigue, headache, myalgias, chills, arthralgias, fever
    - Myocarditis?

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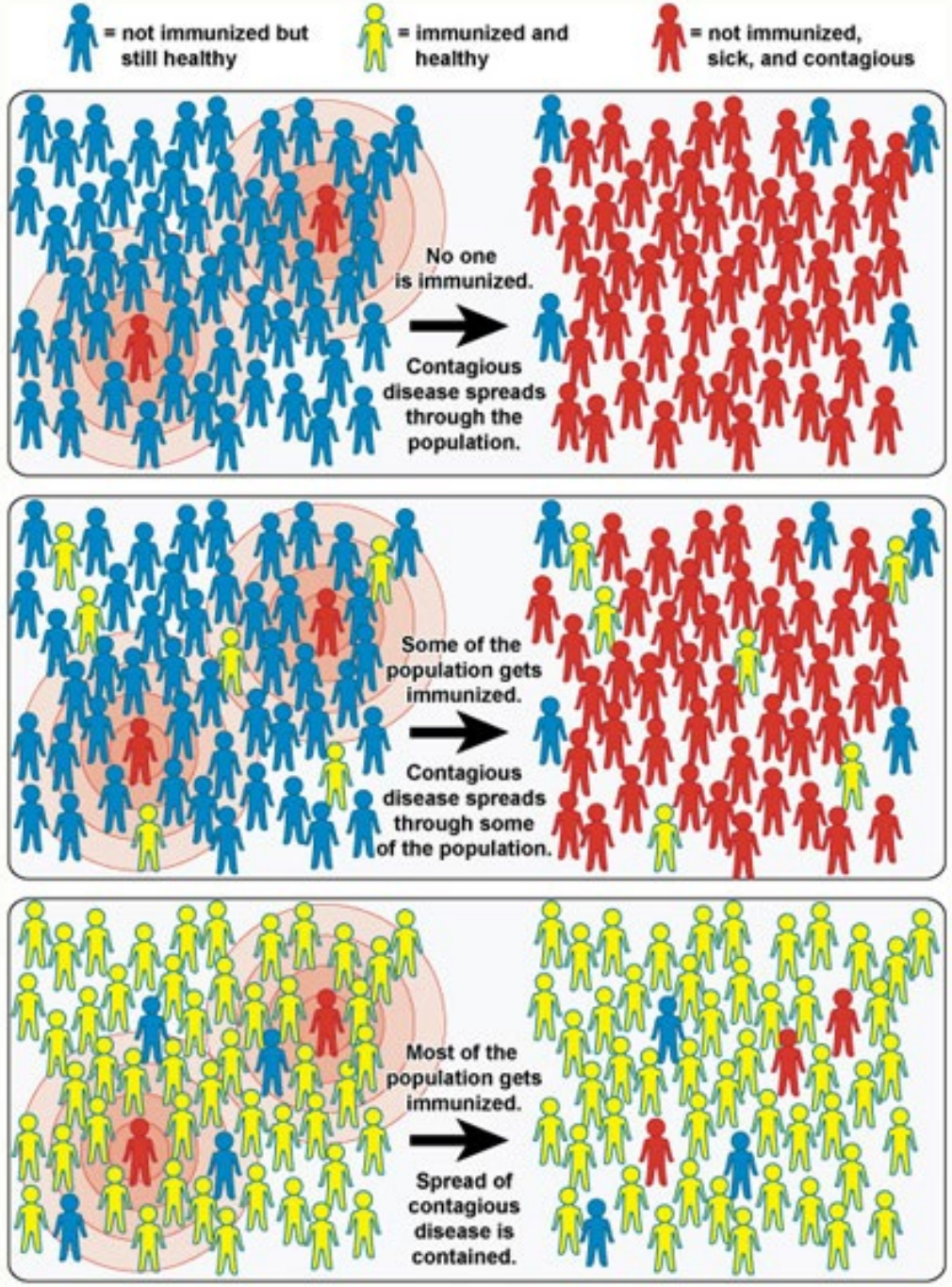
Herd Immunity



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Vaccine Antigen Counts Over Time

- 1960: Smallpox, Polio, Diphtheria, Tetanus, Pertussis
  - 3217 antigens
- 1980: MMR replaced Smallpox, DTP, Polio (OPV)
  - 3041 antigens
  - The complete vaccine schedule from birth to 18 years totaled 15,096 antigens
- Today: DTaP/Tdap, MMR, Varicella, IPV, Hib, PCV13, Hep A and B, MCV4, HPV9, Rota, Influenza
  - 177 antigens (16 vaccine preventable diseases)
  - The complete vaccine schedule from birth to 18 years totals 653 antigens (less than one dose of DTP, which was used until 1997)
  - Now we can add COVID-19!

Vials labeled 'smallpox' found at vaccine research facility in Pennsylvania, CDC says

By Maggie Fox, CNN

Updated 10:20 AM ET, Wed November 17, 2021

The battle to eradicate smallpox 01:24

(CNN) — Several vials labeled "smallpox" have been found at a vaccine research facility in Pennsylvania, the US Centers for Disease Control and Prevention said Tuesday.

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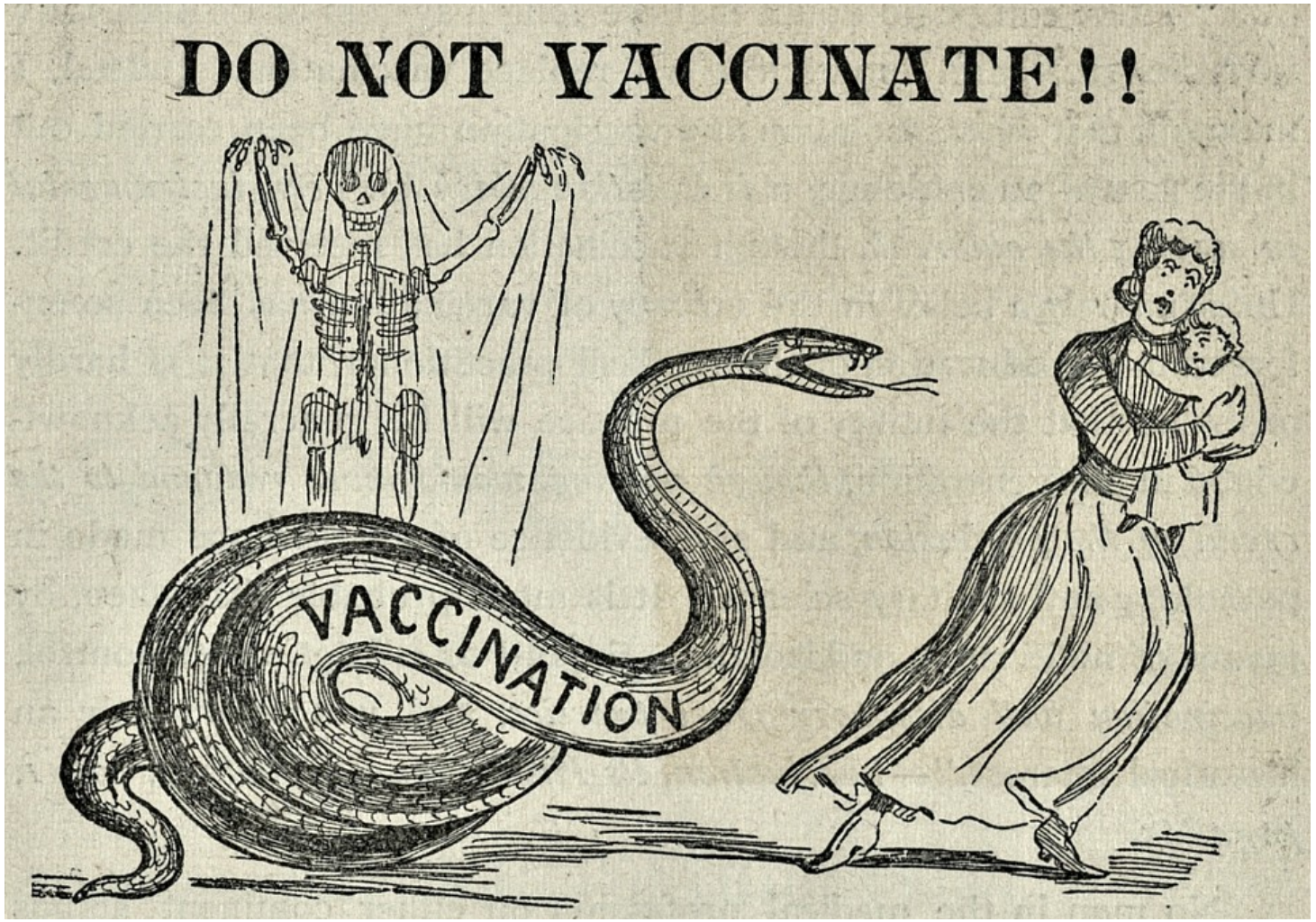
Vaccine Hesitancy and Refusal



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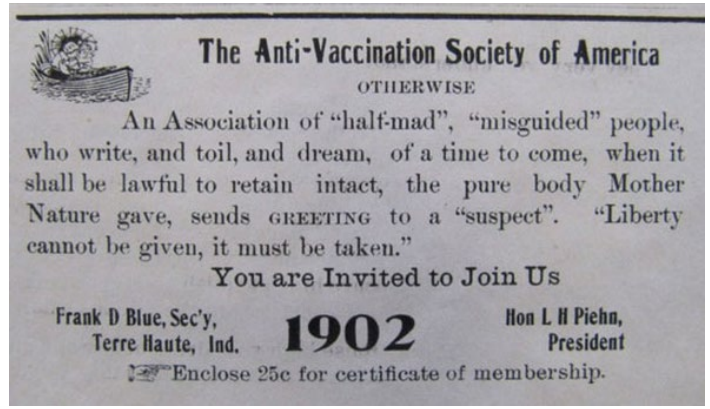
History

- Smallpox
  - Edward Jenner's smallpox vaccine led to Anti Vaccination League and Anti-Compulsary Vaccination League in England in 1800s
  - Turn of 19th century saw smallpox outbreaks in US leading to vaccination campaigns
    - Anti Vaccination Society of America founded in 1879
    - 1902: Cambridge, Mass mandated smallpox vaccination during an outbreak; Supreme Court ruled in favor of the city's mandate
- Cutter Incident
  - 1955: 200 people paralyzed and 10 deaths after contracting polio from the Salk polio vaccine that was not inactivated despite the manufacturers' adherence to government standards
    - Many lawsuits against vaccine manufacturers
- DPT
  - 1970s and 1980s: increase in lawsuits against vaccine manufacturers due to unsubstantiated concerns about neurologic damage due to DPT
    - By 1984, only one US company still manufactured DPT



The Anti-Vaccination Society of America

OTHERWISE

An Association of "half-mad", "misguided" people, who write, and toil, and dream, of a time to come, when it shall be lawful to retain intact, the pure body Mother Nature gave, sends GREETING to a "suspect". "Liberty cannot be given, it must be taken."

