

UIM 2023

Pandemics

Science & Leadership

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Disclosures

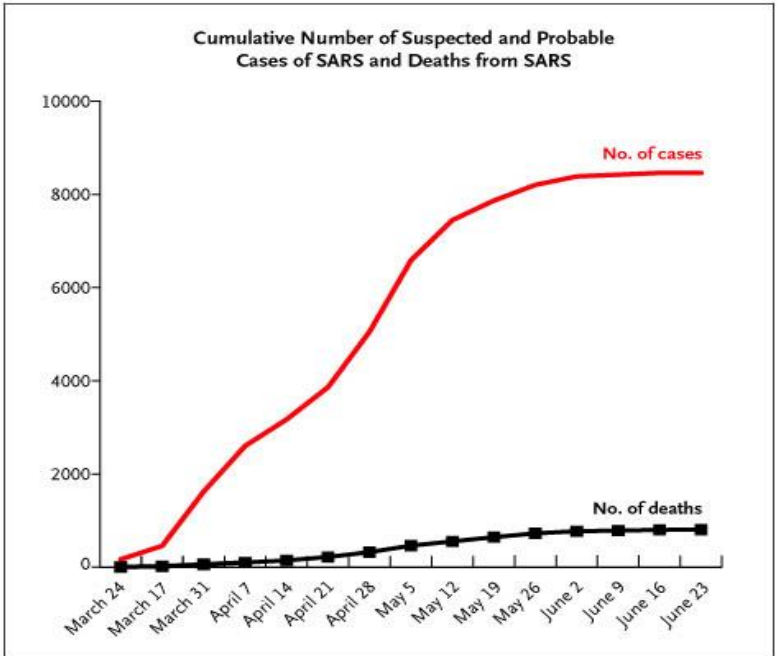
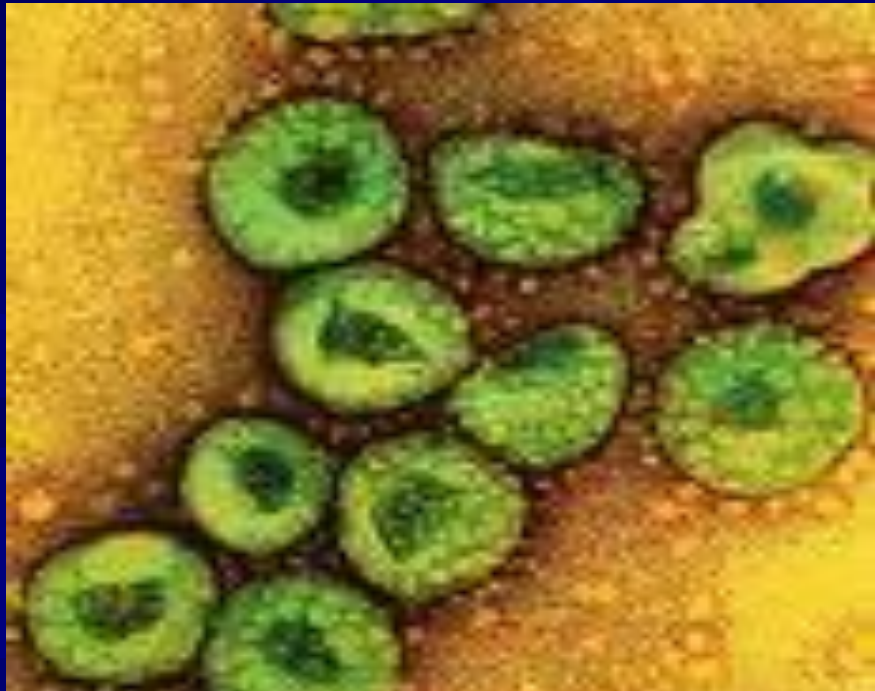
- Member of ACOG COVID-19 WG
- Co-PI for NIH/NIAID-MOMI-Vax
 - No Commercial COI's



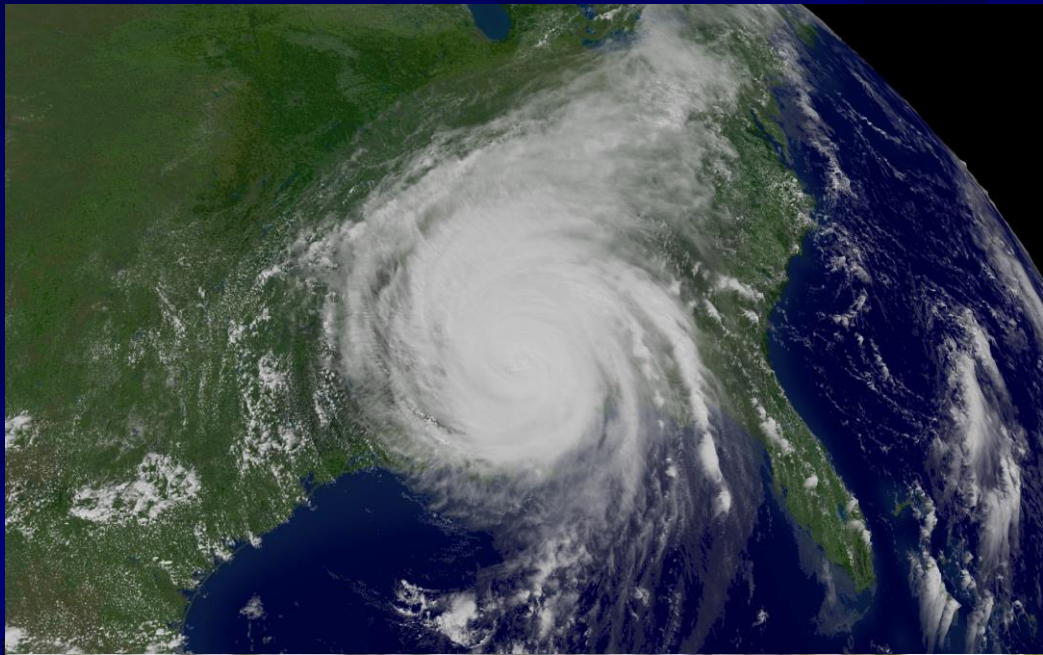
SEPTEMBER 11
2001

\$7.95 303
0022-0816





Data are from the World Health Organization (WHO). Cases identified in China between November 1, 2002, and February 28, 2003, were added to the March 31 total.



Bio-preparedness

- Prepare for biologically-derived disasters
 - Rare, yet potentially significant
- **Goal:**
 - Conceptualize scenarios and
 - Preemptively plan to **minimize** disruption, morbidity and mortality:
 - Pregnant women
 - Unborn fetuses
 - Family structure
- Hospital Preparedness
 - Maternity hospital in particular

Pathogens vs. Humanity



“The Triumph of Death” Pieter Bruegel @1562

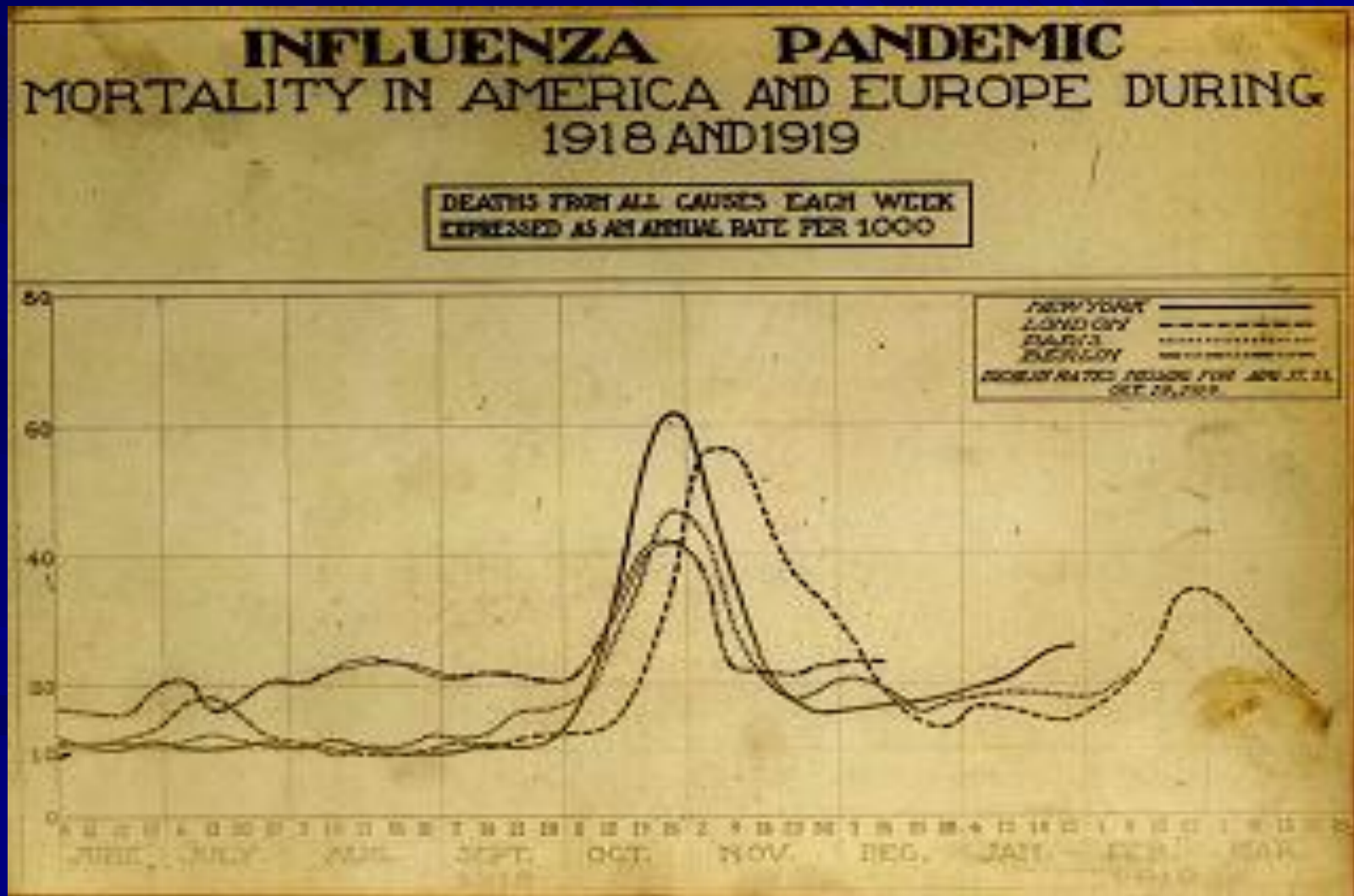
Modern Flu Pandemics

1918-19 “Spanish Flu”	1957-58 “Asian Flu”	1968-69 “Hong-Kong Flu”	1976 “Swine Flu”
U. S. Mortality \geq 500K	U.S. Mortality \geq 68K	U. S. Mortality \geq 34K	Minimal
Not Spain ? Europe, ? Asia	Asian	Asian	Fort Dix
? Avian H1N1	Avian H2N2	Avian H3N2	Swine H1N1

