Influenza in pregnancy and Influenza Vaccination

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References:

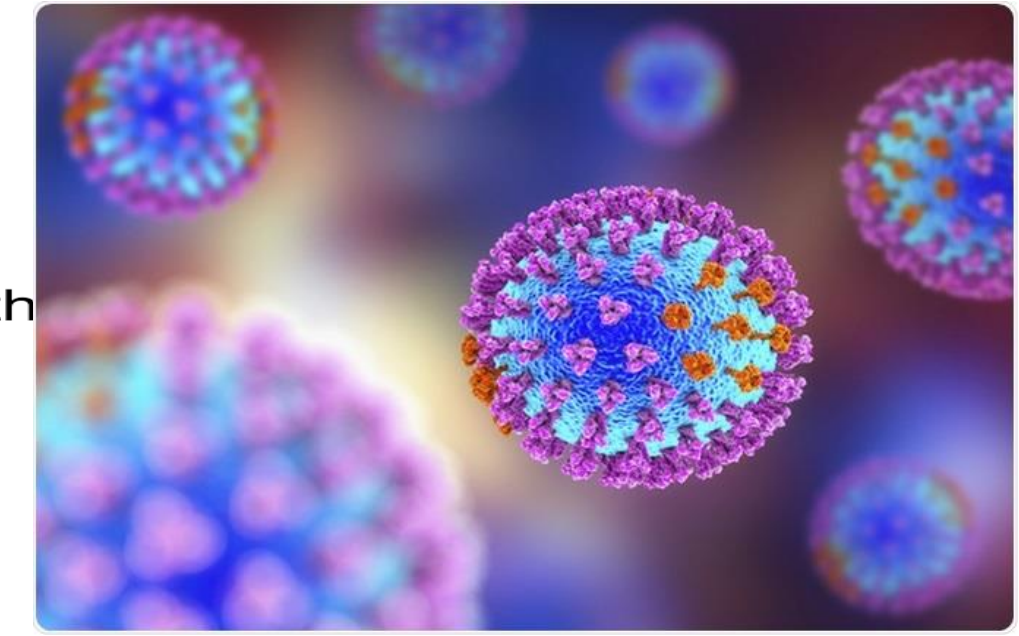
World Health Organization 2025

UpToDate® 2025

ACOG The American College of Obstetricians and Gynecologists 2024

CDC Centers for Disease Control and Prevention **CDC** 2025

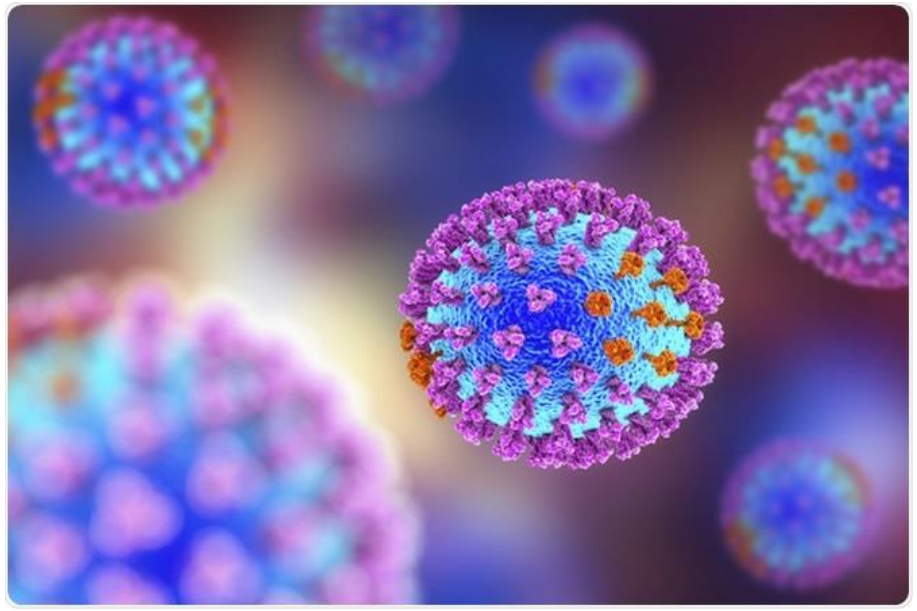
UK Health Security Agency



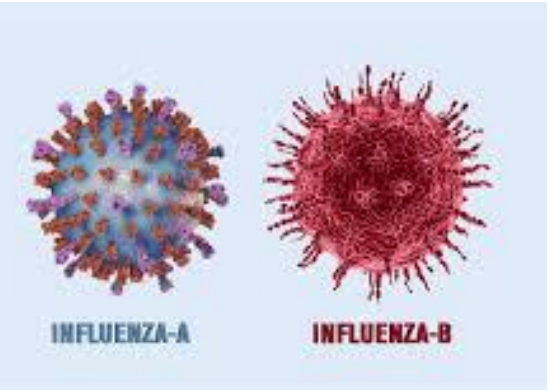
UK Health Security Agency 2023

NEEDS ASSESSMENT:

- ***Infection with influenza virus places a large burden on human health.***



World Health Organization



- ***Key facts [1]: (WHO, 2025)***

- *There are **4 types of influenza** viruses, types A, B, C and D.*
- ***Influenza A and B viruses** circulate and **cause seasonal epidemics** of disease.*

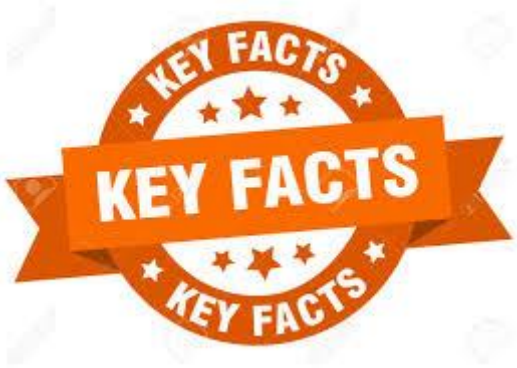
- *There are around **a billion cases** of seasonal influenza **annually,** including **3–5 million cases of severe illness**.*

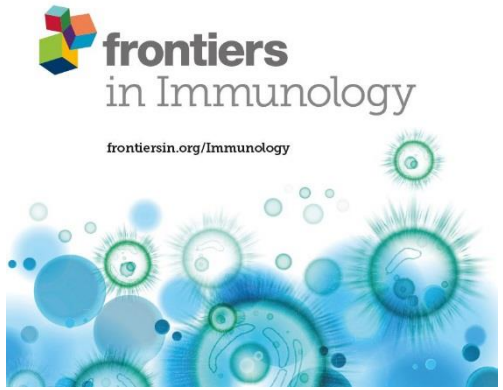
- *It causes **290 000 to 650 000 respiratory deaths annually**.*