You are Invited to Join Us

Frank D Blue, Sec'y, Terre Haute, Ind. **1902** Hon L H Piehn, President

☞Enclose 25c for certificate of membership.

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Government Oversight

- 1986: National Childhood Vaccine Injury Act (NCVIA)
  - Vaccine Information Statements (VIS), NVICP, VAERS
- National Vaccine Injury Compensation Program (NVICP, started in 1988)
  - Intended to prevent liability suits from driving vaccine manufacturers from the market (no-fault system)
  - Funded by tax on each vaccine dose
  - Those claiming vaccine injury cannot sue the manufacturer without first filing a claim with NVICP
  - There is a table with known adverse events and a formula for claim reimbursement for the known event
- Vaccine Adverse Events Reporting System (VAERS, started in 1990)
  - Voluntary reporting system, anyone can make report
  - CDC then investigates the event
  - However, this is limited by under-reporting and reporter bias

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Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

Summary

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associa by the parents, with measles, mumps, and rub a vaccination in eight of the 12 children, with measl infection in one child, and otitis media in an r. All 1 children had intestinal abnormalities rangi from lymphoid nodular hyperplasia to a thoid u eration. Histology showed patchy chronic inflam ation i in 11 children and reactive ileal mpho perplasia in seven, but no granulomas. Be vioural diso rs included autism (nine), disintegrativ sys sis (one), a possible postviral or vaccinal encephalitis o). There were no focal neurological ab malities and I and EEG tests were normal. Abno al laboratory results re significantly raised urinary thylmal c acid compared with age-matched contro (p=0 03), low haemoglobin in four children, a the low s m IgA in r children.

Inter tation e iden associated gastrointestinal dis se and evelopmental regression in a group of previ ly mal chi n, which was generally associated in time with possible environmental triggers.

Lancet 199 **351:** 637–41
See Commentary page

Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, includ g com nication. They all had gastrointestinal mptoms, luding abdominal pain, diarrhoea, and ating and, some cases, food intolerance. We scribe e clinical f dings, and gastrointestinal featur of these ch en.

Patients and meth ds

12 children, cons tively red to department of paediatric gastr terology a hi y of a pervasive developmental der with loss ired skills and intestinal symptoms arrh abdominal in, bloating and food intolerance), were inv gated. All children were admitted to the ward f week, accomp d by their parents.

Clinical investigations

took histori including details of immunisations and e sure to infect s diseases, and assessed the children. In 11 cas the history as obtained by the senior clinician (JW-S). Neuro d psychiatric assessments were done by consultant staff (PH, MB) with HMS-4 criteria.[1] Developmental s included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known

NEMOURS CHILDREN'S HEALTH

NEMOURS
CHILDREN'S HEALTH

Anti-Vaccine Celebrities

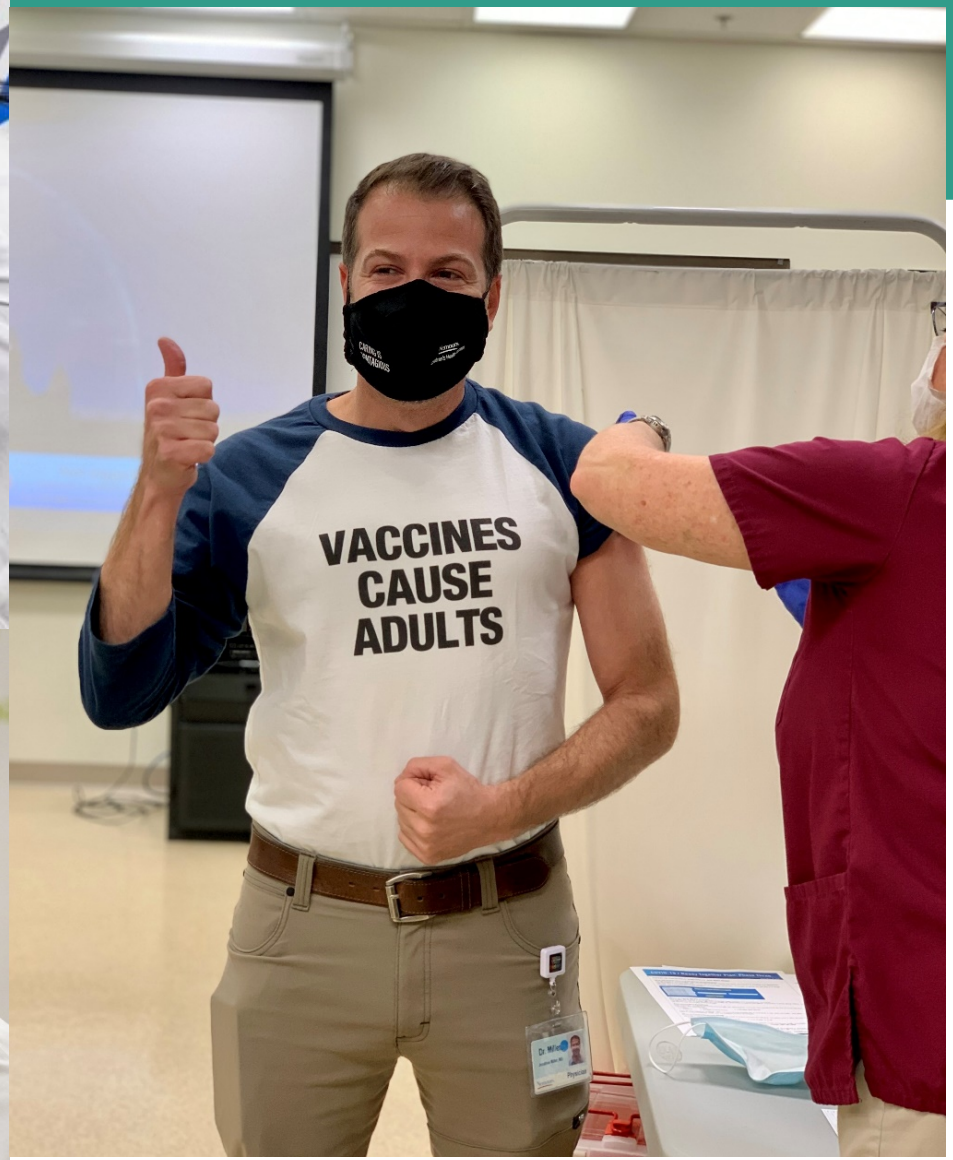
- Jenny McCarthy
- Jenna Elfman
- Jim Carrey
- Alicia Silverstone
- Charlie Sheen
- Kirstie Alley
- Selma Blair
- Mayim Bialik
- Billy Corgan
- Lisa Bonet
- Aidan Quinn
- Rob Schneider
- Miranda Bailey
- Erin Brockovich
- Juliette Lewis
- Holly Robinson Peete
- Bill Maher
- Kristin Cavallari
- Alex Jones
- Michele Bachmann
- Robert F. Kennedy, Jr
- Donald J. Trump

NEMOURS CHILDREN'S HEALTH

Pro-Vaccine Celebrities

- Chelsea Clinton
- Salma Hayek
- John Oliver
- Kristen Bell
- Kim Kardashian
- Jennifer Garner
- Bill Gates
- Sarah Michelle Gellar
- Jennifer Lopez
- Kristi Yamaguchi
- Michelle Obama
- Amanda Peet
- Marc Anthony
- Julie Bowen
- Keri Russell
- Ewan McGregor
- Jon Stewart
- Lenny Kravitz
- David Beckham
- Serena Williams
- Stephen Colbert