Influenza Pandemic Line Graph

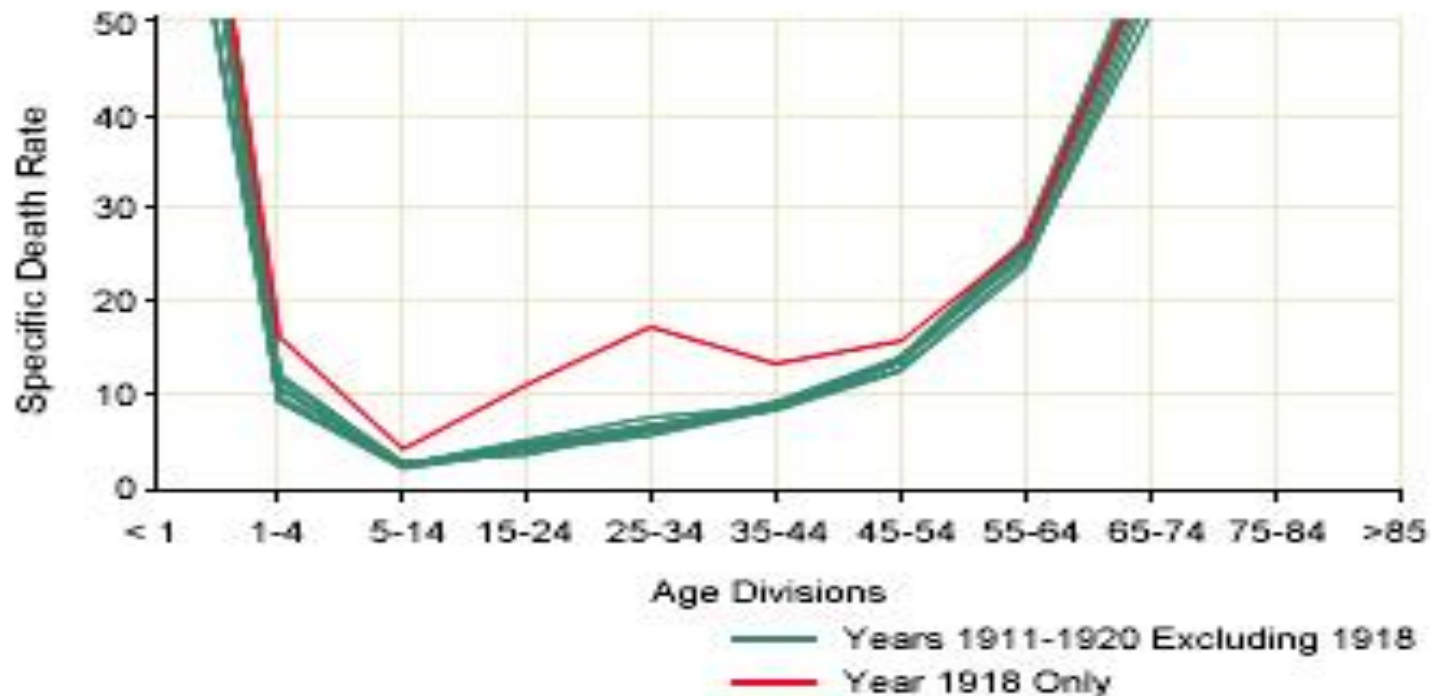
Mortality in America and Europe During 1918 and 1919

Deaths from all causes each week expressed as an annual rate per 1000



1918 Pandemic

Number of Deaths by Age Group
per 1000 Population
1911-1920



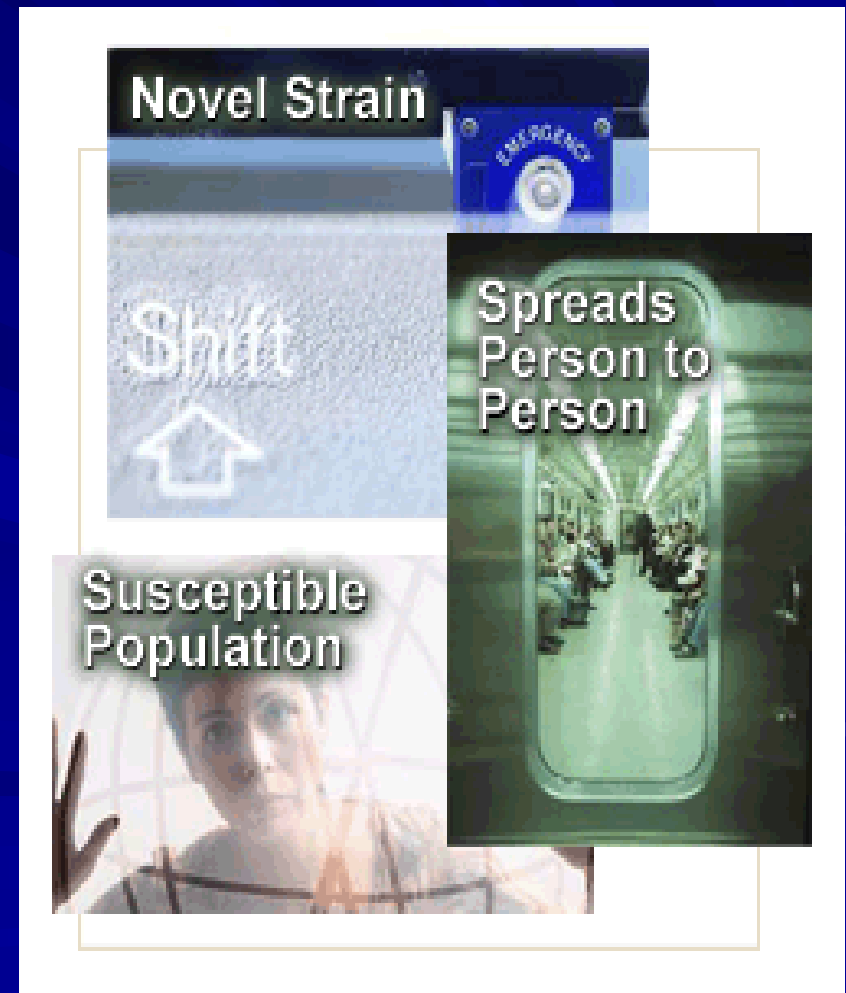
Summary of Pandemic Influenza in Pregnancy

- Pandemics disproportionately affect pregnant women
 - Higher morbidity & mortality
 - Pneumonia key
 - High pregnancy wastage
 - 1918 Flu strain slowly became endemic
- **Obstetricians and Maternity Hospitals: Central Role**

When Will the Next Pandemic Occur?

■ NOT IF.....WHEN

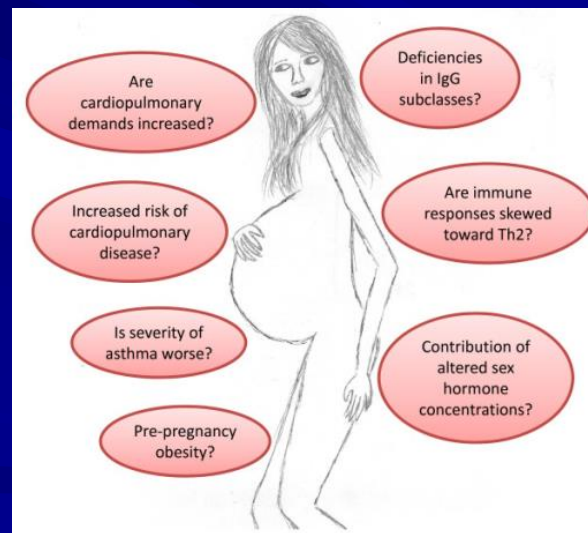
- New strain
- Susceptible population + conditions suitable for quick dissemination
- Highly communicable



The NEW ENGLAND JOURNAL of MEDICINE

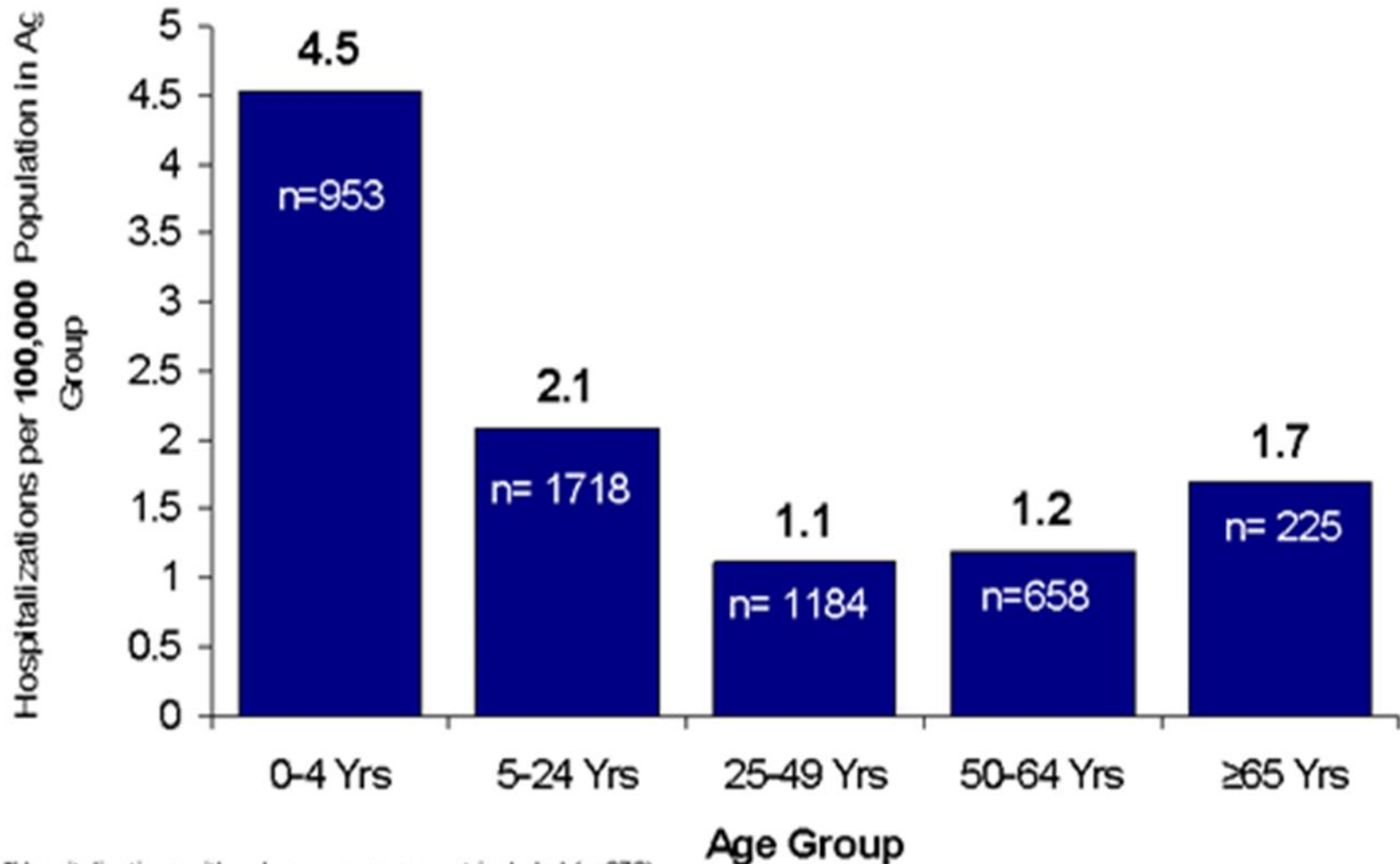
Emergence of a Novel Swine-Origin Influenza A (H1N1) Virus in Humans