- ***99%** of **deaths in children under 5 years** of age with influenza-related **lower respiratory tract infections** are in **developing countries**.*

- *People at **greater risk** of **severe disease** or **complications** when infected **are pregnant women**, **children under 5 years of age**, older people, individuals with chronic medical conditions (such as chronic cardiac, pulmonary, renal, metabolic, neurodevelopmental, liver or hematologic diseases) and individuals with immunosuppressive conditions/treatments (such as HIV, receiving chemotherapy or steroids, or malignancy).*

1: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)





- *In the **U.S. alone**, the CDC estimated **35.5 million** people experienced influenza in the 2018–19 season* [1]
- ***Newborns** and **young infants** represent a **particularly susceptible** population for **severe disease** following influenza virus infection.*
- *Even in countries like the U.S., where health care resources are widely available, those **under the age of 6 months** are **six times more likely to die** as a result of influenza virus infection compared to children between the ages of 13 and 17 years* [2]

1: https://archive.cdc.gov/#/details?url=https://www.cdc.gov/flu/about/burden/2018-2019.html
2:Martha A Alexander-Miller. Challenges for the Newborn Following Influenza Virus Infection and Prospects for an Effective VaccineFront Immunol. 2020 Sep 16;11:568651.

World Health Organization

- ***Key facts [1]: (WHO, 2025)***

- *People at **high risk** or with **severe symptoms** should be treated with **antiviral medications** as **soon as possible**.*
- *They include people who are [1]:*

- ***Pregnant***
- *Children under 59 months of age*
- *Aged 65 years and older*
- *Living with other chronic illnesses*
- *Receiving chemotherapy*
- *Living with suppressed immune systems due to HIV or other conditions.*

1: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)

World Health Organization

KEY FACTS

- ***Key facts [1]: (WHO, 2025)***

- ***Vaccination is the best way to prevent influenza.***

- ***Safe*** *and* ***effective vaccines*** *have been used for* ***more than 60 years****.*
- ***Immunity*** *from vaccination* ***goes away over time*** *so* ***annual vaccination*** *is* ***recommended*** *to protect against influenza.*

- *Vaccination is especially* ***important*** *for people at* ***high risk*** *of influenza* ***complications*** *and their carers.*

- ***Annual vaccination*** *is recommended for:*
- ***pregnant women***
- *children aged 6 months to 5 years*
- *people over age 65*
- *people with chronic medical conditions*
- *health workers.*

1: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)

Prevention; Vaccination

- ***WHO (2012) recommends*** *seasonal influenza vaccination for:* [1]

A: Highest priority:

Pregnant *women and women* ***up to 2 weeks postpartum***

B: Priority *(in no particular order):*

Children *aged* ***6-59 months***

Elderly

Individuals with ***specific chronic medical conditions***

Health-care workers

- ***1: Buchy et al. Vaccinating pregnant women against influenza needs to be a priority for all countries: An expert commentary . International Journal of Infectious Diseases 92 (2020) 1–12***

World Health Organization

WHO Weekly epidemiological record

No 19, 2022, 97, 185–208

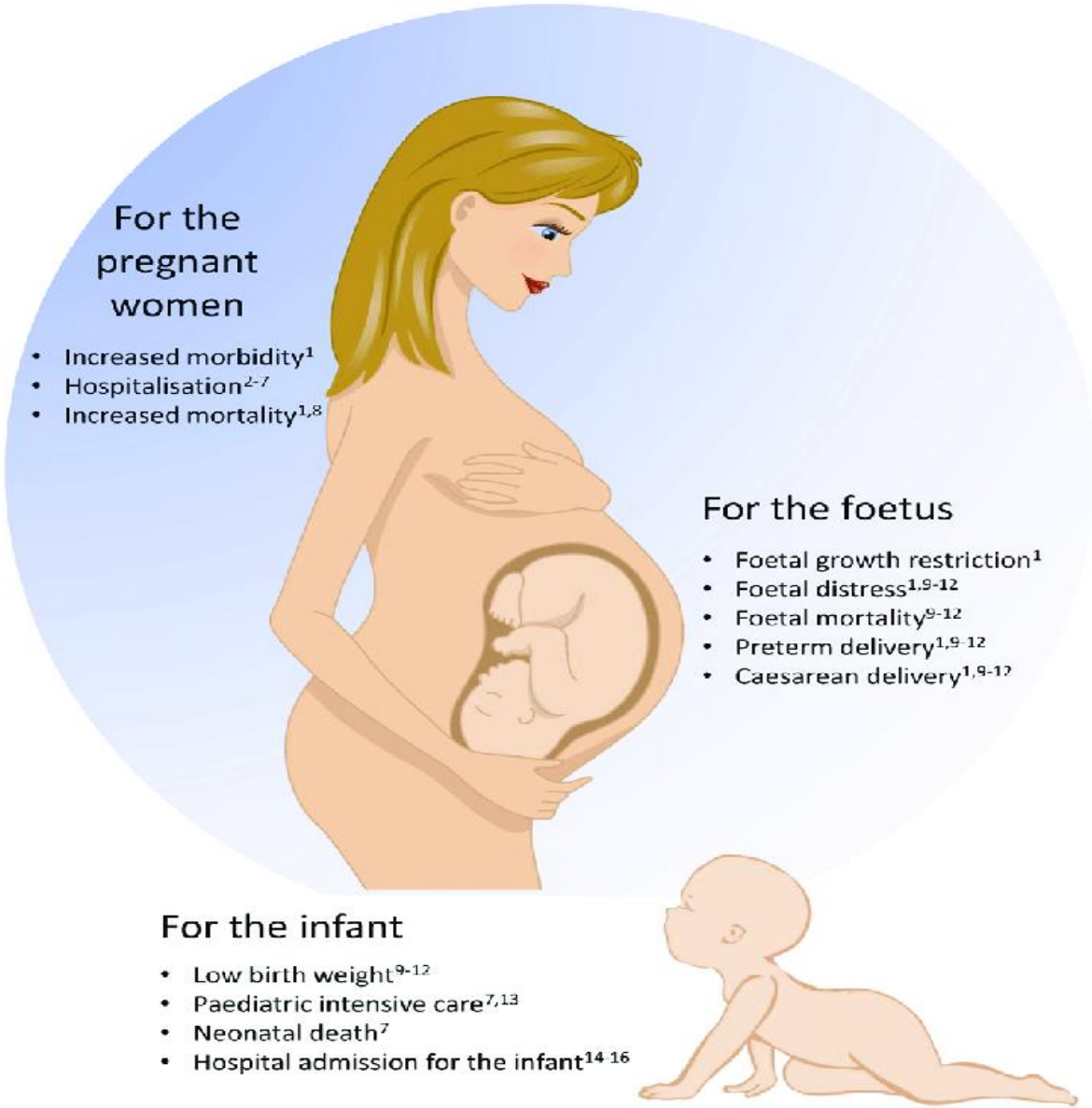
- ***Groups** at particular **risk of severe influenza** or complications include:*