NEMOURS CHILDREN'S HEALTH



NEMOURS
CHILDREN'S HEALTH

2015: Disneyland Measles Outbreak

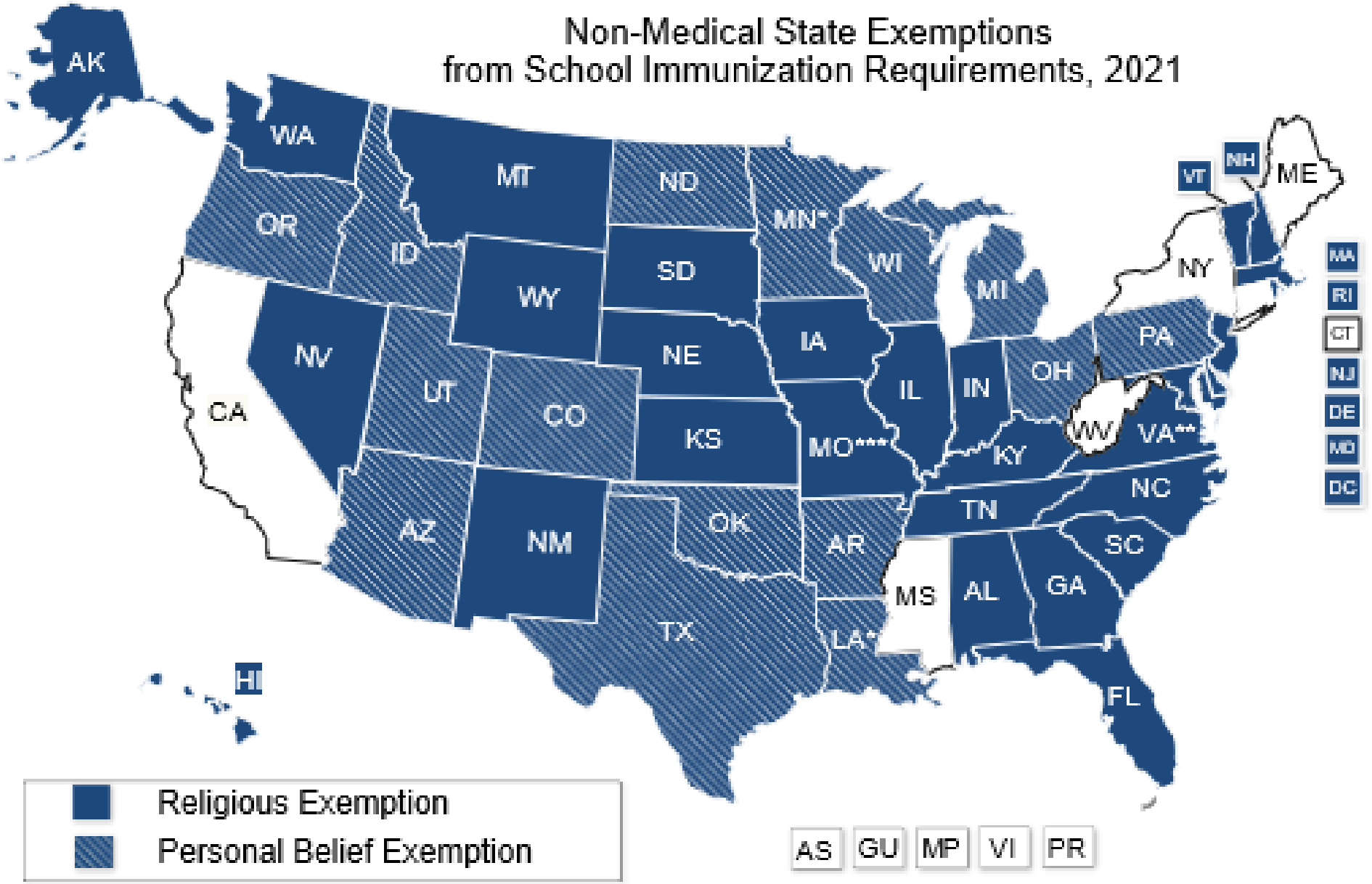
NEMOURS CHILDREN'S HEALTH

School Exemptions from Vaccination

- All states allow medical exemptions
- 44 states allow religious and/or personal belief exemptions
- West Virginia, Mississippi, California, Maine, New York, and now Connecticut do not allow religious or philosophical exemptions
- Delaware allows medical and religious exemptions, but not personal belief exemptions, PA allows all
- Individuals with exemptions can be excluded from school during outbreaks

NEMOURS CHILDREN'S HEALTH

Non-Medical State Exemptions from School Immunization Requirements, 2021



AS GU MP VI PR

NEMOURS CHILDREN'S HEALTH

Who's behind a new anti-vaccine trend in California? Doctors, say health offi…

California banned 'personal belief' vaccine exemptions for children entering school three years ago. But a disturbing trend has emerged.

nbcnews.com

6:16 PM - 27 Jan 2019

Jonathan Miller MD
@DrJMiller8

"Dr" Bob is going to need to find an Alternative Occupation.
respectfulinsolence.com/2018/06/29/dr-...
#VaccinesWork

Antivaccine pediatrician Dr. Bob Sears finally faces discipline from the Medic…

Antivaccine pediatrician Dr. Bob Sears has been disciplined by the Medical Board of California, and I feel schadenfreude.

respectfulinsolence.com

5:10 AM - 29 Jun 2018

NEMOURS CHILDREN'S HEALTH

Weaponized Health Communication: Twitter Bots and Russian Trolls Amplify the Vaccine Debate

David A. Broniatowski, PhD, Amelia M. Jamison, MAA, MPH, SiHua Qi, SM, Luluah AlKulaib, SM, Tao Chen, PhD, Adrian Benton, MS, Sandra C. Quinn, PhD, and Mark Dredze, PhD

Objectives. To understand how Twitter bots and trolls ("bots") promote online health content.

Methods. We compared bots' to average users' rates of vaccine-relevant messages, which we collected online from July 2014 through September 2017. We estimated the likelihood that users were bots, comparing proportions of polarized and antivaccine tweets across user types. We conducted a content analysis of a Twitter hashtag associated with Russian troll activity.

Results. Compared with average users, Russian trolls ($\chi^2(1) = 102.0$; $P < .001$), sophisticated bots ($\chi^2(1) = 28.6$; $P < .001$), and "content polluters" ($\chi^2(1) = 7.0$; $P < .001$) tweeted about vaccination at higher rates. Whereas content polluters posted more antivaccine content ($\chi^2(1) = 11.18$; $P < .001$), Russian trolls amplified both sides. Unidentifiable accounts were more polarized ($\chi^2(1) = 12.1$; $P < .001$) and antivaccine ($\chi^2(1) = 35.9$; $P < .001$). Analysis of the Russian troll hashtag showed that its messages were more political and divisive.

Conclusions. Whereas bots that spread malware and unsolicited content disseminated antivaccine messages, Russian trolls promoted discord. Accounts masquerading as legitimate users create false equivalency, eroding public consensus on vaccination.

Public Health Implications. Directly confronting vaccine skeptics enables bots to legitimize the vaccine debate. More research is needed to determine how best to combat bot-driven content. (*Am J Public Health.* Published online ahead of print August 23, 2018: e1–e7. doi:10.2105/AJPH.2018.304567)

preventable diseases such as influenza and viral pneumonia[14] underscore the importance of combating online misinformation about vaccines.

Much health misinformation may be promulgated by "bots"[15]—accounts that automate content promotion—and "trolls"[16]—individuals who misrepresent their identities with the intention of promoting discord. One commonly used online disinformation strategy, amplification,[17] seeks to create impressions of false equivalence or consensus through the use of bots and trolls. We seek to understand what role, if any, they play in the promotion of content related to vaccination.

Efforts to document how unauthorized users—including bots and trolls—have influenced online discourse about vaccines have been limited. DARPA's (the US Defense Advanced Research Projects Agency) 2015 Bot Challenge charged researchers with identifying "influence bots" on Twitter in a stream of vaccine-related tweets. The teams

NEMOURS CHILDREN'S HEALTH

MEGAN MOLTENI SCIENCE 11.05.18 07:00 AM

HOW ANTIVAX PACS HELPED SHAPE MIDTERM BALLOTS

NEMOURS CHILDREN'S HEALTH

New Measles Update: Number Of Confirmed, Suspected Cases Climbs Past 100

New Measles Update: Number Of Confirmed, Suspected Ca...

The number of confirmed and suspected measles cases in Rockland County has climbed past 100 for the first time.As of Monday, Dec. 17, Rockland County Department of Health offici...

dailyvoice.com

10:38 AM - 18 Dec 2018

NEMOURS CHILDREN'S HEALTH

Tens of thousands infected in measles outbreak in Madagascar @CNN

More than 20,000 people infected in measles outbreak in Madagascar

In a country like Madagascar, where they are battling a deadly outbreak and vaccines are in short supply, the US and European anti-vax movement infu...

cnn.com

NEMOURS CHILDREN'S HEALTH

Anti-vax Movement Listed by World Health Organization as One of the Top 10 Health Threats for 2019

The anti-vax movement has been listed by WHO as one of its top 10 health th…

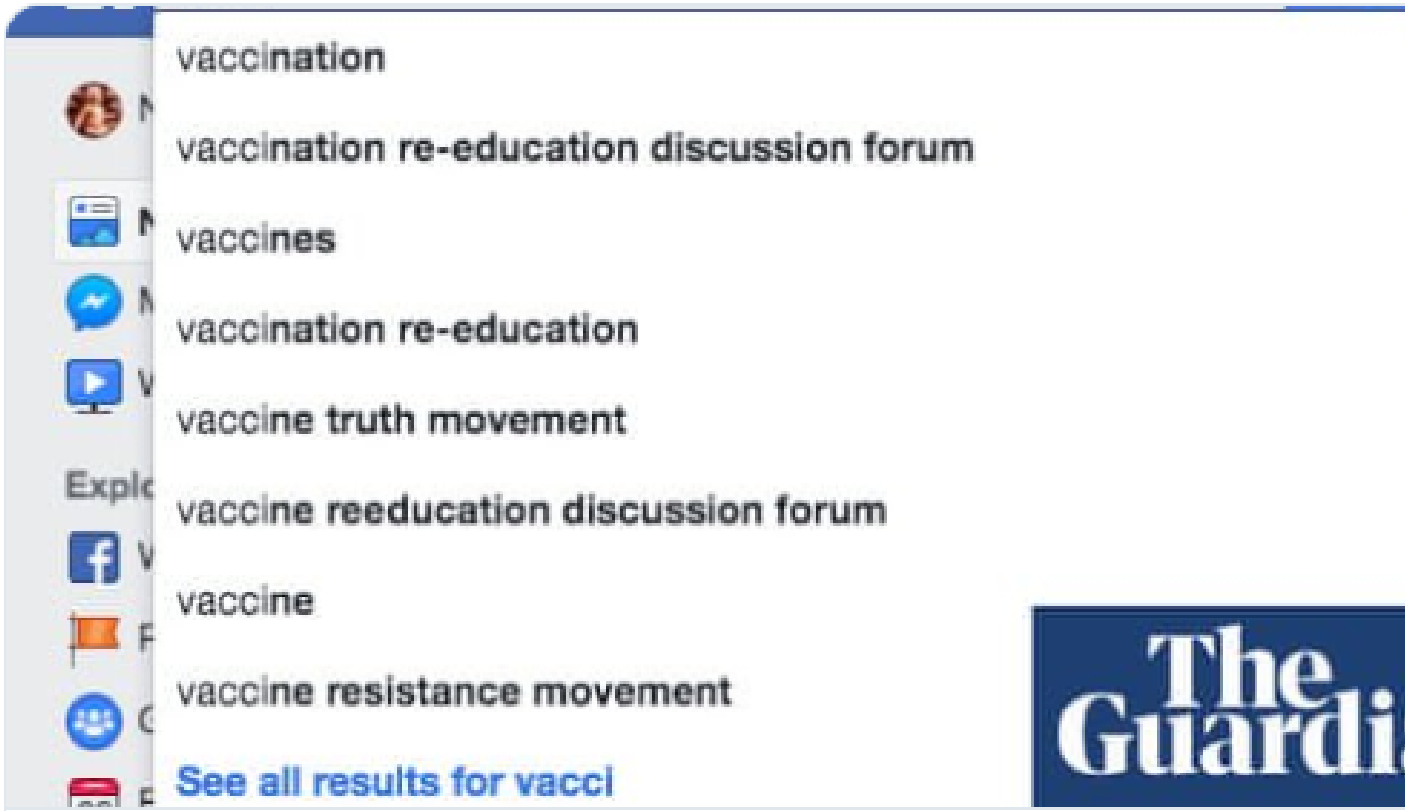
"Vaccine hesitancy" has been identified as one potential factor contributing to the 30 percent increase in measles cases around the world.