Novel Swine-Origin Influenza A (H1N1) Virus Investigation Team*





H1N1 U.S. Hospitalization Rate per 100,000 Pop

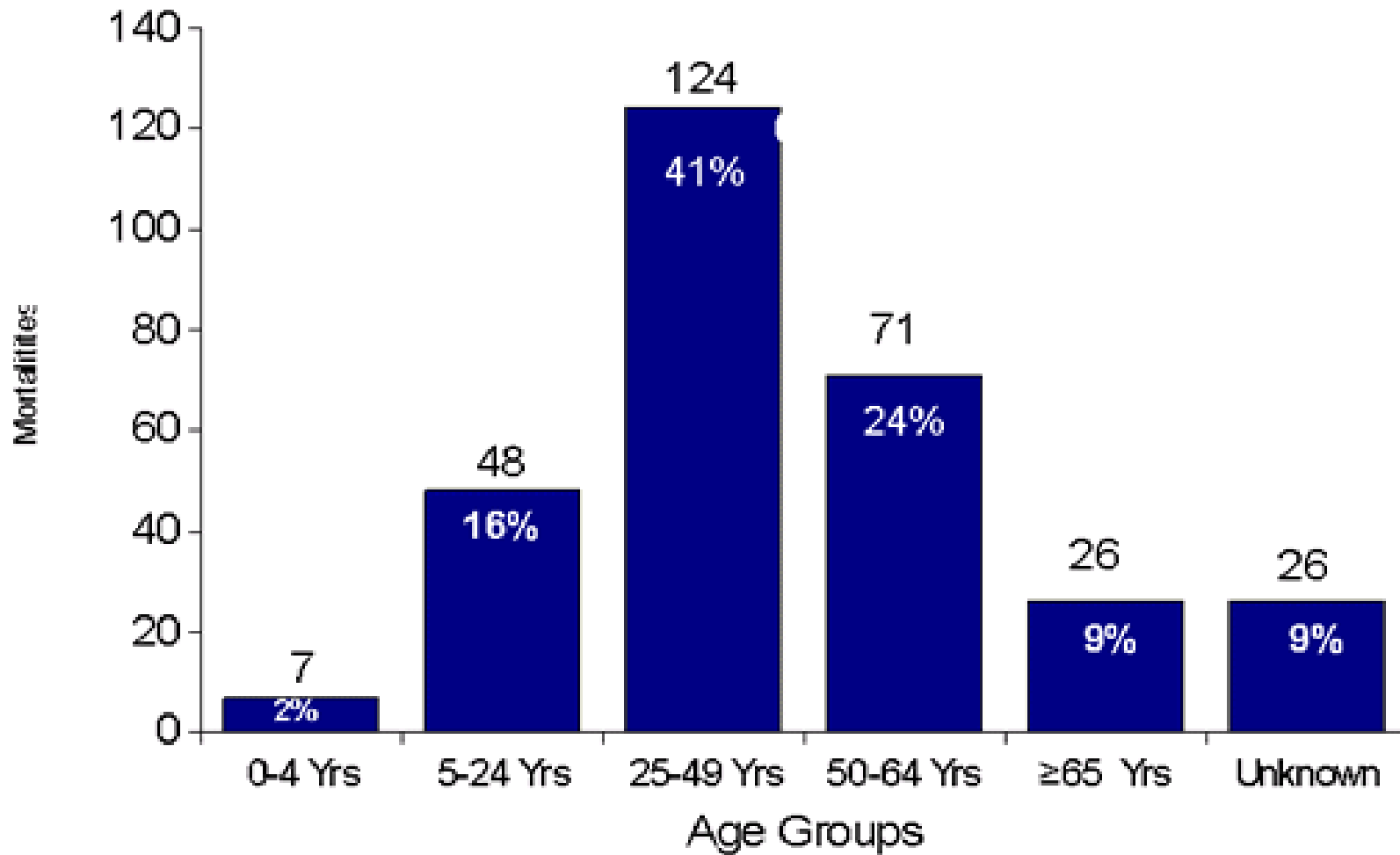


*Hospitalizations with unknown ages are not included (n=273)

*Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at:

<http://www.census.gov/popest/national/asrh/files/NC-EST2007-ALLDATA-R-File24.csv>

H1N1 U.S. Deaths



Approximately 1/2 have underlying predisposing conditions (Pregnancy, Obesity), etc

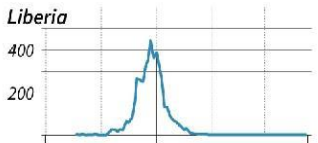
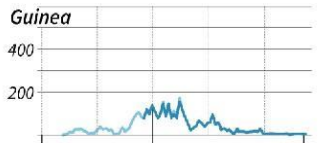
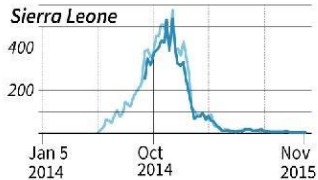
Ongoing Epidemics (2013-'16)

West African Ebola outbreak

2014 - 2016 Total cases: **28,616** Deaths: **11,310**

Weekly cases

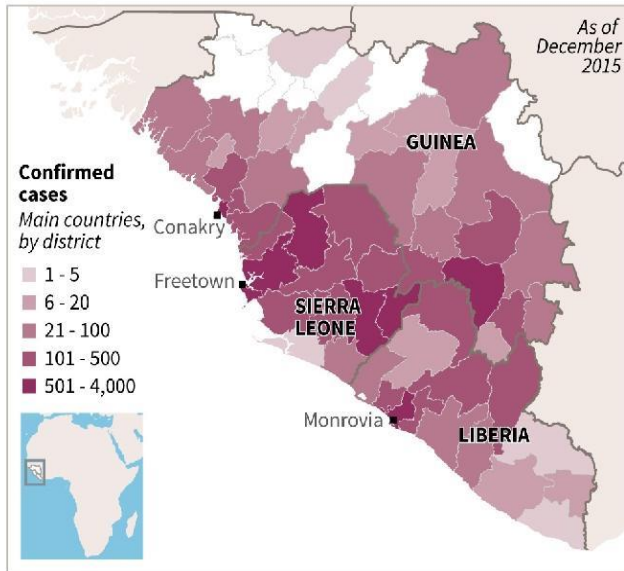
How the outbreak peaked



— Patient database
— WHO situation report

Ebola Hemorrhagic Fever (EHF)

Pertaining to bleeding or the abnormal flow of blood



Source: WHO AFP

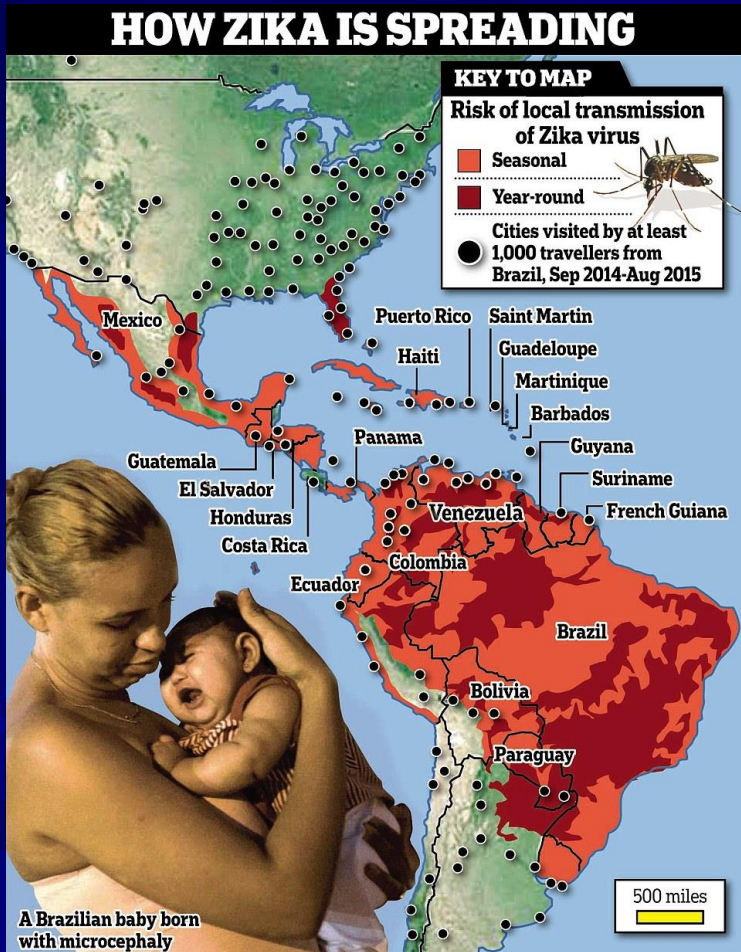
PREGNANCY AND EBOLA

Ebola increases the risk of miscarriage and early labour.

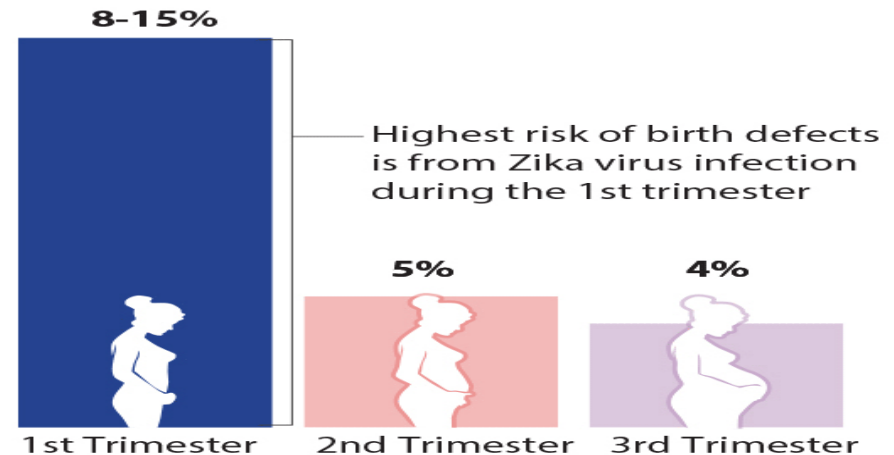
- Isolate confirmed cases
- Use personal protective equipment
- Choose non-invasive procedures
- Offer the same therapy to pregnant and non-pregnant populations
- Consult with both maternal health and Ebola-response trained providers



Ongoing Epidemics (2017)