- ***Older adults;***
- ***Pregnant women and women up to 2 weeks postpartum;***

- *Children under 59 months;*
- *Individuals **younger than 19 years of age on long-term aspirin- or salicylate-containing medications**;*
- *People with a **body mass index of 40 or higher**;*
- *And individuals with underlying health conditions, including those living with chronic cardiac disease, asthma, chronic pulmonary disease, chronic renal disease, metabolic disorders, endocrine disorders (e.g. diabetes), neurological and neurodevelopmental disorders, liver disease; haematological diseases and immunosuppressive conditions (e.g. HIV/AIDS).*

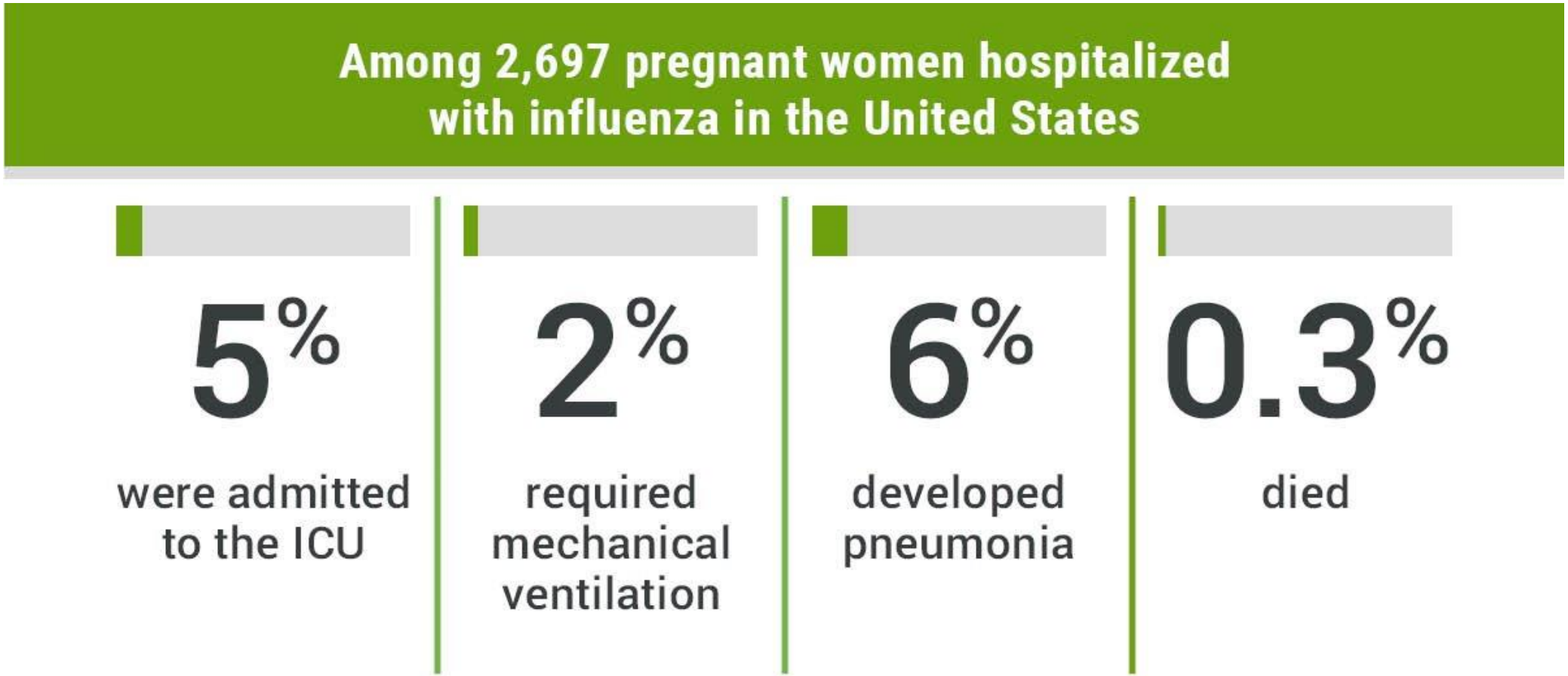
Why is flu so bad in pregnancy?

- ***Effects of pregnancy on influenza***
- ***Influenza effects on pregnancy***



Rachel Holstein , et al.

Characteristics and Outcomes of Pregnant Women Hospitalized with Influenza in the United States, Flusurv-net, 2010–2019. *Open Forum Infectious Diseases, Volume 7, Issue Supplement_1, October* ***2020****, Pages S193–S194*



ACOG
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- ***ACOG (2024)***
- ***Established potential complications*** *of influenza during pregnancy include:*

- ***Preterm delivery,***

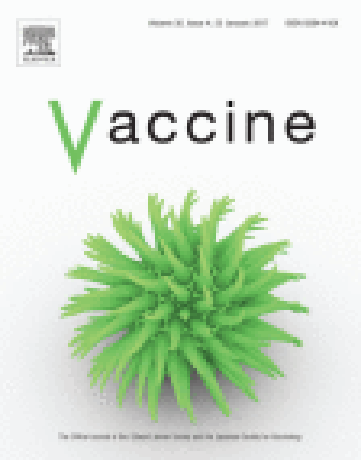
- ***Pneumonia,***

- ***Hospital or intensive care unit admission,***

- ***And maternal and fetal death***

1: https://www.acog.org/clinical/clinical-guidance/committee-statement/articles /2024/02/influenza-in-pregnancy-prevention-and-treatment

- ***Effects of pregnancy on influenza.***
  - ***Maternal effects***



Pregnancy as a risk factor for severe outcomes from influenza virus infection: A systematic review and meta-analysis of observational studies. *Vaccine* *Volume 35, Issue 4*, *23 January 2017, Pages 521-528*

Dominik Mertz[1], *Johanna Geraci*[2], *Judi Winkup*[3], *Bradford D Gessner*[4], *Justin R Ortiz*[5], *Mark Loeb*[6]

- **Pregnant *individuals*** and **their infants** may be at **increased risk of adverse pregnancy outcomes** when infected with influenza.