newsweek.com

5:49 PM - 16 Jan 2019

NEMOURS CHILDREN'S HEALTH

How Facebook and YouTube help spread anti-vaxxer propaganda



How Facebook and YouTube help spread anti-vaxxer propaganda

Companies have acknowledged the problem and are taking modest steps to discourage misinformation

theguardian.com

2:32 PM - 1 Feb 2019

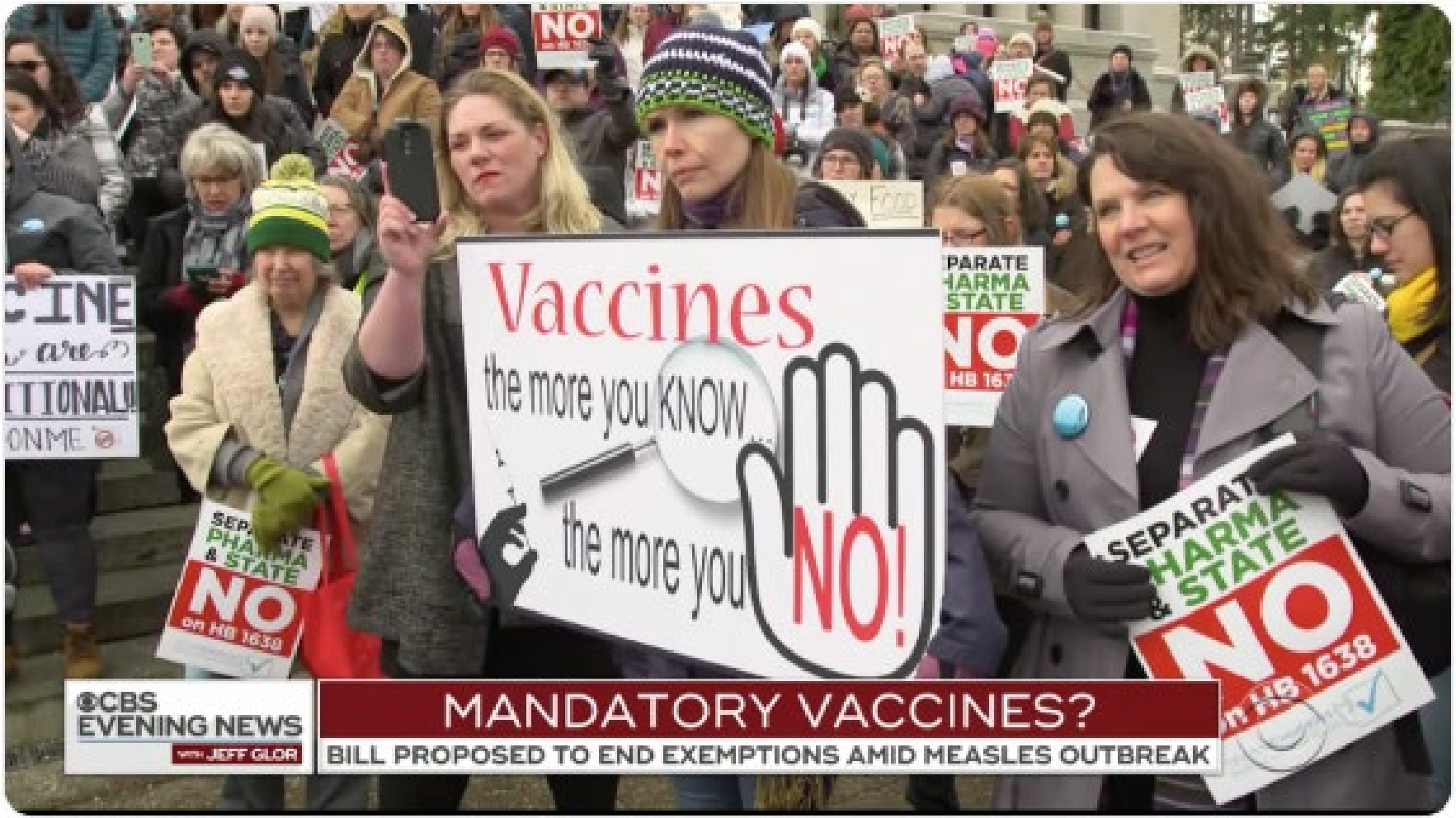
LOUISE MATSAKIS BUSINESS 03.07.19 05:29 PM

FACEBOOK WILL CRACK DOWN ON ANTI-VACCINE CONTENT

YANA TATEVOSIAN/GETTY IMAGES

NEMOURS CHILDREN'S HEALTH

Hundreds protest for right not to vaccinate children in Washington during ongoing outbreak of measles hill.cm/H8d1tTX



3:45 PM - 9 Feb 2019

NEMOURS CHILDREN'S HEALTH

"Unvaccinated people living in select ZIP codes will be required to receive the measles, mumps and rubella vaccine, known as MMR, to curtail the outbreak and protect others" #VaccinesWork #measlesoutbreak

New York City declares a public health emergency amid Brooklyn me...

New York City has declared the measles outbreak affecting the Orthodox Jewish community in Williamsburg to be a public health emergency, Mayo...

cnn.com

NEMOURS CHILDREN'S HEALTH

HEALTH NEWS APRIL 29, 2019 / 11:15 AM / 4 MONTHS AGO

U.S. measles outbreak hits 'completely avoidable' 25-year-high: officials

Gabriella Borter

3 MIN READ

NEW YORK (Reuters) - The number of measles cases in the United States has reached a 25-year peak, propelled by the spread of misinformation about the vaccine that can prevent the disease, federal health officials said on Monday.

Wed, Aug 21, 2019

Newsweek

U.S. | World | Business | Tech & Science | Culture | Sports | Health | Op

NEWS

MEASLES IS ON THE RISE: OUTBREAK GROWS TO OVER 1,200 CASES IN 30 STATES, WHILE U.K. LOSES MEASLES-FREE STATUS

BY MATT KEELEY ON 8/19/19 AT 10:18 PM EDT

NEMOURS CHILDREN'S HEALTH

Dr. Sean Gallagher @TheKidKidDoc · Jul 3

This year, the number of states in the US allowing only medical exemptions from vaccination nearly doubled (from 3 to 5.)

Mississippi, West Virginia, California, Maine, and New York: thank you for putting kids first! #VaccinesWork #PutKids1st

How California made a 'dramatic' impact on kindergartners getting va...

The rate of kindergarteners in California without an up-to-date vaccination status rose fell from 9.84% in 2013, before interventions took place, to 4.8...

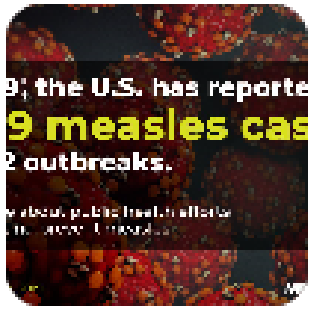
cnn.com

NEMOURS CHILDREN'S HEALTH

Dan Freedman
@dfreedman7

Following

Important data on the measles outbreak. 89% of cases were unvaccinated, undervaccinated or vaccine status unknown (85% of cases occurring in insular communities with lower vaccine uptake). Genotyping revealed 100% of samples tested were strains B3 or D8 (not vaccine related).



MMWR @CDCMMWR

U.S. reports the most #measles cases in 25 years. Keeping high coverage of #MMRvaccination is key to prevent measles cases and outbreaks. Learn more: bit.ly/MMWR_Measles_U...