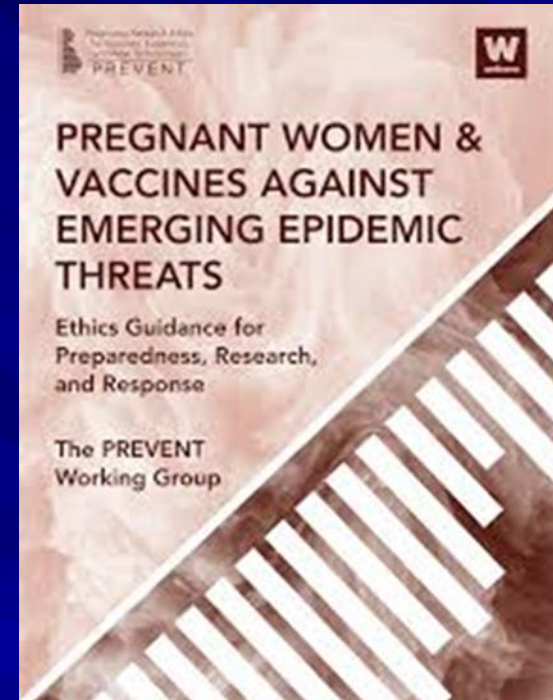


Range of Microcephaly Severity



Emerging Infectious Diseases in Pregnancy

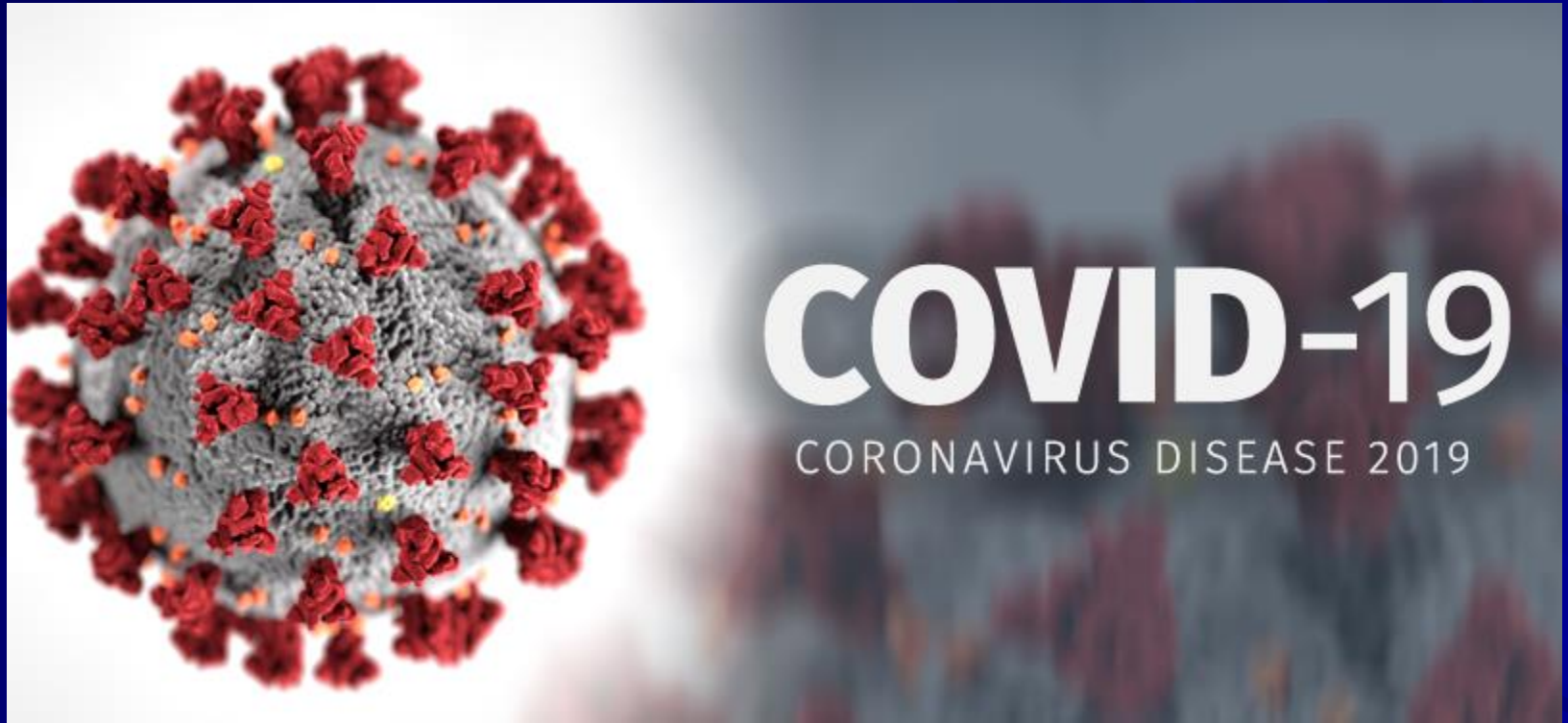
It has been recognized for centuries that pregnant women have unique susceptibilities to many infectious diseases that predispose them to untoward outcomes compared with the general adult population. It is thought a combination of adaptive alterations in immunity to allow for the fetal allograft combined with changes in anatomy and physiology accompanying pregnancy underlie these susceptibilities. Emerging infectious diseases are defined as those whose incidence in humans has increased in the past two decades or threaten to increase in the near future. The past decade alone has witnessed many such outbreaks, each with its own unique implications for pregnant women and their unborn fetuses as well as lessons for the health care community regarding response and mitigation. Examples of such outbreaks include, but are not limited to, severe acute respiratory syndrome, the 2009 H1N1 pandemic influenza, Ebola virus, and, most recently, the Zika virus. Although each emerging pathogen has unique features requiring specific considerations, there are many underlying principles that are shared in the recognition, communication, and mitigation of such infectious outbreaks. Some of these key principles include disease-specific delineation of transmission dynamics, understanding of pathogen-specific effects on both mothers and fetuses, and advance planning and contemporaneous management that prioritize communication among public health experts, clinicians, and patients. The productive and effective working collaboration among the Centers for Disease Control and Prevention, the American College of Obstetricians and Gynecologists, and the Society for Maternal-Fetal Medicine has been a key partnership in the successful communication and management of such outbreaks for women's health care providers and patients alike. Going forward, the knowledge gained over the past decade will undoubtedly continue to inform future responses and will serve to optimize the education and care given to pregnant women in the face of current and future emerging infectious disease outbreaks.



Beigi RH. Emerging infectious diseases in pregnancy. *Obstet Gynecol*. 2017

Key considerations:

- Impact of disease on pregnancy (gestational age specific)
- Impact of pregnancy on disease course
- Countermeasures (? How best to include pregnancy)
 - Ethics → Justice, Primum Non Nocere, etc.
 - NPI, Rx, Vaccines, monoclonals, etc.

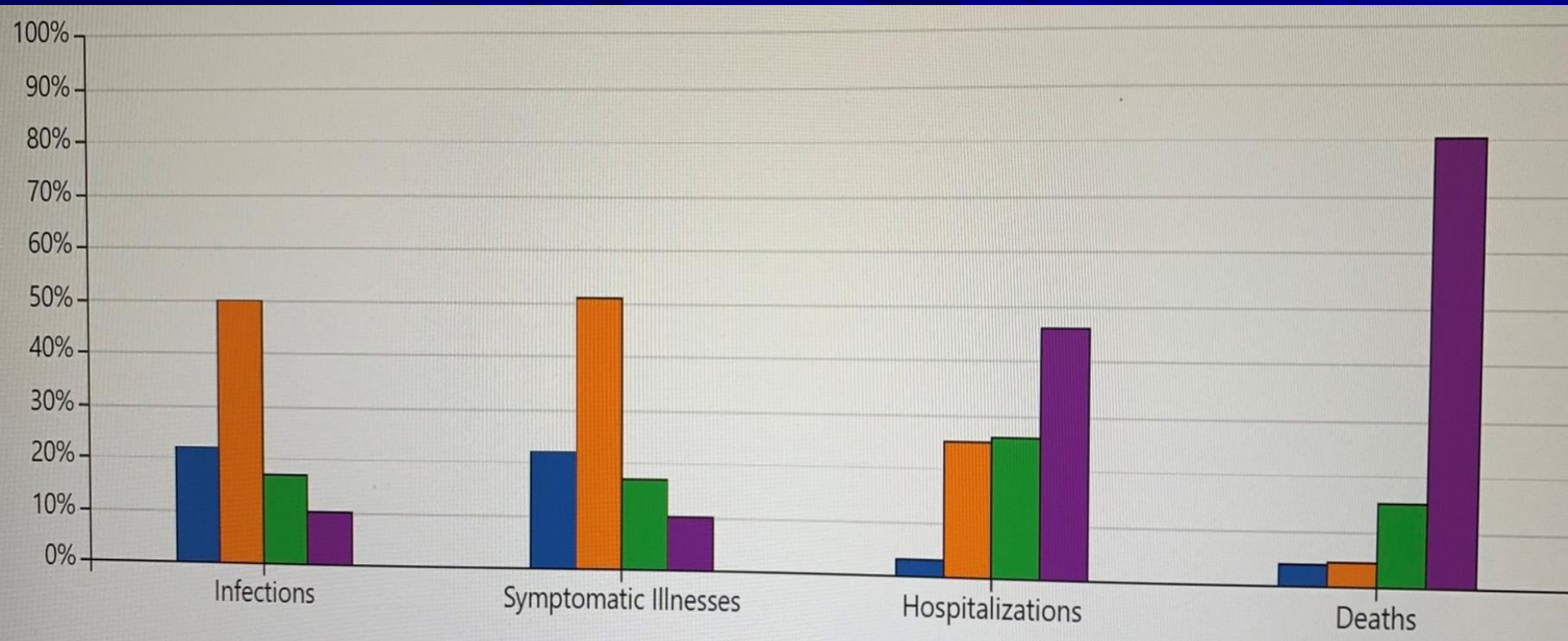


COVID-19

CORONAVIRUS DISEASE 2019

1st Quarter 2020

U.S. % COVID-19 Cases, Hospitalizations, Deaths by age categories



■ 0-17 years ■ 18-49 years ■ 50-64 years ■ 65 and older

Summary COVID-19 Epidemiology (Generalizations)

- Case rates spread across age groups
- Bulk of overall hospitalizations/M&M:
 - Older age groups + Co-morbidities
 - High-risk categories
- What about pregnancy ?