- *A systematic review in **2017** and a meta-analysis in **2019** showed that influenza during pregnancy resulted in a:*
- ***7 times higher risk of hospital admission*** *(OR 6.8, 95% CI 6–7.7)*

- *The risk of **severe infection** in pregnancy is **exacerbated** by the presence of **comorbidities**, such as **asthma**, **HIV infection**, **diabetes mellitus** and **obesity.***

BMC Infectious Diseases

Pregnancy as a risk factor for severe influenza infection: an individual participant data meta-analysis

•*Dominik Mertz, Calvin Ka-Fung Lo, Lyubov Lytvyn, Justin R. Ortiz & Mark Loeb , BMC Infectious Diseases volume 19, 683 (**2019**)*

- *A total of **33 datasets** with data on **36,498 eligible women** of reproductive age and **known pregnancy** status.*

- *In the multivariable model, **pregnancy was associated with a 7 times higher risk of hospital admission.***

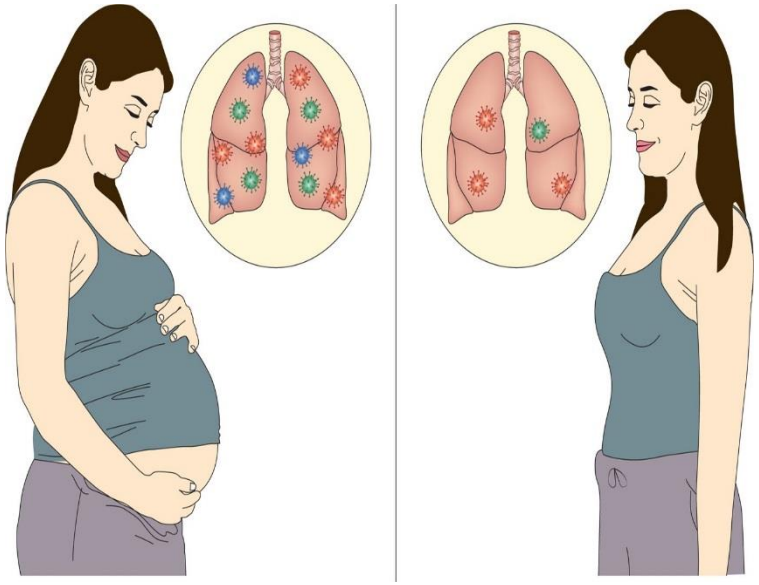
- *The **increased severity** is thought to be related to **normal physiologic changes** during pregnancy:*

- ***Heart rate** and **oxygen consumption** increase,*
- ***Lung capacity** decreases, and*
- ***Lower cell-mediated** immunity.*

- ***Pregnant** and recently **postpartum** women with influenza are **more likely**:*

- *To develop **severe illness** and*
- ***To die***

- *Than the general population,*



- ***Influenza effects on pregnancy***

- ***Fetal effects of Maternal influenza during pregnancy:***

Fetal effects of Maternal influenza during pregnancy:[1]

- *Flu also may be **harmful** for a **pregnant woman's** developing **baby.** [1]*
- ***Trans-placental** transmission is **rare** .*
- *Might have **adverse effects** on the **fetus** even in the **absence of trans-placental transmission**.*
- *A common flu symptom is **fever**,*
- *Which may be associated with **neural tube defects** and other **adverse outcomes** for a developing baby.*

- ***1: https://www.cdc.gov/flu/highrisk/pregnant.htm***

Fetal effects of Maternal influenza during pregnancy: [1]

- ***Hyperthermia*** *is a* ***risk factor*** *for certain birth defects and other adverse infant outcomes.*
- *This risk appears to be* ***attenuated*** *by use of* ***antipyretics****.*

- *In the* ***first trimester*** *was associated with an* ***increased risk of:***
  Congenital abnormalities *(AOR 2.00), Including:*

- ***Cleft lip*** *(OR 3.2),*
- ***Neural tube defects*** *(OR 3.3),*
- ***Hydrocephaly*** *(OR 5.7), and*
- ***Congenital heart defects*** *(OR 1.6).*

1: ACOG, Committee Opinion Number 732, 2019

Fetal effects of Maternal influenza during pregnancy

Severely ill pregnant *women is associated with an* ***increased*** *risk for :*

- ***Spontaneous abortion,***
- ***Preterm delivery,***
- ***Low birth weight,***
- ***Small for gestational age,***
- ***And fetal death.***

Meta-Analysis

Int J Infect Dis. . 2021 Apr:105:567-578.

The effect of influenza virus infection on pregnancy outcomes: A systematic review and meta-analysis of cohort studies

Ruitong Wang[1], Wenxin Yan[1], Min Du[1], Liyuan Tao[2], Jue Liu[3]

- *A systematic review of cohort studies involving* ***more than 2 million participants*** *showed that* ***influenza infection during pregnancy:***

- ***Increased the risk of stillbirth*** ***(RR) 3.62****, 95% CI 1.60–8.20),*

- *But had* ***no significant effect*** *on:*
- ***Preterm birth*** *(RR 1.17, 95% CI 0.95–1.45),*
- ***Fetal death*** *(RR 0.93, 95%CI 0.73–1.18),*
- ***Small for gestational age*** *(RR 1.10, 95% CI 0.98–1.24)*
- ***Low birth weight*** *(RR 1.88, 95% CI 0.46–7.66)*

- ***Influenza effects on pregnancy***

- ***Neonatal effects of Maternal influenza during pregnancy:***

Neonatal effects of influenza

- ***Influenza in newborns can lead to serious illness, hospitalization, and death.***
- *"The **neonatal immune system**:*
- *Is **not able to effectively clear** pathogens, bacteria, viruses,*
- *And **lacks a robust immune memory***
- *Because neonates **don't have the same antigen exposure** as older children and adults,*

Prevention; Vaccination

Prevention; Vaccination

- ✓ *Because of the **increased severity of influenza** in **pregnancy** and **postpartum**;*
- ✓ ***Inactivated influenza vaccine** is **recommended** for these women, **regardless of trimester of pregnancy**.*
- ✓ ***Flu vaccines** have been shown to **reduce** the risk of **flu illness**, **hospitalization** and **death**.[1]*
- ✓ *In addition, **pregnant** and **postpartum** women with **suspected** or confirmed **influenza** should receive **prompt empiric treatment** .*