8:27 PM - 5 Oct 2019

NEMOURS CHILDREN'S HEALTH

As COVID-19 dominates the news, flu deaths continue

Author — LABline

Feb 13th, 2020

LATEST IN FLU

Flu

Fast-spreading mutatior

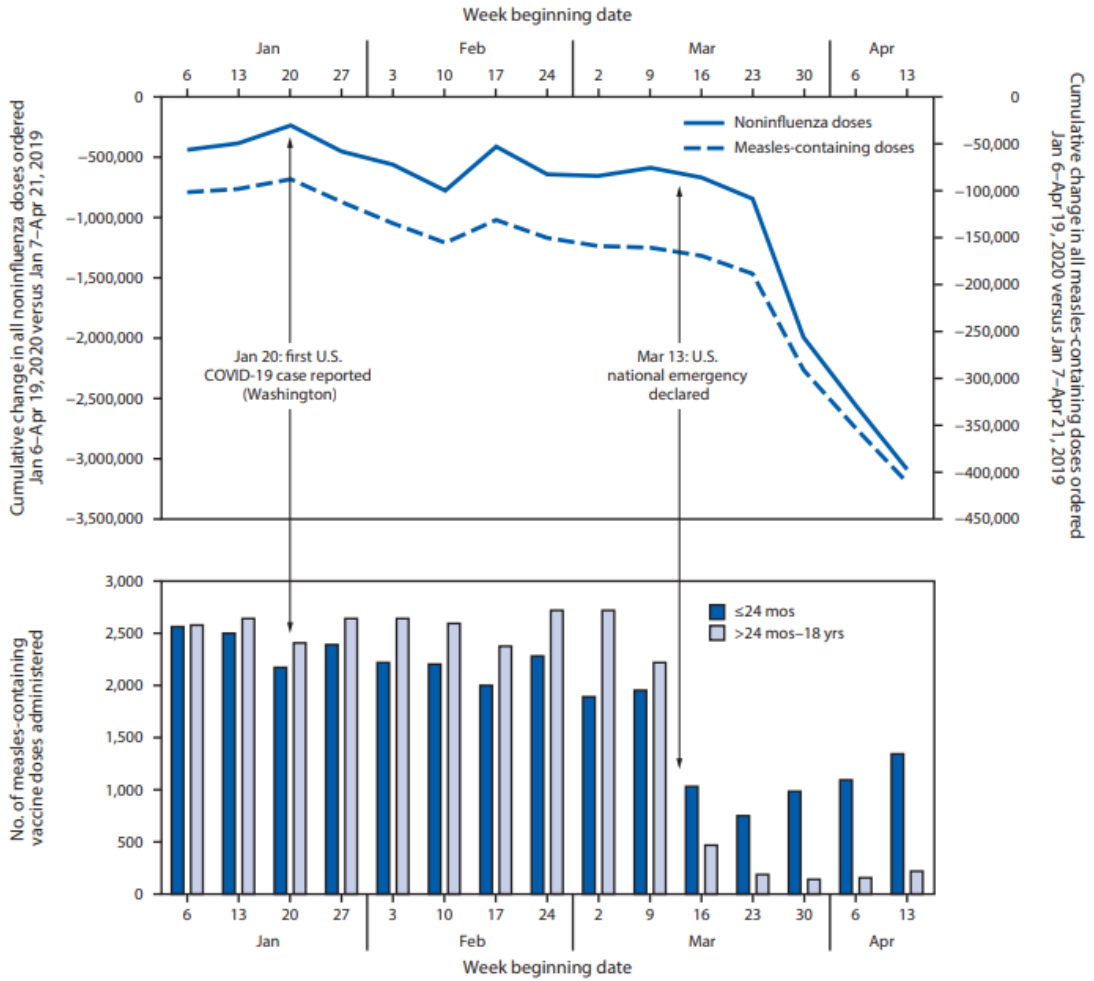
NEMOURS CHILDREN'S HEALTH

Morbidity and Mortality Weekly Report

Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration — United States, 2020

Jeanne M. Santoli, MD[1]; Megan C. Lindley, MPH[1]; Malini B. DeSilva, MD[2]; Elyse O. Kharbanda, MD[2]; Matthew F. Daley, MD[3]; Lisa Galloway[1]; Julianne Gee, MPH[4]; Mick Glover[5]; Ben Herring[6]; Yoonjae Kang, MPH[1]; Paul Lucas, MS[1]; Cameron Noblit, MPH[1]; Jeanne Tropper, MPH, MS, MBA[1];

FIGURE. Weekly changes in Vaccines for Children Program (VFC) provider orders* and Vaccine Safety Datalink (VSD) doses administered† for routine pediatric vaccines — United States, January 6–April 19, 2020



* VFC data represent the difference in cumulative doses of VFC-funded noninfluenza and measles-containing vaccines ordered by health care providers at weekly intervals between Jan 7–Apr 21, 2019, and Jan 6–Apr 19, 2020.

† VSD data depict weekly measles-containing vaccine doses administered by age group (age ≤24 mos and >24 mos–18 yrs).

NEMOURS CHILDREN'S HEALTH

Jonathan Miller MD
@DrJMiller8

I'm so proud of our team at @Nemours for creating innovative solutions for providing safe preventive care for kids in a way that also promotes social distancing and keeps our staff safe! #VaccinesWork #ImmunizationStation #DriveByShooting

Vaccination Tents: Children's Hospital Using Outdoor Clinics for Wellness Checku...
Making sure young children continue to stay healthy and get vaccinated for diseases is difficult during the coronavirus pandemic. The WHO estimates more ...
nbcphiladelphia.com

11:53 AM · Apr 18, 2020 · Twitter for iPhone

NEMOURS CHILDREN'S HEALTH

; Getty

POLITICS

The Anti-Vax Movement's Radical Shift From Crunchy Granola Purists to Far-Right Crusaders

The transition is supercharged by Trump and the coronavirus.

KIERA BUTLER JUNE 18, 2020

NEMOURS CHILDREN'S HEALTH

People at a demonstration calling for medical freedom against forced childhood vaccinations at the Capitol, in Sacramento, Calif. | AP Photo

From anti-vax to anti-mask: School districts brace for parent resistance

By **MACKENZIE MAYS** | 07/02/2020 08:01 AM EDT

NEMOURS CHILDREN'S HEALTH

Mass. Public Health
@MassDPH

Flu Vaccine Now Required for all Massachusetts School Students Enrolled in Child Care, Pre-School, K-12, and Post-Secondary Institutions: mass.gov/news/flu-vacci...

3:06 PM · Aug 19, 2020 · Twitter Web App

NEMOURS CHILDREN'S HEALTH

Jonathan Miller MD @DrJMiller8 · Aug 27, 2020

Here's a story that is not getting nearly enough attention: Polio has been eradicated on African continent mercurynews.com/who-polio-has-... #VaccinesWork

WHO: Polio has been eradicated on African continent

"Today we come together to rejoice over a historic public health success, the certification of wild poliovirus eradication in the African region," ...

mercurynews.com

NEMOURS CHILDREN'S HEALTH

Nemours
@Nemours

Vickie Freeman, a registered nurse at Nemours duPont Hospital for Children was the first Nemours associate to receive the #COVID19 #vaccine. “I feel like I’m a pioneer. I did not get a chance to be in the military, so I feel like I am a soldier and I’m fighting this virus.”

9:35 PM · Dec 18, 2020 · Sprinklr

NEMOURS CHILDREN’S HEALTH

Jonathan Miller MD @DrJMiller8 · May 10

Great news: US FDA authorizes Pfizer's #Covid19vaccine for use in people ages 12 to 15. Time to get to work promoting confidence!
@Nemours

US FDA authorizes Pfizer's Covid-19 vaccine for use in people ages 12 ...
The FDA on Monday expanded the emergency use authorization for Pfizer's Covid-19 vaccine to include people ages 12 to 15.
apple.news

NEMOURS CHILDREN'S HEALTH

Journal of Community Health
https://doi.org/10.1007/s10900-021-01017-9

ORIGINAL PAPER

Parental Perspectives on Immunizations: Impact of the COVID-19 Pandemic on Childhood Vaccine Hesitancy

Kaidi He[1] · Wendy J. Mack[2] · Michael Neely[1] · Laura Lewis[3] · Vikram Anand[1]

Accepted: 14 July 2021

Abstract

Childhood vaccine hesitancy has been studied extensively before the COVID-19 pandemic. The pandemic presented new barriers to pediatric vaccinations. Furthermore, the development of COVID-19 vaccines has complicated factors underlying vaccine hesitancy. We performed a cross-sectional mobile phone-based survey at Children's Hospital Los Angeles querying parents regarding perspectives on vaccines before and during the pandemic. Our primary aim was to understand the impact of the pandemic on routine childhood vaccine hesitancy. Secondarily, we examined intent to vaccinate, COVID-19 vaccine hesitancy, and key contributing demographic factors. Among 252 participants, we found overall increased childhood vaccine hesitancy ($p=0.006$), increased risk perception ($p=0.006$), and unchanged vaccine confidence during the COVID-19 pandemic. Increased hesitancy did not translate into decreased intent to vaccinate with routine childhood vaccines or influenza vaccines. During the pandemic, households with higher income (50–99 K, > 100 K) correlated with decreased routine childhood vaccine hesitancy, while Hispanic ethnicity and African American race had increased risk perception. For COVID-19 vaccine hesitancy, households with higher income (> 100 K) correlated with decreased hesitancy, while non-White ethnicity and race had increased risk perception. We found that routine childhood vaccine hesitancy increased during the COVID-19 pandemic, mainly due to increased risk perception. Key contributing demographic factors behind both childhood vaccine hesitancy and COVID-19 vaccine hesitancy included household income and race. Understanding factors behind routine childhood vaccine hesitancy is crucial to maintaining pediatric vaccination rates and promoting vaccine confidence during and after the COVID-19 pandemic.

NEMOURS CHILDREN'S HEALTH

COVID-19 Enterprise Update: Mandatory Vaccination

Important Message for All Associates

Nemours Now
Friday, August 6, 2021

Dear Associate,

As we face the challenges of a troubling resurgence of COVID-19 across the nation and learn that the highly transmissible Delta variant is responsible, we need to do everything we can do to keep our patients and associates safe. We have strongly encouraged vaccination for all associates since the first vaccine for COVID-19 was approved for Emergency Use Authorization by the U.S. Food and Drug Administration. To-date, approximately **37%** of our associates remain unvaccinated and all patients under 12 years of age are still ineligible for vaccination, leaving them at risk for serious morbidity. The best way to protect people and to save lives is through vaccination of those who are eligible.

Having carefully weighed personal choice with our responsibility to protect our vulnerable patients, families, and associates from the growing risk of COVID-19 infection, the COVID-19 Task Force and Employee Health with full support of Dr. Larry Moss and the Executive Cabinet now believe it is imperative to require COVID-19 vaccination for all associates.