Early 3-6 months

Pregnant women **may be at increased risk** for severe illness from COVID-19 compared with non-pregnant women



Pregnant women and their families should take steps to **stay healthy** and **reduce their risk** for getting COVID-19

COVID-19 Pregnancy & Risk of Severe Disease

Outcome	Pregnant women (n=8,207) No. (%)	Nonpregnant women (n=83,205) No. (%)	Adjusted risk ratio (95% CI)
Hospitalization	2,587 (31.5)	4,840 (5.8)	5.4 (5.1-5.6)
ICU admission	120 (1.5)	757 (0.9)	1.5 (1.2-1.8)
Mechanical ventilation	42 (0.5)	225 (0.3)	1.7 (1.2 – 2.4)

Key findings from living systematic review

- Pre-existing **comorbidities, advanced maternal age, high BMI and non-white ethnicity** are risk factors for severe COVID-19 in pregnancy
- Pregnant women vs reproductive aged women with COVID-19
 - Higher ICU admissions, need of mechanical ventilation, ECMO
 - No differences in mortality
- Pregnant women with COVID-19 vs pregnant women without COVID-19
 - Higher rates of **preterm births** (induced or spontaneous)
 - Higher admission to **neonatal unit or ICU**
 - No differences in rates of Caesarean sections
- COVID-19 may be associated with increased maternal death, but more data needed

Source: Allotey et al, Clinical manifestations, risk factors, and maternal and perinatal outcomes of COVID-19 in pregnancy: living systematic review and meta-analysis <https://www.bmj.com/content/372/bmj.n615> (Updated 10 Mar 2021)

Source: https://www.cdc.gov/mmwr/volumes/69/wr/mm6925a1.htm?s_cid=mm6925a1_w#T2_down

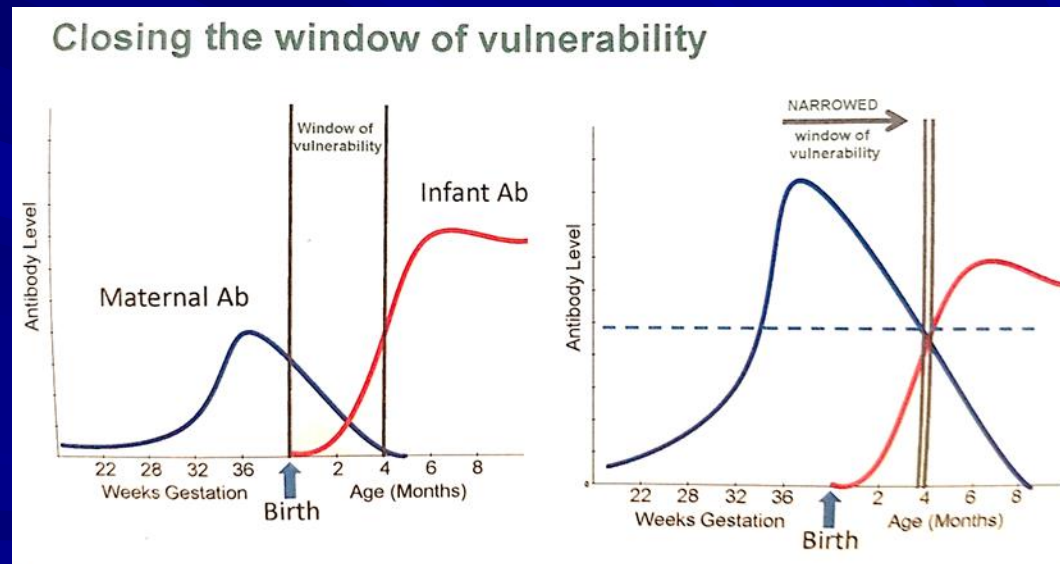
Ellington CDC MMWR 2020;69(25): June 26,2020

FETAL & NEONATAL OUTCOMES

- Vertical transmission of SARS-CoV-2 may occur, but appears to be uncommon
- Pregnant people with COVID-19 are at increased risk for preterm birth
- Some data suggest an increased risk for other adverse pregnancy complications and outcomes, such as:
 - Preeclampsia,
 - Coagulopathy, and
 - Stillbirth
- Data now indicate that neonates born to people with COVID-19 are also at increased risk for admission to the neonatal intensive care unit

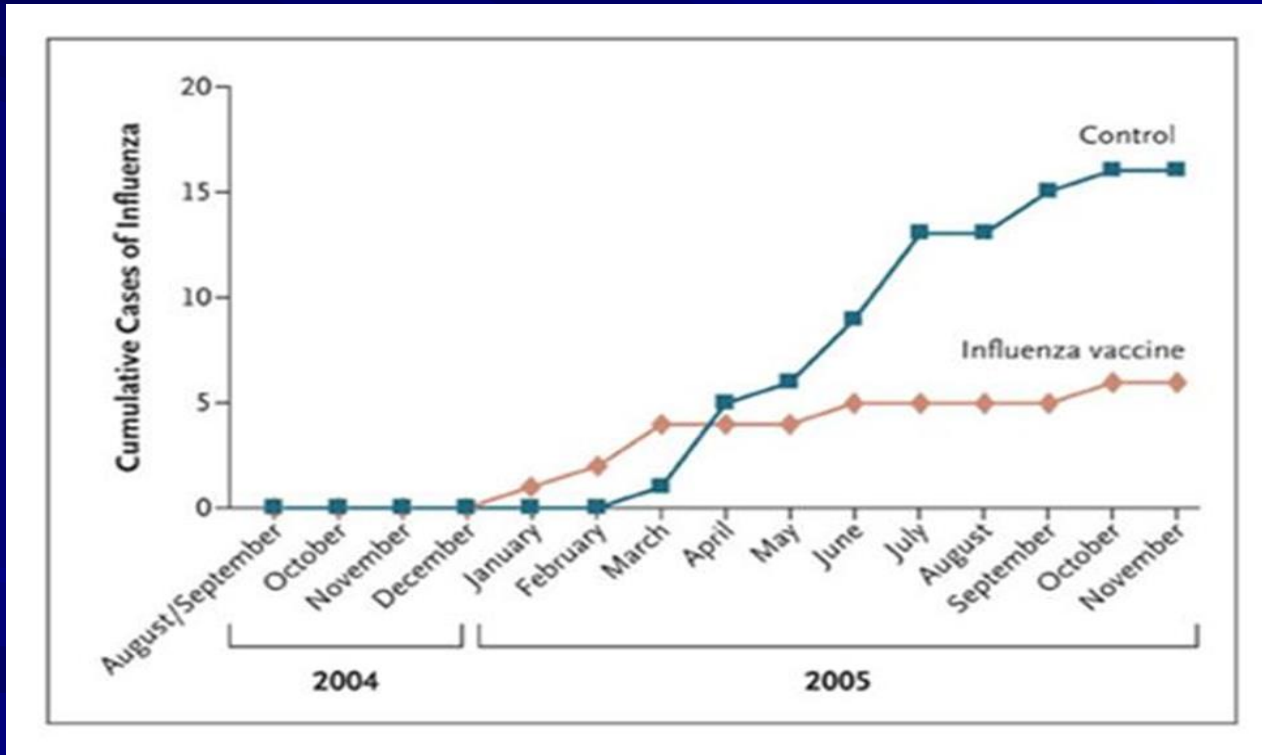
Concept of Maternal Immunization

To boost maternal levels of pathogen-specific antibodies and endow the neonate and infant with sufficient concentrations of antibodies to resist infections during a period of increased vulnerability



Maternal Immunization

- Recognized for > 100 yrs
 - Smallpox, pertussis, tetanus, etc.



Concerns over Maternal Immunization

- Most prevalent concern is **SAFETY**
- Potential risks to mother: Reactions to vaccine, fever, fetal loss, possible induction of labor, effect on other pregnancy outcomes
- Potential risks to infant: Birth defects, infection (?), prematurity, low birth weight, tolerance to vaccine antigens, response to natural infection

Risk from
Disease

Risk from
Vaccine



ADDRESSING PATIENT QUESTIONS & CONCERNS

Will COVID-19
vaccines affect my
fertility?

Are COVID-19
vaccines safe during
pregnancy?

I already had
COVID-19, why do I
need to get
vaccinated?

I'm nervous
because COVID-19
vaccines are so new
and were developed
so quickly

I'm young and
healthy, why should
I get vaccinated?

How a new vaccine is developed, approved and manufactured

The Food and Drug Administration (FDA) sets rules for the three phases of clinical trials to ensure the safety of the volunteers. Researchers test vaccines with adults first.

PHASE 1

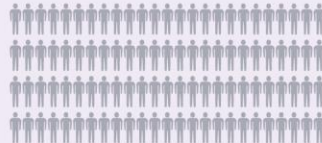


**20-100
healthy volunteers**



- Is this vaccine safe?
- Does this vaccine seem to work?
- Are there any serious side effects?
- How is the size of the dose related to side effects?

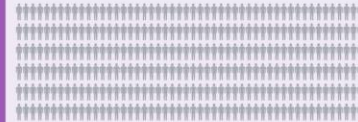
PHASE 2



**several hundred
volunteers**

- What are the most common short-term side effects?
- How are the volunteers' immune systems responding to the vaccine?

PHASE 3



**hundreds or thousands
of volunteers**

- How do people who get the vaccine and people who do not get the vaccine compare?
- Is the vaccine safe?
- Is the vaccine effective?
- What are the most common side effects?

FDA licenses the vaccine only if:

- It's safe and effective
- Benefits outweigh risks

Vaccines are made in batches called lots.



Manufacturers must test all lots to make sure they are safe, pure and potent. The lots can only be released once FDA reviews their safety and quality.

The FDA inspects manufacturing facilities regularly to ensure quality and safety.

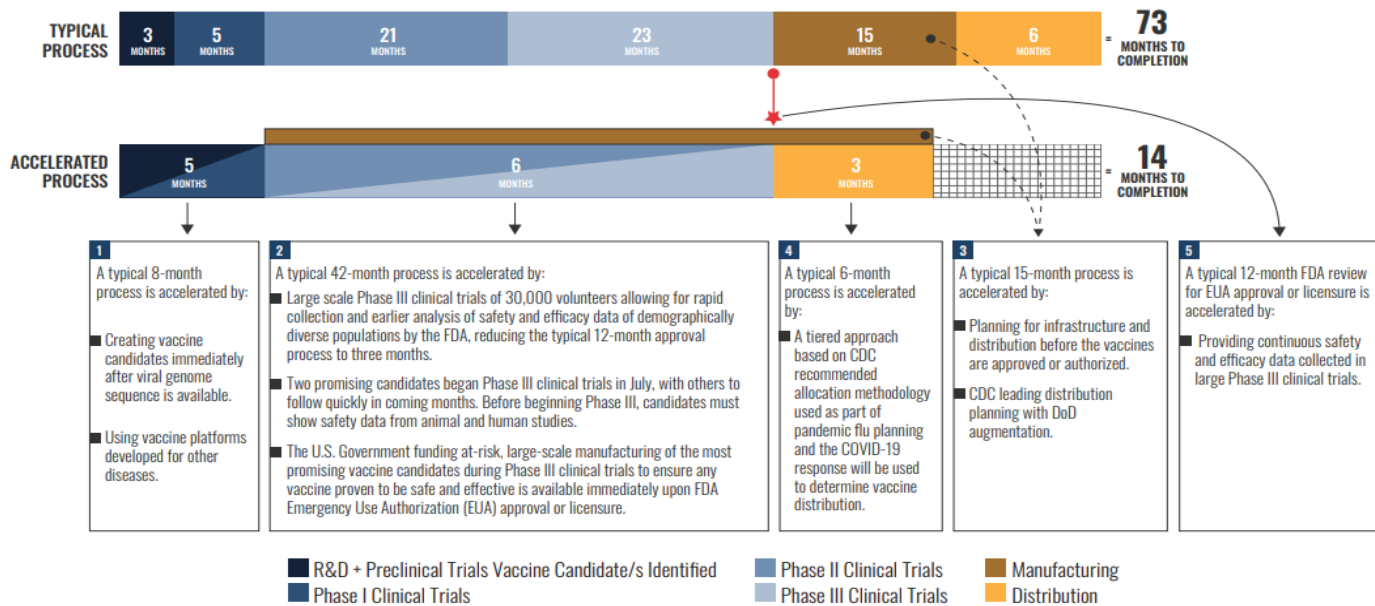


FOR MORE INFORMATION, VISIT [HTTPS://WWW.FDA.GOV/CBER](https://www.fda.gov/cber)



OPERATION WARP SPEED ACCELERATED VACCINE PROCESS

MISSION: Deliver 300 million doses of safe and effective vaccine by 1 January 2021.