✓ ***1: https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm***

Prevention; Vaccination

- ***Since 2004**, the US CDC Advisory Committee on Immunization Practices has recommended that [1]:*
- ***All women** who are **pregnant** or will be **pregnant during influenza season** receive any licensed, **age-appropriate,** recommended **influenza vaccine**, **regardless of trimester**.*
- ***Annual influenza vaccination** is **recommended** for **all persons aged ≥6 months** who do not have contraindications, including **pregnant and postpartum women.***

1: CDC 2021: https://www.cdc.gov/flu/highrisk/pregnant.htm

Prevention; Vaccination

- ***Both a quadrivalent*** *vaccine (2 influenza A viruses and 2 influenza B viruses) and a* ***trivalent*** *(containing 2 influenza A viruses and one influenza B virus)* ***inactivated vaccine*** *are* ***available.***

- *The* ***CDC's Advisory*** *Committee on Immunization Practices* ***does not preferentially recommend*** *a specific formulation of influenza vaccine,* ***trivalent or quadrivalent,***

- *As* ***comparative effectiveness data*** *in large populations are* ***not available*** *to support a specific recommendation.*

- ***Pregnant women should not receive a live-attenuated influenza vaccine*** *due to concerns about the* ***safety***[1]*.*

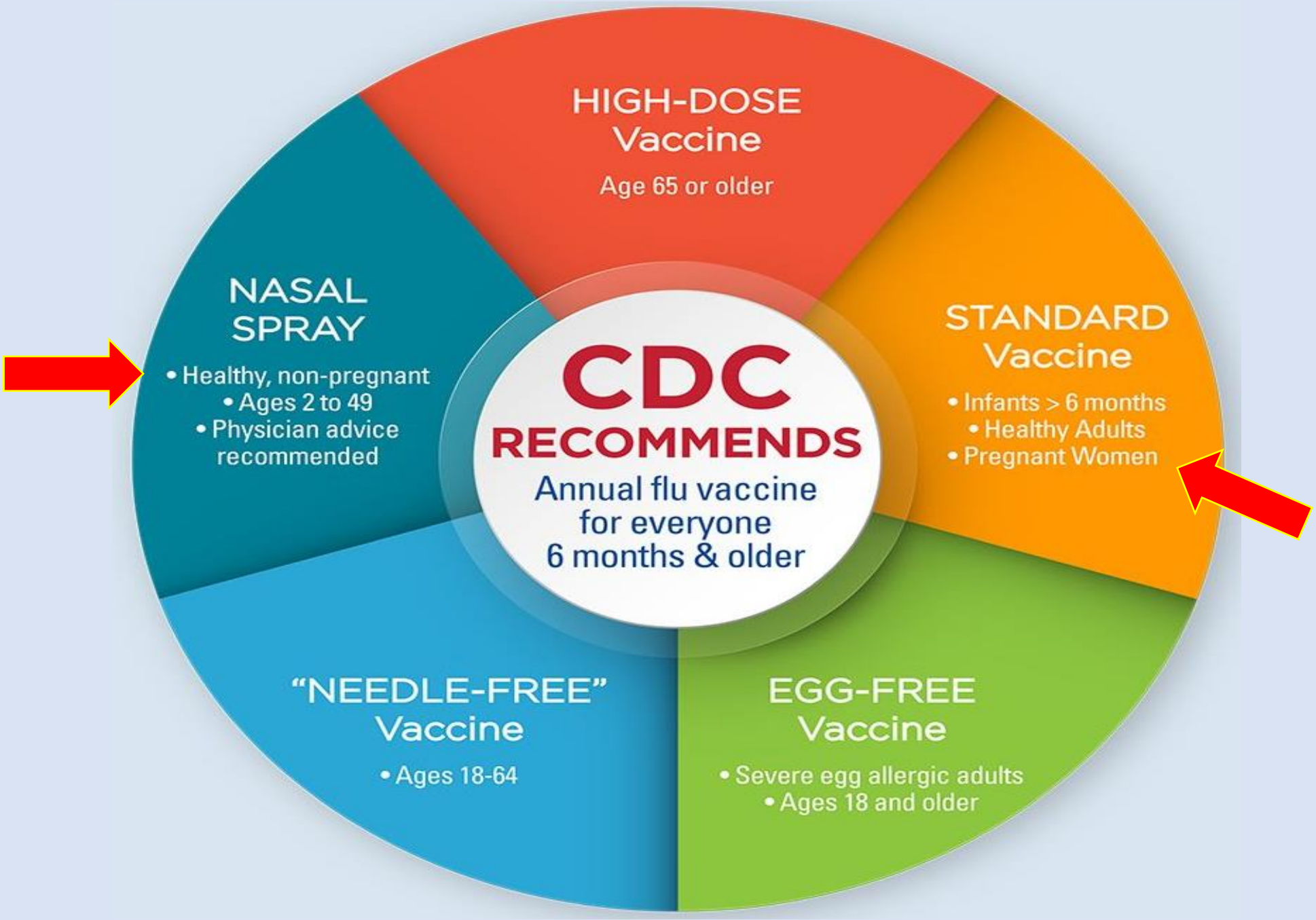
- ***Pregnant*** *and* ***postpartum*** *women do* ***not need to avoid contact*** *with individuals who have* ***recently received*** *the* ***live-attenuated influenza vaccine****,*

- ***Live-attenuated influenza*** *vaccine is* ***safe*** *for use* ***postpartum****.*

- *Pregnant women with a* ***history of egg allergy*** *of any severity* ***may receive any licensed****, recommended, and age-appropriate influenza vaccine (****not live-attenuated vaccine****).*

- *However, if the* ***allergy is severe****, then administration should be* ***supervised*** *by a* ***health care provider*** *who is able to* ***recognize*** *and* ***manage anaphylaxis****.*
- ***Egg-free trivalent and quadrivalent*** *influenza vaccines are also* ***available****.*

- ***1: CDC; Addressing Concerns Pregnant Women Might Have about Influenza Vaccine Safety.***


HIGH-DOSE
Vaccine
Age 65 or older
NASAL
SPRAY
• Healthy, non-pregnant
• Ages 2 to 49
• Physician advice recommended
CDC
RECOMMENDS
Annual flu vaccine
for everyone
6 months & older
STANDARD
Vaccine
• Infants > 6 months
• Healthy Adults
• Pregnant Women
"NEEDLE-FREE"
Vaccine
• Ages 18-64
EGG-FREE
Vaccine
• Severe egg allergic adults
• Ages 18 and older

CENTERS FOR DISEASE CONTROL AND PREVENTION

Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices — United States, 2024–25 Influenza Season

Recommendations and Reports / August 29, 2024 / 73(5);1–25

Lisa A. Grohskopf; Jill M. Ferdinands; Lenee H. Blanton; Karen R. Broder; Jamie Loehr.