NEMOURS CHILDREN'S HEALTH

frontiers in Public Health

MINI REVIEW
published: 28 September 2021
doi: 10.3389/fpubh.2021.747787

The Relationship Between the COVID-19 Pandemic and Vaccine Hesitancy: A Scoping Review of Literature Until August 2021

Matilde de Albuquerque Veloso Machado[1], *Bjelle Roberts*[2], *Brian Li Han Wong*[3,4*], *Robin van Kessel*[1,5,6†] *and Elias Mossialos*[7,8†]

[1] Department of International Health, Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands, [2] Merck Sharp & Dohme (MSD), Brussels, Belgium, [3] Medical Research Council Unit for Lifelong Health and Ageing (MRC), London, United Kingdom, [4] Association of Schools of Public Health in the European Region (ASPHER), Brussels, Belgium, [5] Studio Europa, Maastricht University, Maastricht, Netherlands, [6] Research Committee, Global Health Workforce Network (GHWN) Youth Hub, World Health Organization, Geneva, Switzerland, [7] Department of Health Policy, London School of Economics and Political Science, London, United Kingdom, [8] Institute of Global Health Innovation, Imperial College London, London, United Kingdom

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Sara Manti,
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Prasanth Manohar,
Zhejiang University-University of Edinburgh Institute, China

***Correspondence:**
Brian Li Han Wong
b.wong@ucl.ac.uk

[†]*These authors have contributed equally to this work*

Specialty section:
This article was submitted to Infectious Diseases–Surveillance, Prevention and Treatment, a section of the journal Frontiers in Public Health

Received: *26 July 2021*
Accepted: *23 August 2021*
Published: *28 September 2021*

Background: Vaccines have been contributing to eradicate or drastically reduce the incidence of common diseases. Simultaneously, vaccine hesitancy is considered among the top ten global health threats. The COVID-19 pandemic has caused a tremendous impact on health, economics, and society worldwide, while also reinforcing faulty beliefs about the necessity of vaccine programs as a whole. This study aims to synthesise evidence on the impact of the COVID-19 pandemic on vaccine hesitancy.

Methods: A scoping review of literature between 1 January 2020 and 1 August 2021 was performed.

Results: COVID-19 vaccine acceptance decreased from more than 70 to <50% in 8 months starting from January 2020. Healthcare professionals demonstrate higher rates of vaccine receptivity than the public, which was more influenced by (social) media. The circulation of misinformation was associated with increased fear of side effects related to COVID-19 vaccines. Regarding other vaccines coverage, parents' intentions to vaccinate their children against influenza increased 15.8% during the COVID-19 pandemic so far. Nonetheless, the number of vaccines administered decreased, influenced by factors like fear of being exposed to the virus at healthcare facilities and restrictions.

Conclusions: Several efforts should be undertaken to improve vaccine acceptance and coverage now and beyond the pandemic to optimal population protection.

Keywords: COVID-19, immunisation, media, vaccines, vaccine hesistancy, vaccine uptake, vaccine confidence

California will require all schoolchildren to get a COVID vaccine once fully approved

October 1, 2021 · 3:27 PM ET

THE ASSOCIATED PRESS

California Gov. Gavin Newsom (shown here Tuesday) has announced a COVID vaccine mandate for all of the state's schoolchildren.

Aric Crabb/AP

SAN FRANCISCO — California Gov. Gavin Newsom on Friday announced the nation's first coronavirus vaccination mandate for schoolchildren, requiring that all elementary through high school students get the shots once the vaccine gains final approval from the U.S. government for different age groups.

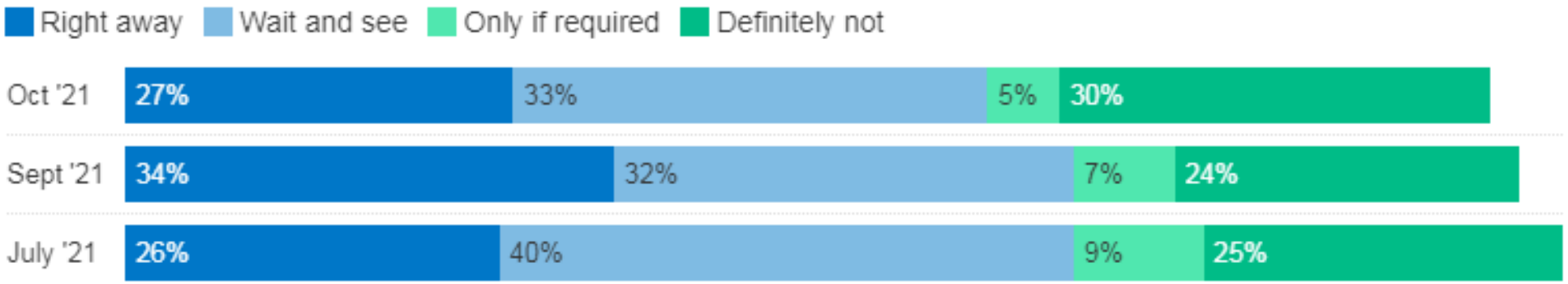
NEMOURS CHILDREN'S HEALTH

Kaiser Family Foundation: Oct 2021

Figure 1

Three In Ten Parents Say They Will Definitely Not Get Their 5 To 11 Year Old Vaccinated

Thinking about your child **between the ages of 5 and 11**, once there is a COVID-19 vaccine authorized and available for your child's age group, do you think you will get them vaccinated...?



NOTE: Among parents or guardians of children ages 5-11. See topline for full question wording.
SOURCE: KFF COVID-19 Vaccine Monitor • Download PNG

KFF COVID-19 Vaccine Monitor

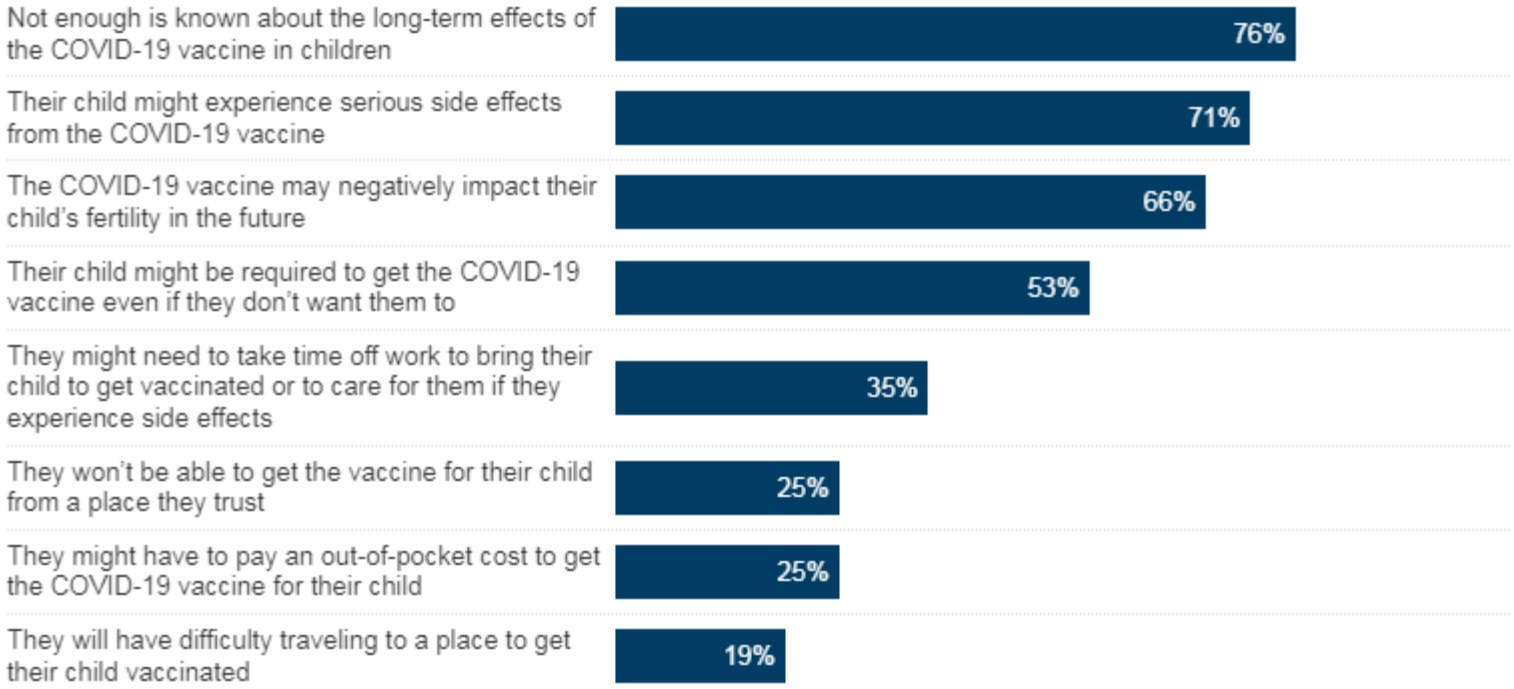
NEMOURS CHILDREN'S HEALTH

Kaiser Family Foundation: Oct 2021

Figure 2

Long-Term Effects, Serious Side Effects, And Impacts On Fertility Are Among The Top Concerns Parents Have About Vaccinating Their 5-11 Year Old Child

Percent of parents of children ages 5-11 who say they are **very** or **somewhat concerned** about each of the following:



NOTE: Among parents or guardians of children ages 5-11. See topline for full question wording.
SOURCE: KFF COVID-19 Vaccine Monitor (October 14-24, 2021) • Download PNG