<https://media.defense.gov/2020/Aug/12/2002475961/-1/-1/1/WARP-SPEED-VACCINE-TIMELINE.PDF>

mRNA VACCINES

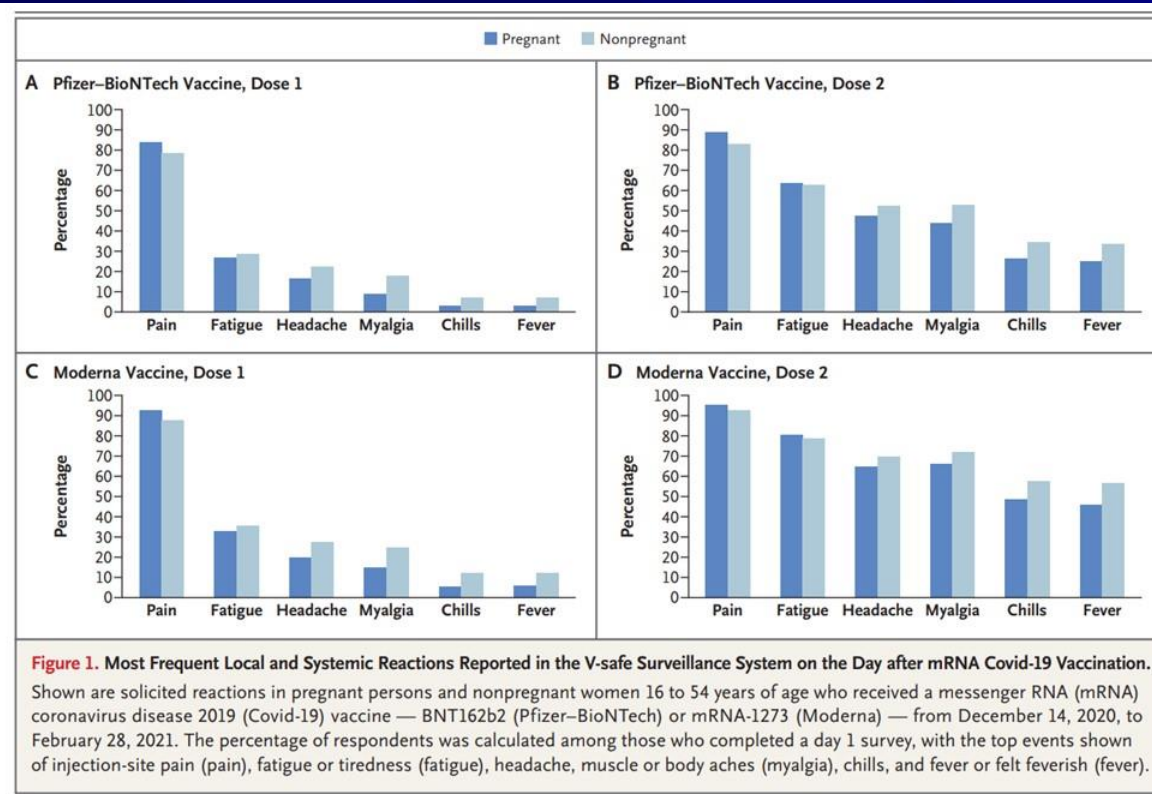
- Development and use of mRNA vaccines is relatively new
- mRNA vaccines consist of messenger RNA (mRNA) encapsulated by a lipid nanoparticle (LNP) for delivery into the host cells.
- These vaccines utilize the body's own cells to generate the coronavirus spike protein (the relevant antigens), which, similar to all other vaccines, stimulates immune cells to create antibodies against COVID-19.

mRNA VACCINES

- Not a live virus vaccine
- No adjuvant
- Do not enter the nucleus
- Do not alter human DNA in vaccine recipients & cannot cause any genetic changes

Preliminary Findings of mRNA Covid-19 Vaccine Safety in Pregnant Persons

Tom T. Shimabukuro, M.D., Shin Y. Kim, M.P.H., Tanya R. Myers, Ph.D., Pedro L. Moro, M.D., Titilope Oduyebo, M.D., Lakshmi Panagiotakopoulos, M.D., Paige L. Marquez, M.S.P.H., Christine K. Olson, M.D., Ruiling Liu, Ph.D., Karen T. Chang, Ph.D., Sascha R. Ellington, Ph.D., Veronica K. Burkel, M.P.H., *et al.*, for the CDC v-safe COVID-19 Pregnancy Registry Team*



December 14, 2020, to February 28, 2021

A total of 35,691 v-safe participants 16 to 54 years of age identified as pregnant

Among 3958 participants enrolled in the v-safe pregnancy registry, 827 had a completed pregnancy

Preliminary findings did not show obvious safety signals among pregnant persons who received mRNA Covid-19 vaccines.

However, more longitudinal follow-up, including follow-up of large numbers of women vaccinated earlier in pregnancy, is necessary to inform maternal, pregnancy, and infant outcomes.

Emerging Data: V-Safe

V-safe pregnancy registry outcomes of interest in COVID-19 vaccinated pregnant women as of February 18, 2021*

Outcomes	Background rates ^a	V-safe pregnancy registry overall
Pregnancy outcome		
Miscarriage (<20 weeks)	26%	15% [†]
Stillbirth (≥ 20 weeks)	0.6%	1%
Pregnancy complications		
Gestational diabetes	7-14%	10%
Preeclampsia or gestational hypertension [§]	10-15%	15%
Eclampsia	0.27%	0%
Intrauterine growth restriction	3-7%	1%
Neonatal		
Preterm birth	10.1%	10%
Congenital anomalies [‡]	3%	4%
Small for gestational age [¶]	3-7%	4%
Neonatal death	0.38%	0%

* Sources listed on slide 33; [†] 93% of these were pregnancy losses <13 weeks of age; [‡] Pre-eclampsia or gestational hypertension diagnosed during pregnancy and/or during delivery; [§] Congenital anomalies (overall) diagnosed after delivery only; [¶] Birthweight below the 10th percentile for gestational age and sex using INTERGROWTH-21st Century growth standards

ORIGINAL ARTICLE

Preliminary Findings of mRNA Covid-19 Vaccine Safety in Pregnant Persons

Tom T. Shimabukuro, M.D., Shin Y. Kim, M.P.H., Tanya R. Myers, Ph.D., Pedro L. Moro, M.D., Titilope Oduyebo, M.D., Lakshmi Panagiotakopoulos, M.D., Paige L. Marquez, M.S.P.H., Christine K. Olson, M.D., Ruiling Liu, Ph.D., Karen T. Chang, Ph.D., Sascha R. Ellington, Ph.D., Veronica K. Burkel, M.P.H., et al., for the CDC v-safe COVID-19 Pregnancy Registry Team*

Table 4. Pregnancy Loss and Neonatal Outcomes in Published Studies and V-safe Pregnancy Registry Participants.

Participant-Reported Outcome	Published Incidence*	V-safe Pregnancy Registry [†]
	%	no./total no. (%)
Pregnancy loss among participants with a completed pregnancy		
Spontaneous abortion: <20 wk [‡]	10–26	104/827 (12.6) [§]
Stillbirth: ≥ 20 wk [¶]	<1	1/725 (0.1)
Neonatal outcome among live-born infants		
Preterm birth: <37 wk ^{¶¶}	8–15	60/636 (9.4) ^{¶¶}
Small size for gestational age ^{‡‡}	3.5	23/724 (3.2)
Congenital anomalies ^{§§}	3	16/724 (2.2)
Neonatal death ^{¶¶¶}	<1	0/724

* The populations from which these rates are derived are not matched to the current study population for age, race and ethnic group, or other demographic and clinical factors.

[†] Data on pregnancy loss are based on 827 participants in the v-safe pregnancy registry who received an mRNA Covid-19 vaccine (BNT162b2 [Pfizer–BioNTech] or mRNA-1273 [Moderna]) from December 14, 2020, to February 28, 2021, and who reported a completed pregnancy. A total of 700 participants (84.6%) received their first eligible dose in the third trimester. Data on neonatal outcomes are based on 724 live-born infants, including 12 sets of multiples.

[‡] A total of 96 of 104 spontaneous abortions (92.3%) occurred before 13 weeks of gestation.

[§] The denominator includes live-born infants and stillbirths.

[¶] The denominator includes only participants vaccinated before 37 weeks of gestation.

^{||} Small size for gestational age indicates a birthweight below the 10th percentile for gestational age and infant sex according to INTERGROWTH-21st growth standards (<http://intergrowth21.ndog.ox.ac.uk>). These standards draw from an international sample including both low-income and high-income countries but exclude children with coexisting conditions and malnutrition. They can be used as a standard for healthy children growing under optimal conditions.

^{**} Values include only major congenital anomalies in accordance with the Metropolitan Atlanta Congenital Defects Program 6-Digit Code Defect List (www.cdc.gov/ncbddd/birthdefects/macdp.html); all pregnancies with major congenital anomalies were exposed to Covid-19 vaccines only in the third trimester of pregnancy (i.e., well after the period of organogenesis).

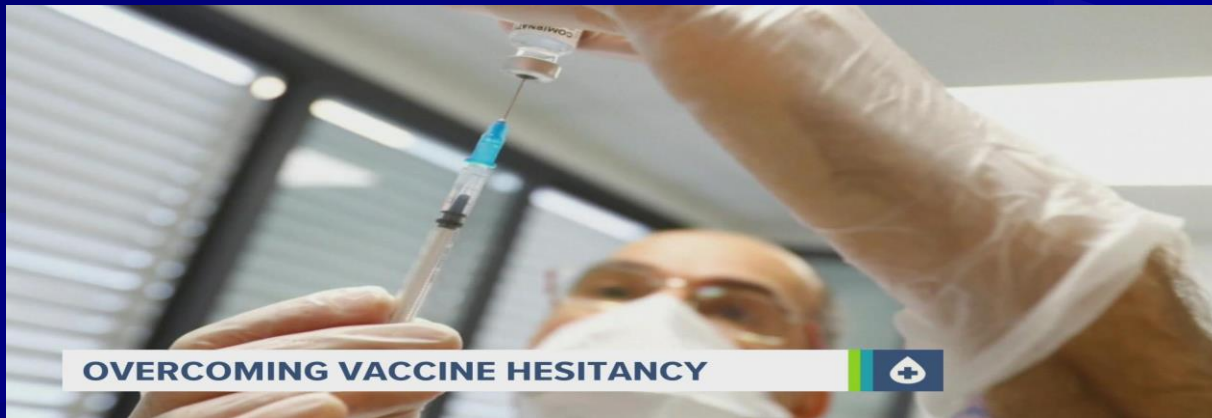
^{††} Neonatal death indicates death within the first 28 days after delivery.