- ***Pregnant*** *and* ***postpartum persons*** *are at* ***higher risk*** *for* ***severe illness*** *and* ***complications*** *from influenza,* ***particularly during the second and third trimesters.***

- *ACIP and the American College of Obstetricians and Gynecologists recommend that persons* ***who are pregnant*** *or who* ***might be pregnant or postpartum during the influenza season*** *receive* ***influenza vaccine.***

- ***IIV3 (****Inactivated influenza vaccine, Trivalent****) or RIV3 (****Recombinant influenza vaccine, Trivalent****) can be used.***

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- ***LAIV3 (****Live, attenuated influenza vaccine, trivalent****) should not be used during pregnancy*** *but* ***can be used postpartum.***

- *Influenza vaccine can be administered* ***at any time during pregnancy*** *(i.e.,* ***during any trimester****),* ***before*** *and* ***during*** *the* ***influenza season.***

- ***Early vaccination (i.e., during July and August):***
- *Vaccination during July and August should be* ***avoided*** *unless there is* ***concern*** *that vaccination later in the season might* ***not be possible****.*

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- ***Early vaccination* (i.e., during July and August):**
- ***Can be considered*** *for persons who are* ***in the third trimester*** *during these months if vaccine is available because this can provide* ***protection for the infant*** *during* ***the first months of life*** *when they are* ***too young to be vaccinated****.*
- *For pregnant persons in the* ***first or second trimester during July and August, waiting to vaccinate until September*** *or* ***October*** *is* ***preferable, unless*** *there is concern that* ***later vaccination might not be possible.***

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- ***Revaccination*** *(i.e., providing a* ***booster*** *dose) to persons who have been* ***fully vaccinated*** *for the season is* ***not recommended****, regardless of when the* ***current season vaccine was received****.*
- *For* ***most persons*** *who need* ***only 1 dose of influenza vaccine*** *for the season, vaccination should ideally be* ***offered during September or October****.*
- *However,* ***vaccination*** *should* ***continue after October*** *and* ***throughout the influenza season as long as influenza viruses are circulating*** *and* ***unexpired vaccine is available****.*

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- ✓ ***Despite*** *these* ***recommendations, (ACOG), coverage rates*** *have remained* ***low for many years****.*
- ✓ *Coverage rates for pregnant women in the* ***US is approximately 49%-54 % .***

%

Coverage

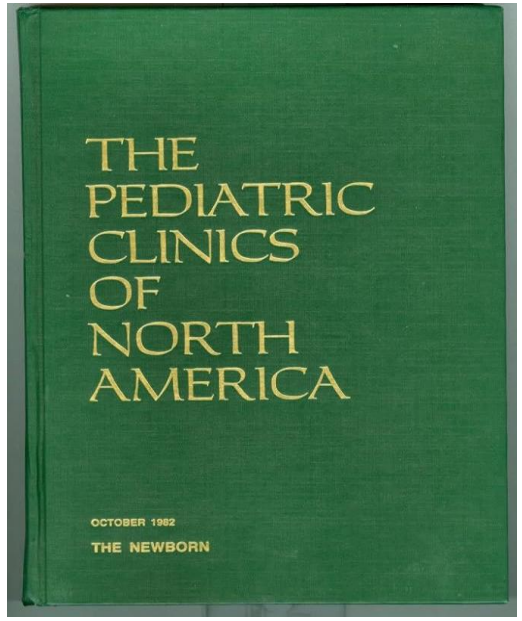
- ✓ ***Rates*** *of* ***influenza vaccination*** *during* ***pregnancy*** *are:*
- ✓ ***Higher*** *in women whose* ***providers*** *specifically* ***recommend*** *it and*
- ✓ ***Highest*** *when the* ***provider both recommends and offers*** *the* ***vaccine.***

- ✓ *These findings* ***highlight*** *the* ***importance*** *of* ***provider involvement*** *to* ***increase influenza vaccination*** *of pregnant women.*

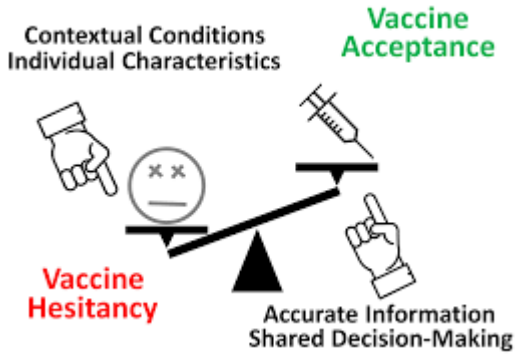
Fig. 3A: Pregnancy Line Graph

Fig. 3B: Pregnancy Bar Graph

Figure 3A. Percent of Pregnant Women Ages 18–49 Years Who Have Received an Influenza Vaccine Overall, by Race and Ethnicity, and Season
Data Source: Vaccine Safety Datalink



Cynthia M Rand et al. Maternal Vaccination and Vaccine Hesitancy. Pediatr Clin North Am. 2023 Feb 24;70(2):259–269.



Key points:

- *Obstetric care providers **should stock vaccine** in their office **to increase vaccination rates.***
- *•Obstetric care providers and their office staff **should continue to offer vaccines** even if a **pregnant person refused** the vaccine **previously**.*
- *•**Vaccine safety** is the **most common concern** for patients; future studies in **vaccine communication** and **counseling** for **obstetric care providers** are needed.*

Benefits [1,2]

- ***Reduction*** *in maternal* ***influenza illness*** *(up to 50%)*
- ***Reduction*** *in maternal* ***influenza hospitalization****(up to 40%)*

- ***Improvement*** *in pregnancy* ***outcome*** *:*
- ***Reduction*** *in risk of* ***stillbirth*** *(RR 0.73)*
- ***Reduced risk*** *for* ***SGA*** *infants and* ***preterm delivery***
- ***An increase*** *in* ***birth weight***
- ***No*** *significant* ***effect*** *on risk of* ***miscarriage*** *(RR 0.91),*

- ***Infant protection*** *(protects the infant for* ***several months after birth****) (41 % - 63 %) reduction in laboratory-confirmed influenza.*

1: Phadke et al. Maternal vaccination for the prevention of influenza: current status and hopes for the future. Expert Rev Vaccines. 2016 Oct; 15(10): 1255–1280.
2: ttps://www.who.int/biologicals/expert_committee/Clinical_changes_IK_final.pdf


VACCINATION DURING PREGNANCY
PROTECTS NEWBORN BABIES.