KFF COVID-19 Vaccine Monitor

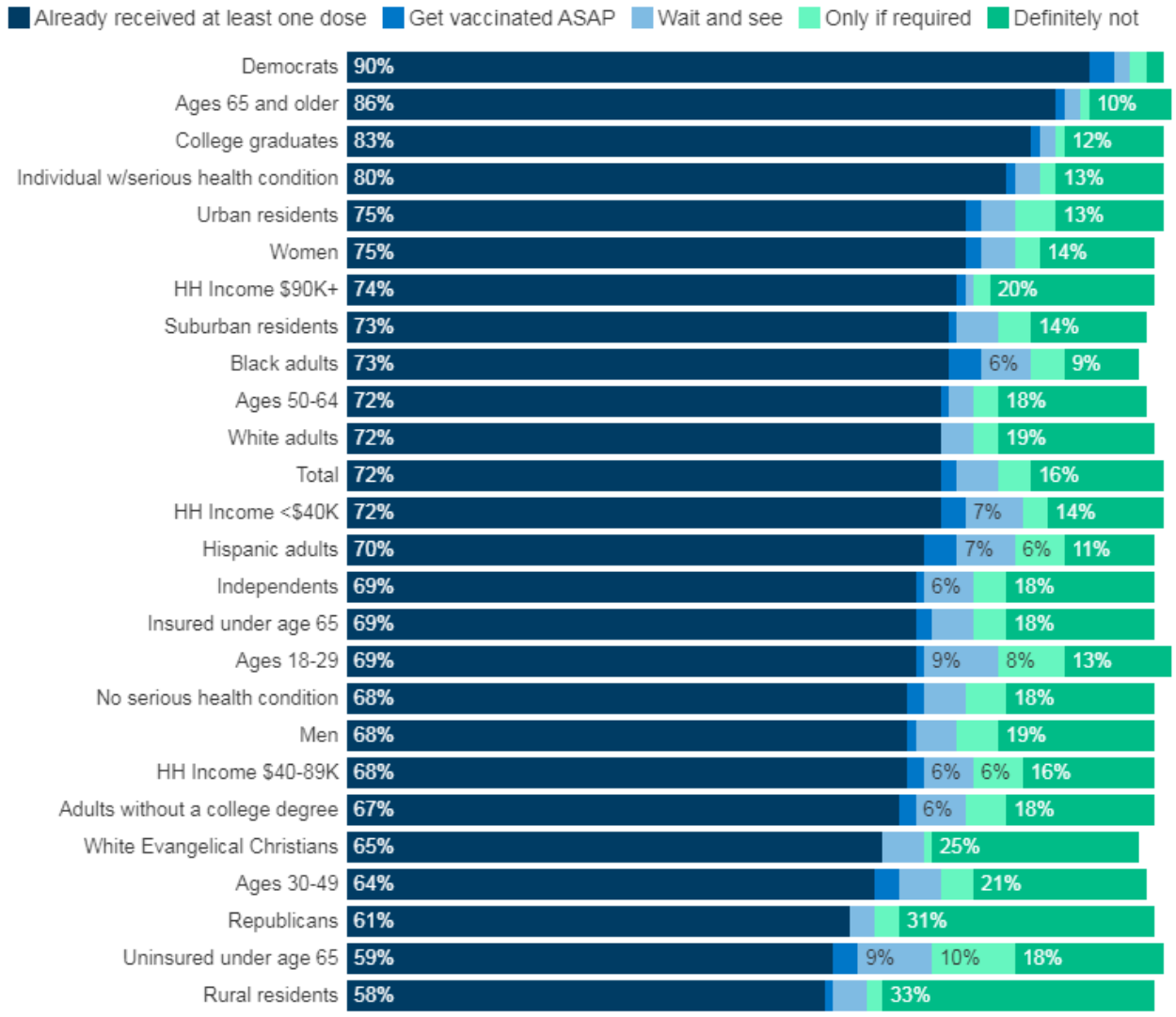
NEMOURS CHILDREN'S HEALTH

Kaiser Family Foundation: Oct 2021

Figure 6

Large Gaps In Vaccine Uptake Remain Across Partisans, Educational Attainment, Age, And Community Type

Have you personally received at least one dose of the COVID-19 vaccine, or not? As you may know, an FDA-authorized vaccine for COVID-19 is now available for free to all adults in the U.S. Do you think you will…?



NOTE: See topline for full question wording.
SOURCE: KFF COVID-19 Vaccine Monitor (October 14-24, 2021) • Download PNG

KFF COVID-19 Vaccine Monitor

HEALTH CARE

FDA authorizes first Covid vaccine for kids ages 5-11

The CDC's vaccine advisers are scheduled to meet Tuesday to evaluate the shot, and are expected to vote in favor of its use

This October 2021 photo provided by Pfizer shows boxes of kid-size doses of its Covid-19 vaccine. | Pfizer via AP

By LAUREN GARDNER and KATHERINE ELLEN FOLEY
10/29/2021 03:19 PM EDT
Updated: 10/29/2021 04:23 PM EDT

The Food and Drug Administration on Friday authorized the Pfizer-BioNTech Covid-19 vaccine for children ages 5 -11.

NEMOURS CHILDREN'S HEALTH

'VACCINATION A CURSE,"

And a Menace to Personal Liberty,"

BY J. M. PEEBLES, A. M., M. D., PH. D.

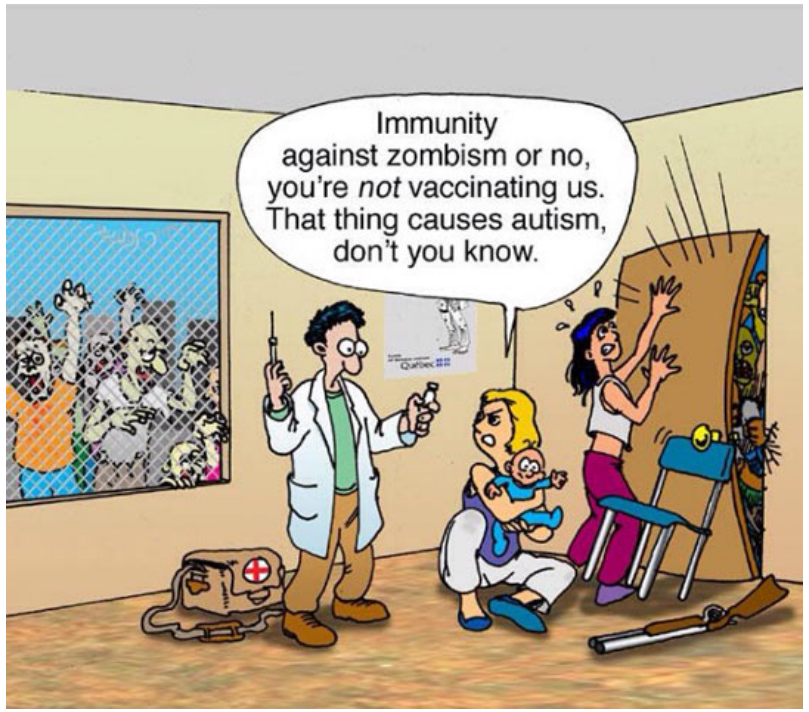
ECZEMA FROM VACCINATION.

AN
INNOCENT
VICTIM
OF
THE
VACCINATOR'S
LANCE

Compulsory Vaccination and the Result.

Types of Vaccine Hesitant Parents

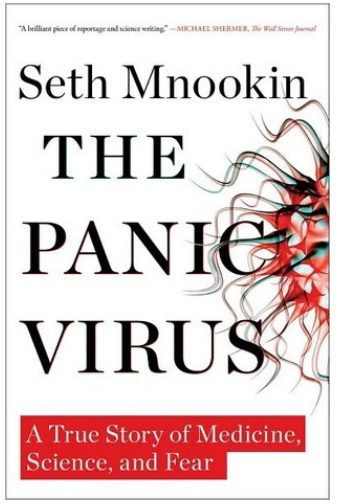
1. No specific objection to vaccines but concerned due to media and word-of-mouth rhetoric
2. Concerned about specific vaccines (i.e. MMR)
3. Concerned about the timing of the recommended vaccine schedule
4. Opposed to all vaccines without exception (including religious or philosophical reasons)



NEMOURS CHILDREN'S HEALTH

Vaccine Controversies

- MMR and Autism
  - Evidence is strong that MMR does not cause autism
- Thimerosal and Neurodevelopmental Disorders
  - Evidence is strong that Thimerosal does not increase the risk of autism or other neurodevelopmental disorders
- Vaccines and Guillain-Barré Syndrome
  - GBS has been inconsistently found to be associated with Influenza vaccination, but the increase in risk is small and less than the increase in risk following natural Influenza infection
- Vaccines and Autoimmunity
  - No evidence linking autoimmune disease and vaccines



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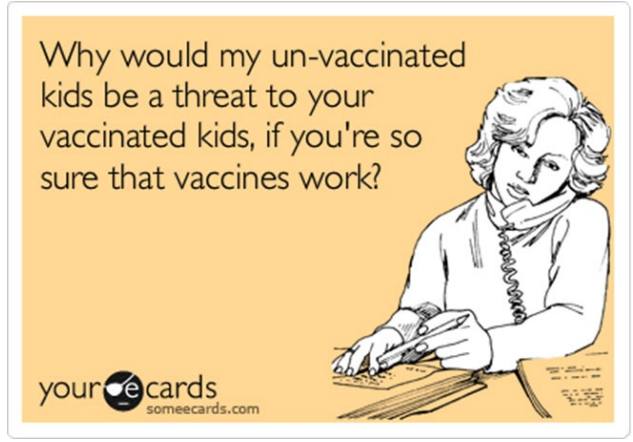
Vaccine Controversies

- Fetal Tissues
  - Varicella, Rubella, Hepatitis A, and one form of Rabies vaccine are made by growing viruses in fetal embryo fibroblast cells first obtained in early 1960s
  - Vatican statement on immunization allows for use of these vaccines
- HPV Vaccine Safety
  - Several studies support the safety of this vaccine
- Aluminum in Vaccines
  - Evidence supports safety of aluminum adjuvants in vaccines
- Too Many Too Soon
  - Immune system of infants is quite capable of handling the number of antigens in vaccines
  - Studies have not found increased risk of adverse outcomes related to number of vaccines or antigens received early in life



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Ethics of Vaccine Hesitancy and Refusal

- Autonomy
  - Parental Preference
  - Patient vs Parent (adolescents and HPV)
- Beneficence
  - Best interest of Patient
  - Best interest of Society
  - Best interest of the Practice
- Non-maleficence
  - Who is at risk of harm?
- Justice
  - Protection of the vulnerable
  - Distribution of resources

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Under-Immunized Children: A Vulnerable Population

- Caregivers are making inadvisable medical decisions (at least regarding immunization)
- Child has relative immuno-deficiency compared with peers
  - At risk for serious, life-threatening, *old-school* diseases (measles, pertussis, varicella) and severe preventable diseases such as meningitis and influenza
  - At higher risk for cancer (HPV, Hep B)
  - Protected by herd immunity only
- Decreased access to adequate medical care due to significant increase in pediatric providers dismissing these families
  - Leads to clustering in “vaccine friendly” practices
  - Families seek alternatives to modern medicine
  - Further erodes trust in the healthcare system