June 17, 2021

N Engl J Med 2021; 384:2273-2282

DOI: 10.1056/NEJMoa2104983

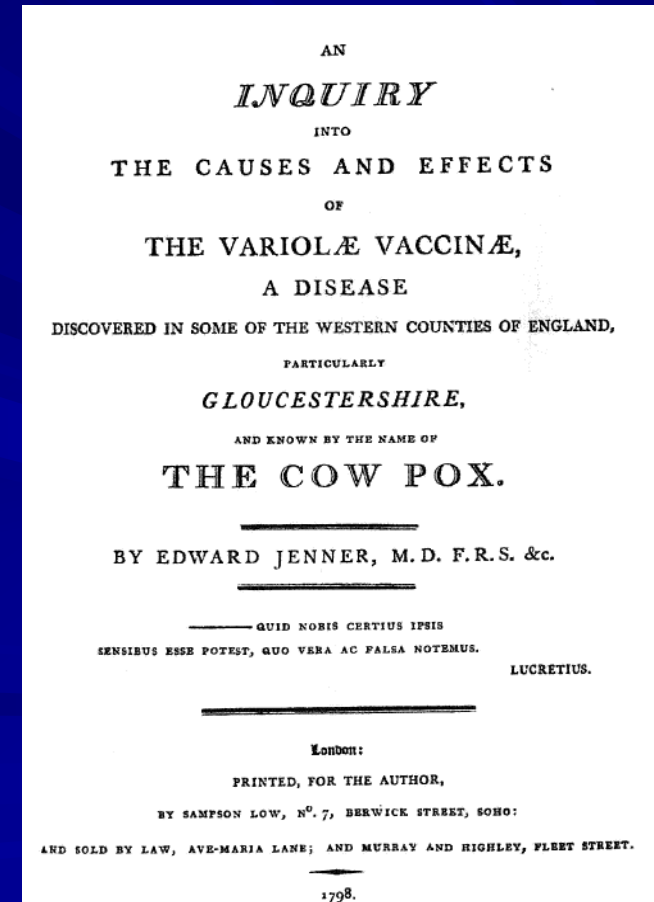
Vaccine Hesitancy



Jenner & Birth of Vaccination (Variolization, Inoculation, Immunization)



The good doctor A portrait of Edward Jenner



Immunization & Anti-vaccination



This might hurt The first vaccination of Edward Jenner in 1796, painted by Melingue Gaston



Have I got moos for you The 'wonderful effects of cowpox' depicted by James Gillray (1802), ridiculing all those who believed that vaccination could turn people into cattle

Smallpox "Remedies":

- Leeches,
- Silver needles to lance pox
- Purgatives (??)



TRIUMPH OF DE-JENNER-ATION.
[The Bill for the encouragement of Small Pox was passed.]

VACCINEIQ

VACCINE HESITANCY CONTINUUM

VACCINE HESITANCY

The delay in acceptance or refusal of vaccination despite the availability of vaccination services

VACCINE ACCEPTANCE

The acceptance of a vaccine or series of vaccines

The Range of Vaccination Behavior



MYTH:

THE COVID-19 VACCINE CAUSES WOMEN TO BE INFERTILE AND IS HARMFUL DURING PREGNANCY



COVID-19 VACCINES AND FERTILITY

Morris, R.S. documented in women that seropositivity to the SARS-CoV-2 spike protein, whether from vaccination or infection, does not prevent embryo implantation or early pregnancy development.

Pregnancy rates.				
	Reactive vaccine	Reactive infection	Nonreactive	<i>P</i> value
All patients	n = 35	n = 20	n = 88	
Biochemical (%)	80.0	73.7	73.9	.19
Clinical (%)	65.7	52.6	62.5	.15
Ongoing (%)	65.7	47.4	52.3	.11
Euploid only	n = 17	n = 10	n = 40	
Biochemical (%)	82.4	80	80	.97
Clinical (%)	70.6	70	70	.99
Ongoing (%)	70.6	70	60	.68

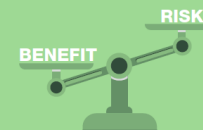
Morris, R.S. SARS-CoV-2 spike protein seropositivity from vaccination or infection does not cause sterility, F&S Reports, 42 2021, <https://www.sciencedirect.com/science/article/pii/S2666334121000684>

WILL COVID-19 VACCINES AFFECT MY FERTILITY?



There is no evidence that the COVID-19 vaccines affect fertility. ACOG recommends vaccination for anyone who may consider getting pregnant in the future.

How a vaccine's safety continues to be monitored



FDA and CDC closely monitor vaccine safety after the public begins using the vaccine.

The purpose of monitoring is to watch for adverse events (possible side effects). Monitoring a vaccine after it is licensed helps ensure that possible risks associated with the vaccine are identified.

Vaccine Adverse Event Reporting System (VAERS)

VAERS collects and analyzes reports of adverse events that happen after vaccination. Anyone can submit a report, including parents, patients and healthcare professionals.

Vaccine Safety Datalink (VSD) and Post-Licensure Rapid Immunization Safety Monitoring (PRISM)

Two networks of healthcare organizations across the U.S.



- VSD can analyze healthcare information from over 24 million people.

- PRISM can analyze healthcare information from over 190 million people.



Scientists use these systems to actively monitor vaccine safety.

Clinical Immunization Safety Assessment Project (CISA)

CISA is a collaboration between CDC and 7 medical research centers.

- Vaccine safety experts assist U.S. healthcare providers with complex vaccine safety questions about their patients.

- CISA conducts clinical research studies to better understand vaccine safety and identify prevention strategies for adverse events following immunization.

Vaccine recommendations may change if safety monitoring reveals new information on vaccine risks (like if scientists detect a new serious side effect).

FOR MORE INFORMATION, VISIT [HTTPS://WWW.CDC.GOV/VACCINESAFETY](https://www.cdc.gov/vaccinesafety)

SHOULD
PREGNANT WOMEN
BE VACCINATED
FOR COVID-19?



YES !!



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



cdc.gov/coronavirus

CS826116 08/11/2021

TIMELINE OF ACOG COVID-19 VACCINE RECOMMENDATIONS

Dec. 11, 2020

Pfizer-BioNTech COVID-19 vaccine recommended

Pregnant people excluded from clinical trials

Only animal model data in pregnancy – no safety signals indicated

Dec. 21, 2020

Moderna COVID-19 vaccine recommended

ACOG Practice Advisory revised – to recommend access to both mRNA vaccines

ACOG recommends pregnant people have *access* to COVID-19 vaccines

ACOG recommends risk-benefit conversation with a clinician

Dec. 13, 2020

ACOG receives reports of pregnant people being denied access to COVID-19 vaccines

ACOG develops Eight Key Recommendations for COVID-19 Vaccination Sites

Jan. 2021

TIMELINE OF ACOG RECOMMENDATIONS

Jan. 2021

CDC begins reporting numbers of people enrolled in v-safe after vaccine health checker who identify as pregnant (15,000 first reported)

Feb. 28, 2021

ACIP votes to recommend the use of J&J/Janssen COVID-19 vaccine
ACOG guidance updated to reflect availability of J&J/Janssen

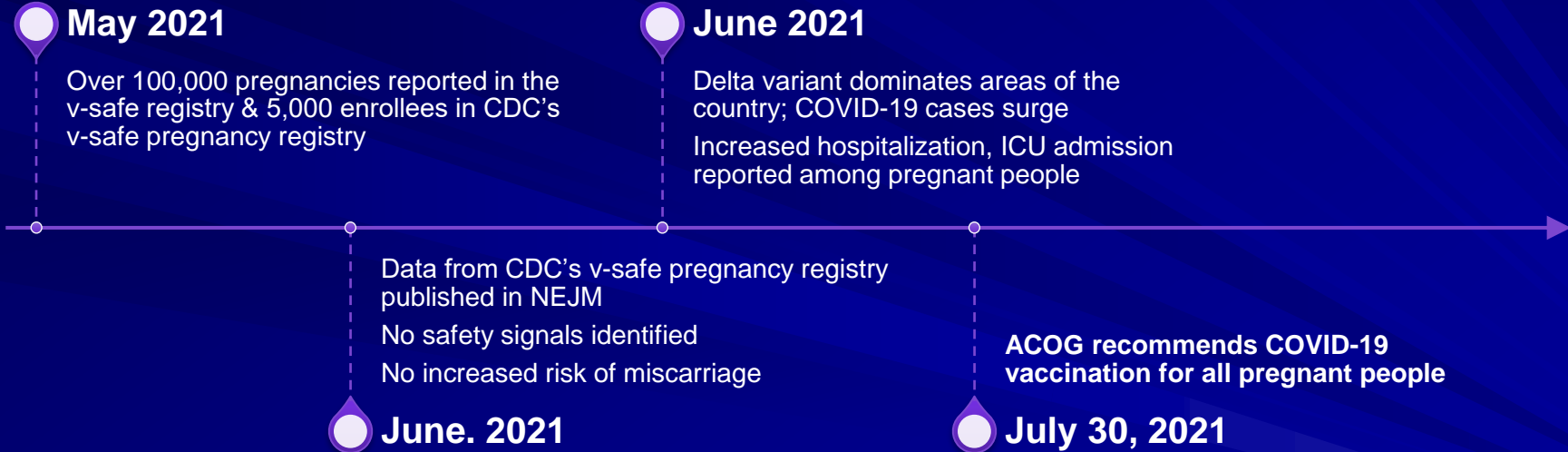
ACOG leads statement: Maternal Immunization Task Force and Partners Urge That COVID-19 Vaccine be Available to Pregnant Individuals