***Infant protection** of **influenza vaccination during pregnancy** [1,2]*

- ✓ ***Protects the infant** for **several months** after birth .*
- ✓ ***Induces** substantial levels of **anti-influenza-specific serum (IgG),** which are actively **transferred** across the **placenta** to the **fetus** ,*
- ✓ *And anti-influenza-specific **IgA in breast milk**, which is **transferred** to the **infant during lactation** .*
- ✓ *Thus, it is an **effective strategy** for **reducing** influenza-related **morbidity** and **mortality** among **infants**, who are **not eligible** for vaccination **until six months of age** because they **fail to mount an adequate immune response .***

1: Nunes et al. Prevention of influenza-related illness in young infants by maternal vaccination during pregnancy. F1000Research 2018, 7(F1000 Faculty Rev):122 Last updated: 29 JAN 2018. 2: ACOG, Committee Opinion Number 732, 2019

Infant protection

- ***Reduce hospitalizations*** *before* ***three months of age*** *.*

- *The vaccine's* ***efficacy IS*** *approximately:*
  - ***86 % in infants ≤8 weeks*** *of age and*
  - ***25 - 30 % in infants 8 - 24 weeks*** *of age [1] (2049 infants).*

- *Maternal immunization in the* ***third trimester*** *would* ***improve passive protection*** *for the newborn ;*

- *However,* ***delaying maternal*** *immunization places the mother at* ***risk for influenza*** *and its sequelae (maternal and fetal) and is* ***not recommended****.*

1: Omer et al. Efficacy, duration of protection, birth outcomes, and infant growth associated with influenza vaccination in pregnancy: a pooled analysis of three randomised controlled trials. www.thelancet.com/respiratory Vol 8 June 2020.

Safety for pregnant women

- ***No increased risk** of complications for **inactivated influenza** vaccines compared with the **general population**.*
- *Although **rare**, **all vaccines**, including influenza vaccine, have some background risk of **adverse effects**, such as **Guillain-Barré syndrome**.*
- *However, **no specific concerns** for **pregnant women**, their **fetuses**, **infants**, or **school-age children** have been identified from **multiple research** studies on the **safety** of **all types** of **influenza vaccination.***

- *The **only contraindications** to influenza vaccines are:*
  - ***Anaphylaxis** following a **previous** dose of any **influenza vaccine***

- ***Common side effects** from a flu shot include:*
- ***Soreness**, **redness**, and/or **swelling where the shot was given**,*
- ***Headache** (low grade), **fever**, **nausea**, **muscle aches**, and **fatigue.***
- *The flu shot, **like other injections**, can occasionally cause **fainting.***

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- *If the **timing** of the **influenza vaccine** aligns with **other inactivated** or **non–virus-containing vaccines recommended in pregnancy**, such as:*

- *The tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (**Tdap**) vaccine;*
- *Respiratory syncytial virus (**RSV**) vaccine;*
- *Or coronavirus disease 2019 (**COVID-19**) vaccine,*

- *It is **safe** and **effective** to administer **these vaccines** during the **same visit**.*

- *It is also **safe** for **lactating individuals** to receive the **influenza vaccine** if they did **not receive it during pregnancy**.*

1: https://www.acog.org/clinical/clinical-guidance/committee-statement/articles/2024/02/influenza-in-pregnancy-prevention-and-treatment

Treatment (Key Principles)

- ***Sero-protection*** *rates* ***similar*** *to* ***non-pregnant*** *women*
- ***Influenza vaccine*** *is* ***not 100 % effective*** *,*

- ***Pregnant women*** *and* ***postpartum women*** *(within* ***2 weeks*** *of* ***delivery*** *or* ***pregnancy loss****) with suspected or confirmed influenza should* ***receive empiric treatment as early as possible*** ***regardless*** *of* ***vaccination status****,*

- *Treatment should* ***not be withheld*** *while awaiting* ***results of diagnostic testing.***

- ***Initiating treatment*** *of pregnant women* ***early*** *(generally <2 days) after onset of influenza symptoms* ***IS associated*** *with* ***less severe disease*** *and* ***fewer deaths*** *compared with treatment* ***begun later.***

TREATMENT (Key principles)

- *Although the **benefits** are **greatest** when initiated within the **first 48 hours following symptom onset**,*

- *Treatment should **still be administered** to women who **present >48 hours after illness** onset and **have not begun to improve**.*

- ***Health care providers** can facilitate **early treatment** by informing **pregnant** and **postpartum** women about **signs and symptoms of influenza.***

Infection control measures(CON)

- ***Symptomatic women:***
- *Pregnant women with **confirmed or suspected influenza** infection who come to the **hospital for delivery***

- *Should be **placed in a private room.***
- *Should be **treated with appropriate antiviral therapy immediately;***
- ***Treatment** should **not be delayed** while awaiting the **results of diagnostic testing.***

- ***In outpatient settings:***
- *They should **wait in a separate waiting area or** be asked to sit **as far away from others as possible.***

- ***Infant caregivers*** *and household contacts:*

- ***All individuals*** *who* ***live with infants younger than 6 months*** *of age* ***should be vaccinated*** *against influenza.*

- ***Breastfeeding:***

- *Women with* ***suspected*** *or* ***confirmed influenza*** *who are* ***breastfeeding should be encouraged to continue breastfeeding*** *if possible.*

- *During* ***temporary separation****, mothers should be encouraged to* ***express their breast milk****, which a healthy* ***caregiver*** *can use to* ***bottle feed the newborn.***

- ***Temporary separation*** *from* ***her newborn*** *until* ***three criteria*** *were met:*

- *The mother* ***receive antiviral*** *medications for* ***48 hours,***
- *Is* ***afebrile*** *without antipyretics* ***for >24 hours****, and*
- *Is* ***able to control her cough*** *and respiratory secretions.*

- *Mothers who intend to breastfeed should be encouraged to* ***express their milk****.*
- *If* ***temporary separation*** *is* ***not feasible*** *or* ***acceptable****, then environmental controls should be considered, such as* ***physical barriers*** *and* ***keeping the newborn >6 feet away from the ill mother.***
- *Influenza* ***vaccines*** *are recommended for* ***children ≥6 months of age.***

Antiviral medications

- *Treatment decisions, especially those involving **empiric treatments**, should be **informed by knowledge** of **influenza activity** in the community.*

- *The **vast majority** of **currently** circulating **influenza viruses** have been **susceptible** to the **neuraminidase inhibitors**, **oseltamivir**, **zanamivir**, and **peramivir** .*