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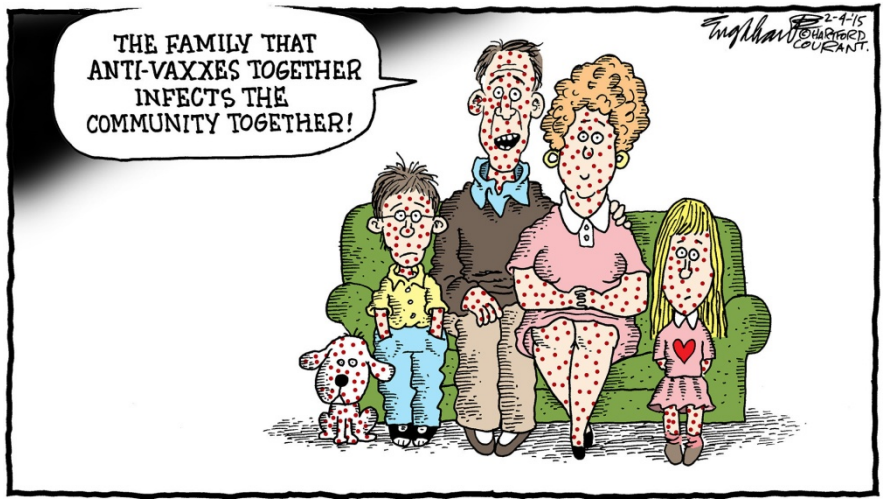
Options

- Document refusal and continue Doctor-Patient Relationship
  - Refusal to Vaccinate Form
- Legal intervention?
  - Imposing care against the wishes of parents has not been successful with regard to vaccines
  - There is a legal right in US to refuse vaccinations; this is based on common and statutory law
- Dismiss the patient



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Characteristics Of Physicians Who Dismiss Families for Refusing Vaccines (O'Leary 2015)

- Objectives: assess pediatrician and family practice physician experience with and response to vaccine refusal, and association of this response with state exemption laws
- Methods: nationally representative survey of AAP and AAFP members
- Results:
  - 51% often required parents to sign a refusal to vaccinate form
  - 21% of pediatricians and 4% of FPs often dismissed families for refusing a vaccine
  - Pediatricians who dismissed families were more likely to be in private practice, from the South, and reside in a state WITHOUT personal belief exemption law

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Dismissing the Family: Pros and Cons

- Pros
  - Reduces number of unvaccinated children in the office (waiting room)
  - Teaches the family the importance of vaccines
  - Physician is not comfortable working with families with substantial differences in values and beliefs
  - Physician is not comfortable working with families that reject their professional advice
- Cons
  - Forces these patients to see another doc, often a “vaccine-friendly” physician that serves many vaccine hesitant families
  - Access to other physicians may be limited, leading to increasing health inequities and vulnerable status
  - Missed opportunity for continued education about vaccination
  - Missed opportunity for preventive counseling in the event of disease exposure or outbreak
  - Dismissal does not result in getting the child vaccinated
  - “As provider tolerance decreases, hesitant children become more clustered in a smaller number of practices and eventually are not able to find a practice that will accept them.” (Buttenheim 2013)

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Continuing DPR

- Pros
  - Continued opportunity for education
    - Studies have shown that continued communication can lead to favorable outcomes
  - Can keep track of unvaccinated children and provide preventative counseling in case of outbreak or exposure
  - Maintains family's trust in the medical establishment to not abandon them when there is a disagreement
- Cons
  - Condones poor choices by parents
  - Exposes our vulnerable patients to vaccine-preventable diseases

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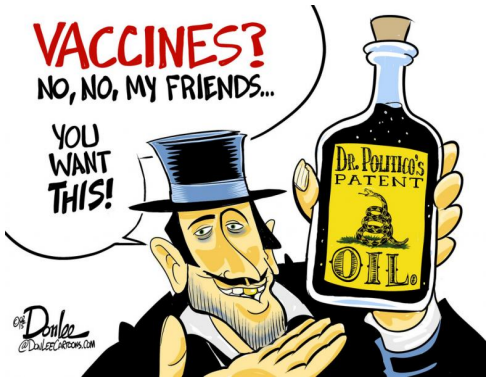
Approach to Hesitant Families

- Establish rapport, trust, therapeutic alliance
- Listen carefully and respectfully to the parents' concerns
  - Elicit the reasons for their concerns about vaccines
- Educate the family about what is and is not known about the risks and benefits of immunization
  - Correct misperceptions and misinformation
  - Compare the risks of the vaccine with the risk of being unimmunized
  - Provide resources
  - Share real life stories
- Work with the family
  - If they have concern about a specific vaccine or giving many vaccines at once, despite your best efforts, consider giving less shots at once
- Don't give up
  - Continue to discuss immunization at future visits; with time and trust, many families change their minds



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Evidence-Based Techniques

- Presumptive Approach
  - “Zuri is due for her vaccines today” versus “What do you think about doing vaccines today?”
- Motivational Interviewing
  - Not paternalistic
  - Technique to guide conversations in non-confrontational manner to lead patients and caregivers to their own decisions to follow vaccine recommendations
- Persistence
  - Persistence after initial resistance
  - Persistence over time

Table. Motivational interviewing components with definitions and sample comments or questions that illustrate each component

Components	Definition	Sample Question/Comment
Partnership	We avoid being the “expert,” assuming the role of a partner and validating concerns. We work “for” and “with” patients and parents; we don’t lecture “to” or “at” them. After hearing parental concerns, we ask permission to share information with them.	“It makes sense that you’re worried about vaccine safety. All parents want to keep their children safe. Could I share a few things I’ve learned about vaccine safety with you?”
Acceptance	We affirm the absolute value of our patients or parents, accepting them as fellow humans. We highlight their autonomy to make decisions, although we are free to disagree with them.	“I strongly recommend this vaccine, but the choice is yours. Thank you for continuing to have this hard conversation with me. I’m happy to continue talking with you at our next visit.”
Compassion	We seek the good and well-being of others. We recommend vaccines because we believe they help others, not out of self-interest.	“I want you to consider the measles vaccine because I care about your child’s health. I also think it’s really important in order to protect babies who are too young to get the measles vaccine.”
Evocation	Positive ideas about and reasons for vaccination come from the patient or parent, not us. We reflect on patient or parental ideas and demonstrate how they align with the benefits of vaccination.	“You’ve shared a lot of worries with me. Would you tell me more about what’s important to you? […] I hear protecting your child is important to you. May I share how vaccines would work to protect your child?”

Upstream Approaches

- State Level (advocacy!)
  - Eliminate non-medical exemptions
  - Add vaccines to public school mandate (i.e. HPV, COVID-19, Influenza)
- Practice Level
  - Protocol for Under-Immunized Patients
  - Maintain registry of under-immunized patients to notify in the event of a regional outbreak (i.e. MMR)
  - When sick, these patients should be masked and brought directly to exam room (or triaged in parking lot)
  - Mandate regular well visits, no walk-in visits
  - Refusal to Vaccinate Form
  - Quality Improvement initiatives to improve vaccination coverage
    - Registries to identify Gaps in Care; Standing orders; Vaccinate at all opportunities

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References

- Badr H, *et al*. Overcoming COVID-19 vaccine hesitancy: Insights from an online population-based survey in the U.S. Vaccines. 2021;9(10):1100.
- Centers for Disease Control and Prevention. http://www.cdc.gov/vaccines/
- De Albuquerque Veloso Machado M, *et al*. The relationship between the COVID-19 pandemic and vaccine hesitancy: A scoping review of literature until August 2021. Front Public Health. 2021;9.
- Edwards KM and Hackell JM, Committee on Infectious Diseases, Committee on Practice and Ambulatory Medicine. Countering Vaccine Hesitancy. Pediatrics. 2016;138(3):e1-14.
- Flanagan-Klygis EA, Sharp L, Frader JE. Dismissing the family who refuses vaccines: a study of pediatrician attitudes. Arch Pediatr Adolesc Med. 2005;159(10):929-34.
- Gilmour J, Harrison C, Asadi L, Cohen MH, Vohra S. Childhood immunization: when physicians and parents disagree. Pediatrics. 2011;128 Suppl 4:S167-74.
- He K, *et al*. Parental perspectives on immunizations: Impact of the COVID-19 pandemic on childhood vaccine hesitancy. J Community Health. 2021;1-14.
- Hough-Telford C, Kimberlin DW, Aban I, Hitchcock WP, Almquist J, Kratz R, O'Connor KG. Vaccine Delays, Refusals, and Patient Dismissals: A Survey of Pediatricians. Pediatrics. 2016;138(3).
- Hamel *el at*. KFF COVID-19 Vaccine Monitor: October 2021. KFF COVID-19 Vaccine Monitor: October 2021 | KFF
- Kelly BJ, *et al*. Predictors of willingness to get a COVID-19 vaccine in the U.S. BMC Infect Dis. 2021;21(1):338.
- Kempe A, *et al*. Physician Response to Parental Requests to Spread Out the Recommended Vaccine Schedule. Pediatrics. 2015;135(4):666-77.
- Kimberlin DW, Brady MT, Jackson MA, and Long SS, eds. *Red Book: 2015 Report of the Committee on Infectious Diseases.* 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.
- O'Leary ST, Allison MA, Fisher A, Crane L, Beaty B, Hurley L, Brtnikova M, Jimenez-Zambrano A, Stokley S, Kempe A. Characteristics of Physicians Who Dismiss Families for Refusing Vaccines. Pediatrics. 2015;136(6):1103-11.
- Teasdale CA, *et al*. Plans to vaccinate children for coronavirus disease 2019: A survey of U.S. parents. J Pediatr. 2021;237:292-297.
- https://vaxopedia.org/2016/09/07/antigens-in-vaccines/
- www.historyofvaccines.org

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Thank You!