Feb. 3, 2021

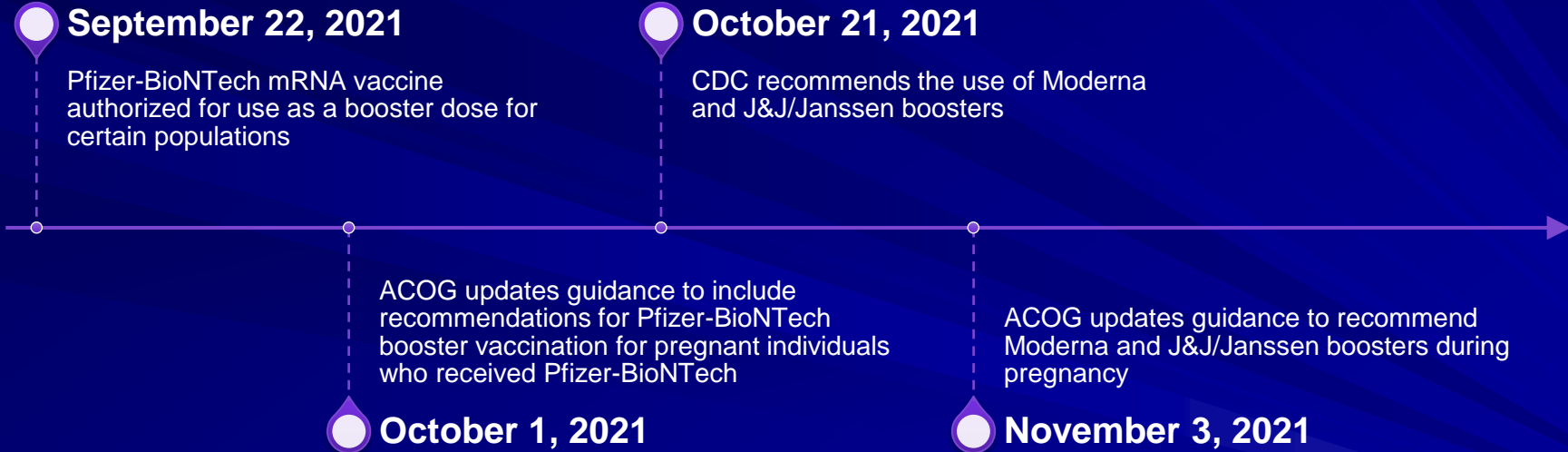
First safety data from the v-safe pregnancy registry reported at ACIP
Reactogenicity profile and adverse events **did not** indicate any safety concerns

Mar 1, 2021

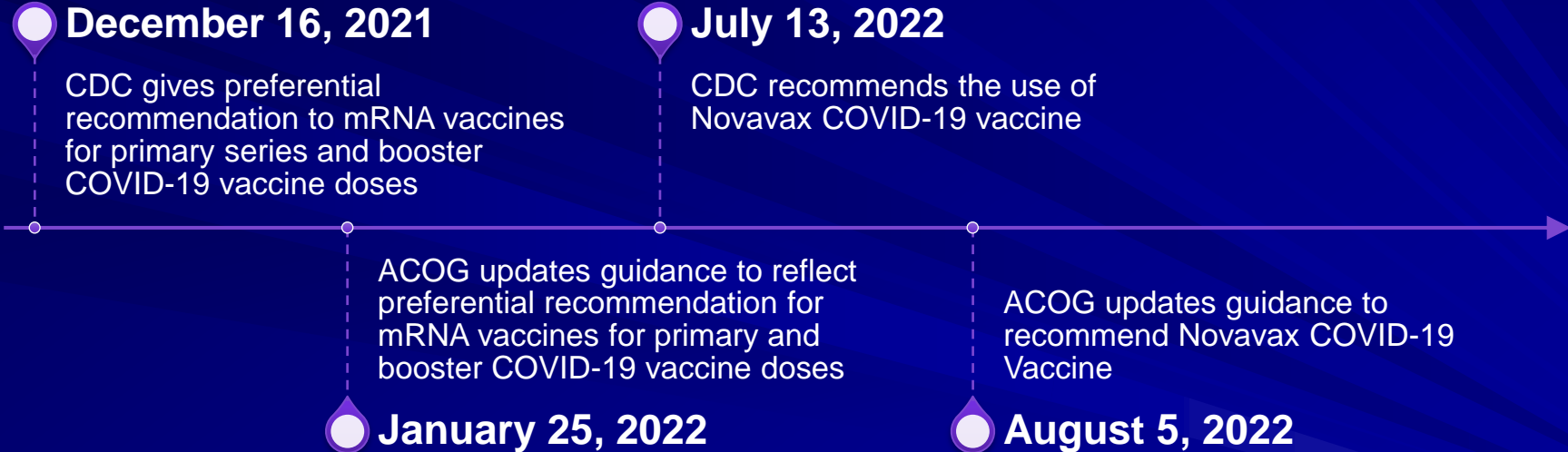
TIMELINE OF ACOG RECOMMENDATIONS



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TIMELINE OF ACOG RECOMMENDATIONS

September 1, 2022

CDC recommends the use of bivalent mRNA COVID-19 vaccines for use as a booster dose in all individuals aged 12 years and older, replacing previous recommendations for monovalent COVID-19 vaccines

ACOG updates guidance to reflect new recommendations for the use of bivalent mRNA COVID-19 vaccines for use as boosters; recommending bivalent boosters for pregnant individuals

September 12, 2022

ACOG PRACTICE ADVISORY

Comprehensive clinical guidance regarding COVID-19 Vaccination

- FDA & ACIP recommendations
- Efficacy & safety information
- ACOG recommendations

COVID-19 Vaccination Considerations for Obstetric–Gynecologic Care

Practice Advisory | December 2020

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Last updated November 16, 2022

This Practice Advisory was developed by the American College of Obstetricians and Gynecologists' Immunization, Infectious Disease, and Public Health Preparedness Expert Work Group in collaboration with Laura E. Riley, MD; Richard Beigi, MD; Denise J. Jamieson, MD, MPH; Brenna L. Hughes, MD, MSc; Geeta Swamy, MD; Linda O'Neal Eckert, MD; Mark Turrentine, MD; and Sarah Carroll, MPH.

Summary of Updates

This Practice Advisory provides an overview of the currently available COVID-19 vaccines and guidance for their use in pregnant, recently pregnant, lactating, and nonpregnant individuals aged 12 years and older. For guidance and recommendations for the use of these vaccines in individuals aged 11 years or younger, please visit the website of the [American Academy of Pediatrics](#). For additional information regarding severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and treatment, see ACOG's [Frequently Asked Questions](#).

LACTATING INDIVIDUALS

- **ACOG strongly recommends** that lactating individuals be vaccinated against COVID-19.
- Theoretical concerns regarding the safety of vaccinating lactating individuals do not outweigh the potential benefits of receiving the vaccine.
- There is no need to avoid initiation or discontinue breastfeeding in patients who receive a COVID-19 vaccine.
- Current data demonstrate that lactating people who have received mRNA COVID-19 vaccines have antibodies in their breast milk, suggesting a potential protective effect against infection in the infant, although the degree of clinical benefit is not yet known.



After you get vaccinated, the antibodies made by your body may be passed through breastmilk and may help protect your baby from the virus. **ACOG recommends that breastfeeding women be vaccinated against COVID-19.**

ACOG BOOSTER RECOMMENDATION GRAPHIC

COVID-19 VACCINE BOOSTERS DURING PREGNANCY

All people, including pregnant people should receive a bivalent mRNA COVID-19 vaccine booster dose following the completion of their last COVID-19 primary vaccine dose or monovalent booster.

Bivalent mRNA COVID-19 vaccines are now the recommended vaccines for use as a booster for individuals aged 5 years and older.

- Monovalent mRNA COVID-19 vaccines are no longer authorized for use as a booster.
- Bivalent mRNA COVID-19 vaccines are the default for booster vaccination. However, Novavax's monovalent COVID-19 vaccine is allowable for use as a booster (not primary vaccination) when a person has not yet received any booster dose and:
 - » is unable to get a bivalent mRNA COVID-19 vaccine, or
 - » is unwilling to get a bivalent mRNA COVID-19 vaccine.
- Bivalent mRNA COVID-19 vaccines are only authorized for use as boosters. They are not authorized for use as primary doses at this time. Individuals must complete their primary monovalent COVID-19 vaccine series before receiving a bivalent mRNA COVID-19 booster.
- Booster vaccination may occur in any trimester, and emphasis should be on vaccine receipt as soon as possible to maximize maternal and fetal health.



Then & Now



Then & Now



TWO CITIES PROTEST WEARING FLU MASKS

PASADENA, Jan. 21.—Fifty Pasadenaans, many prominent, were under arrest here today charged with appearing in public without “flu” masks. The police started enforcement of the “flu” mask ordinance yesterday.



Then & Now

ANTI-MASK MEETING TONIGHT (Saturday) JAN. 25 DREAMLAND RINK

To Protest Against the Unhealthy Mask Ordinance

Extracts will be read from State Board of Health Bulletin showing compulsory mask wearing to be a failure.

Eugene E. Schmitz and other interesting speakers.

Admission Free.

HEALTH ORDER DOOMS LODGE HALL COBWEBS
 Grip Ban on All Meetings Until Places Are Renovated; 21 Theaters Reopen.

GRIIP VIGILANCE STILL NEEDED
 Dr. Robertson Warns Against Relaxing Precaution, Despite Wane of Epidemic

'OPEN-FACE' SNEEZERS TO BE ARRESTED
 Orders to arrest any person indulging in the "open face" sneeze or cough in public places.

POLICE RAID SALOONS IN WAR ON INFLUENZA; KEEP CHURCH WINDOWS OPEN
 Stringent New Orders Are Issued for Preventing Spread of Epidemic; Police Ambulances Are Drafted; 100,000 Doses of Vaccine on Way.

'NONESSENTIAL' CROWDS BARRED IN EPIDEMIC WAR
 Churches and Saloons Exempt; Conventions, Athletics, Parties Hit.

FREE DOCTOR
 Influenza victims unable to pay for a doctor can obtain one by calling Main 647, Level 108, day or night.

CHURCH WINDOWS MUST STAY OPEN, SAYS ROBERTSON
 Health Department Gives Out New Rules in Fight on Influenza.

FLU CURFEW TO SOUND FOR CITY SATURDAY NIGHT
 Persons Not on Business Expected to Quit the Streets at 9 o'Clock.

DRAFT MEN TO BE FIRST INOCULATED FOR "FLU"
 The curfew will ring on, rather, blow in Chicago tomorrow night. Promptly at 9 o'clock the whistles of

Which Is

THREE SHOT IN STRUGGLE WITH MASK SLACKER

urgently and other h to the and sub- d of their s are at doctors on distributed have most public to protection man Brit- Red Cross he neigh- gauze pro- TIONS Two men and a woman were shot yesterday at Powell and Market streets when Henry D. Miller, an inspector in the city Health Department, discharged his revolver in a battle with James Wister, a blacksmith, who refused to don a gauze influenza mask at the order of the health officer.

Wister was one of the wounded, being shot in the arm and leg. Henry Appleton, 53 years old, 124 Belvedere street, was shot in the leg by one of the four bullets fired by Miller, as was a woman whose name could not be learned by the police, she having gone at once to her home after learning her wound was slight.

The police report that Miller found Wister standing at the corner working his arms and urging a crowd to dispense with the masks. "They are the bunk," he is reported to have said.

bacteriologist Medical C epidemic v cording to nounced h test treat adopted by was broug a short w Secretary plimented for eradic said that it was not s urely pro CLAIM He stat men found respecter virulent in East as p predicted California, have a ar the germs Dr. Hia hospitals supplied w clinics at the treat said.

100 M Held Dis



Many of us lived this as well

It's amazing how many parents went from, "*I don't understand my kid's 6th grade math homework*" to, "*I'm an infectious disease expert*" in just six months.



Expectations

- COVID era will continue for some time – now regular biosphere pathogen
 - Transition of SARS-CoV-2 to endemicity
- We will have future Pandemics
 - Predictably unpredictable in nature & timing
 - Predictable in occurrence
 - Pregnant population (challenges & opportunities they present) will stay prominent