- *Although information on the **safety** of **oseltamivir**, **zanamivir**, and **peramivir** during **pregnancy is limited**, **the benefits of treatment outweigh the potential risks.***

- *Although some reports of **increased fetal risk** following prenatal exposure to **influenza antiviral medications** have been published, the **number of first-trimester exposures has been small**.*

- ***Oseltamivir*** *is generally* ***preferred*** *over* ***inhaled zanamivir*** *and* ***intravenous peramivir*** *for treatment of* ***pregnant women****, assuming that* ***prevalence of oseltamivir resistance is low*** *among circulating influenza viruses.*

- ***Oseltamivir*** *is the* ***drug of choice*** *because of its* ***systemic absorption*** *and the* ***greater clinical experience*** *using this drug in* ***pregnancy****,*

- *But* ***pregnancy*** *is* ***not a contraindication*** *to use of* ***zanamivir*** *or* ***peramivir.***

- ***Zanamivir is relatively contraindicated*** *in patients with* ***asthma*** *or* ***chronic obstructive pulmonary disease.***

- *Based on limited data, the **dose of antiviral therapy** for treatment of influenza during **pregnancy** is the **same as in non-pregnant** adults:*

- ●*Oseltamivir 75 mg twice daily (preferred), **OR***
- ●*Zanamivir 10 mg (two 5 mg inhalations) twice daily*

- *The **usual duration** of treatment is **five days**,*
- *But **longer treatment** courses can be considered for patients who **remain severely ill after five days of treatment.***

- *Some clinicians have recommended that **severely ill patients** be treated with **double-dose oseltamivir** (ie, 150 mg twice daily);*
- *However, **no data** are available to suggest that **higher doses** are **more effective** .*

- *The **oral formulation** of **oseltamivir** appears to be adequately **absorbed** following **nasogastric administration**.*

- *Until more safety data on **baloxavir marboxil** use in pregnancy are available, **oseltamivir remains the preferred drug for use in pregnancy.***

- ***Fever** should be treated with **acetaminophen**.*

- ***Antipyretics**:*
- *Use of acetaminophen for treatment of fever may be important, since **hyperthermia during the first trimester** has been associated with **neural tube defects** and possibly **other birth defects.***

- *In addition, **fever during labor** is a **risk factor for neonatal seizures**, **encephalopathy**, **cerebral palsy**, and **neonatal death.***

- ***Other antipyretics** (eg, aspirin, ibuprofen) have been **associated** with **adverse pregnancy** and **infant outcomes**; **therefore**,**acetaminophen appears to be the best option.***

- ***Symptomatic therapy*** *:*

- *Many pregnant women will seek advice about* ***symptomatic therapy*** *for* ***cough***, ***rhinorrhea***, ***sore throat***, ***headache***, *and* ***myalgia***.

- *Symptomatic therapy is* ***similar*** *to that for the* ***common cold***.

- ***Role of antibiotics**:*

- *Antibiotics are indicated **only for bacterial complications** of acute influenza, such as **bacterial pneumonia**, **otitis media**, or **sinusitis**.*

- ***Treatment is similar** to that in **non-pregnant** adults ,*

- *Except for **avoidance** of antibiotics with **potentially harmful** effects in pregnant women or the fetus.*

- ***Obstetric Management**:*

- *There are **no published guidelines** for **monitoring the fetus** during or after maternal influenza infection.*

- *The **type** and **frequency of fetal surveillance** should be guided by the health care provider's **judgment** on a case-by-case basis.*

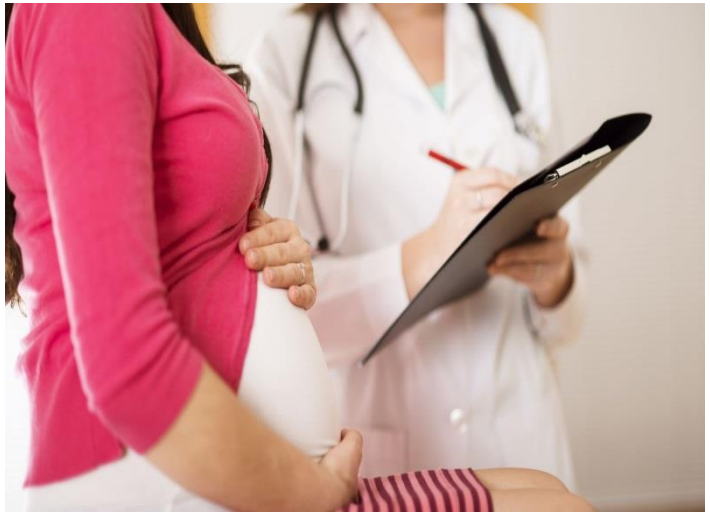
Infection control measures

- ***Standard precautions :***
- *For **reducing the transmission** of influenza include:*
- ***Hand hygiene** (eg, washing with soap and water, use of alcohol-based disinfectant),*
- ***Respiratory hygiene/cough etiquette** (covering the nose and mouth when coughing, disposing of used tissues promptly, and practicing hand hygiene after contact with respiratory secretions).*
- ***Health care workers** should use **gloves**, **gowns**, **masks**, and **eye protection**, as appropriate, **when in contact** with **infected patients.***

Protection of pregnant health care workers

- ***Is the same** infection control procedures **as all health care personnel;***

- ***Avoiding involvement** with aerosol-generating **procedures on patients** with suspected or confirmed influenza to avoid potentially **high-risk exposures**.*



- ***Pregnant women*** *with seasonal influenza are at* ***increased risk*** *for* ***serious complications*** *requiring* ***hospitalization*** *and* ***intensive care unit admission****, and* ***death****.*
- ***Severe maternal*** *illness* ***increases*** *the risk of* ***adverse pregnancy outcome****.*
- ●*The* ***diagnosis*** *of seasonal influenza should be* ***made clinically****,* ***without waiting*** *for results from* ***diagnostic testing****.*
- ●***Infection control measures*** *are indicated in* ***outpatient*** *and* ***inpatient*** *settings to* ***reduce*** *the risk for* ***transmission*** *of virus among* ***mothers****,* ***newborns****,* ***staff****, and* ***non-staff*** *(eg,* ***infant caregivers****,* ***household contacts****) in* ***contact*** *with* ***mothers*** *and* ***newborns****.*
- ●***All women*** *who are pregnant or will be* ***pregnant*** *or* ***postpartum*** *during influenza season* ***should receive either the trivalent or quadrivalent inactivated influenza vaccine****, regardless of* ***pregnancy trimester.***

Thank You