May 1st KPQC Spring Conference

Stronger Together for Kansas Moms and Babies:

Connecting Best Practices, Lived Experiences, and Improved Outcomes

Keynote Speakers

Kourtney Bettinger, MD, MPH, FAAP

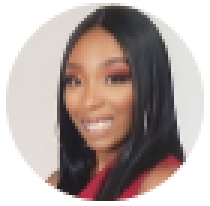
Dr. Bettinger is a general pediatrician and Associate Professor at the University of Kansas Medical Center who leads multiple state and international maternal and child health initiatives, particularly for immigrant, refugee and newborn populations.

Brandan Kennedy, MD, FAAP, FABPM

Dr. Kennedy is a Clinical Professor of Pediatrics at the University of Missouri–Kansas City, a pediatric hospitalist, and a clinical informatics specialist focused on improving patient safety through better electronic health record workflows.

Angela Martin, MD, FACOG

Dr. Martin is a Clinical Associate Professor of Maternal–Fetal Medicine at the University of Kansas, recognized with multiple national teaching awards. She founded the Pregnancy Heart Team, serves as vice chair of the hospital pharmacy and therapeutics committee, and is the medical director of labor and delivery.



Brianna Harris-Henderson

Brianna Harris Henderson is a maternal health advocate and nonprofit leader who uses her lived experience with pregnancy-related heart conditions to educate, raise awareness, and champion better care and support for mothers.

Agenda

9:00 a.m. Kickoff

9:15 a.m. Hot Topics: Pediatric and Maternal Vaccines, Panel Discussion

Brandan Kennedy, MD, FAAP, FABPM

Kourtney Bettinger, MD, MPH, FAAP

Angela Martin, MD, FACOG

10:15 a.m. The Untold Story: Peripartum Cardiomyopathy & Other Maternal Cardiac Risk Factors

Angela Martin, MD, FACOG

11:30 a.m. Let's Talk: The Lived Experience of Peripartum Cardiomyopathy

Brianna Harris-Henderson, President and Founder of LetsTalkPPCM

12:00 p.m. Lunch & Celebration of Success

KPQC Advisory Committee

1:00 p.m. Enrolled Sites Workday: Breakout Sessions & Open Mic Discussion

4:00 p.m. Day concludes

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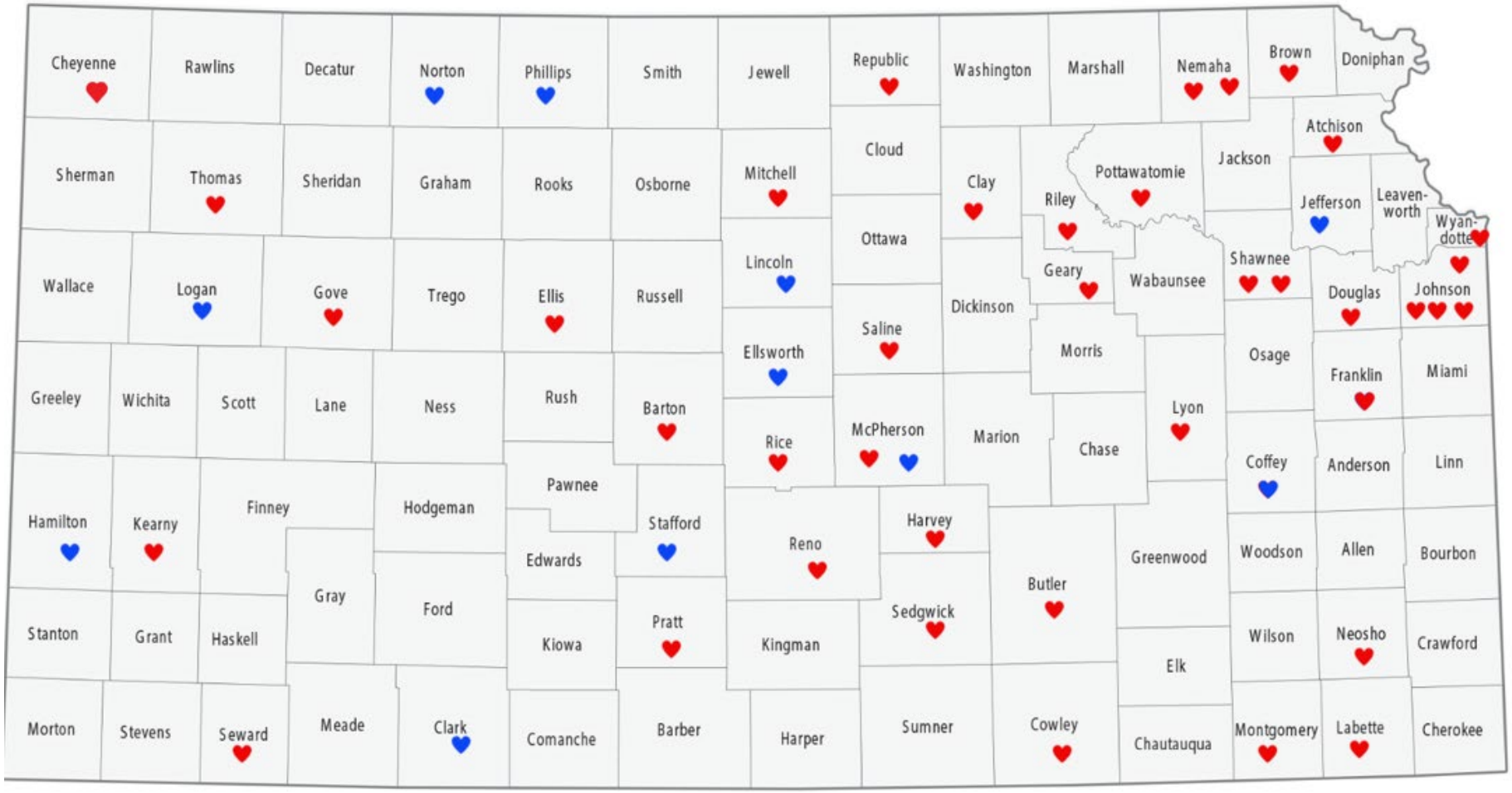
Kansas Perinatal Quality Collaborative

Kick Off!

Impacting 83% of all births in KS

- 39 Birthing Facilities
- 11 Non-birthing Facilities



KPQC Kansas Perinatal Quality Collaborative

SHTN in Pregnancy Safety Bundle

SHTN Model: Kansas!

Recognize & Respond
- Identify Hypertension
- SHTN Protocols
- Screening for: medical conditions, mental health, substance abuse, breastfeeding, family planning, health related social needs

Elevated Care Needed

Inpatient Transfer
- Transfer protocol
- Lactation initiation
- Specialty services
- Health related social needs

Discharge

Discharge

Outpatient Care
- Appointment with Primary OB at 72 hours and 2-3 weeks
- Referral to navigator and/or additional resources
- Cuff Project

Loop Closure

Comprehensive Postpartum Visit 6-12 weeks

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Kansas SHTN Cuff Project
Improved Identification to Treatment

Access to Early and Consistent OB Care

Prevention (ASA daily)

Education: POSTBIRTH

Identification of Need for Home BP monitoring

Home Blood Pressure Monitoring

Education: Home BP Protocol, POSTBIRTH, and Follow-Up

Increased Maternal/Fetal Surveillance

Health Related Social Needs: screenings and referrals

OB Navigation

OB or ED Triage

Timely Treatment (<60 min)

Delivery or Antepartum Follow-Up

Outpatient Follow-Up (72 hours, 7 days)

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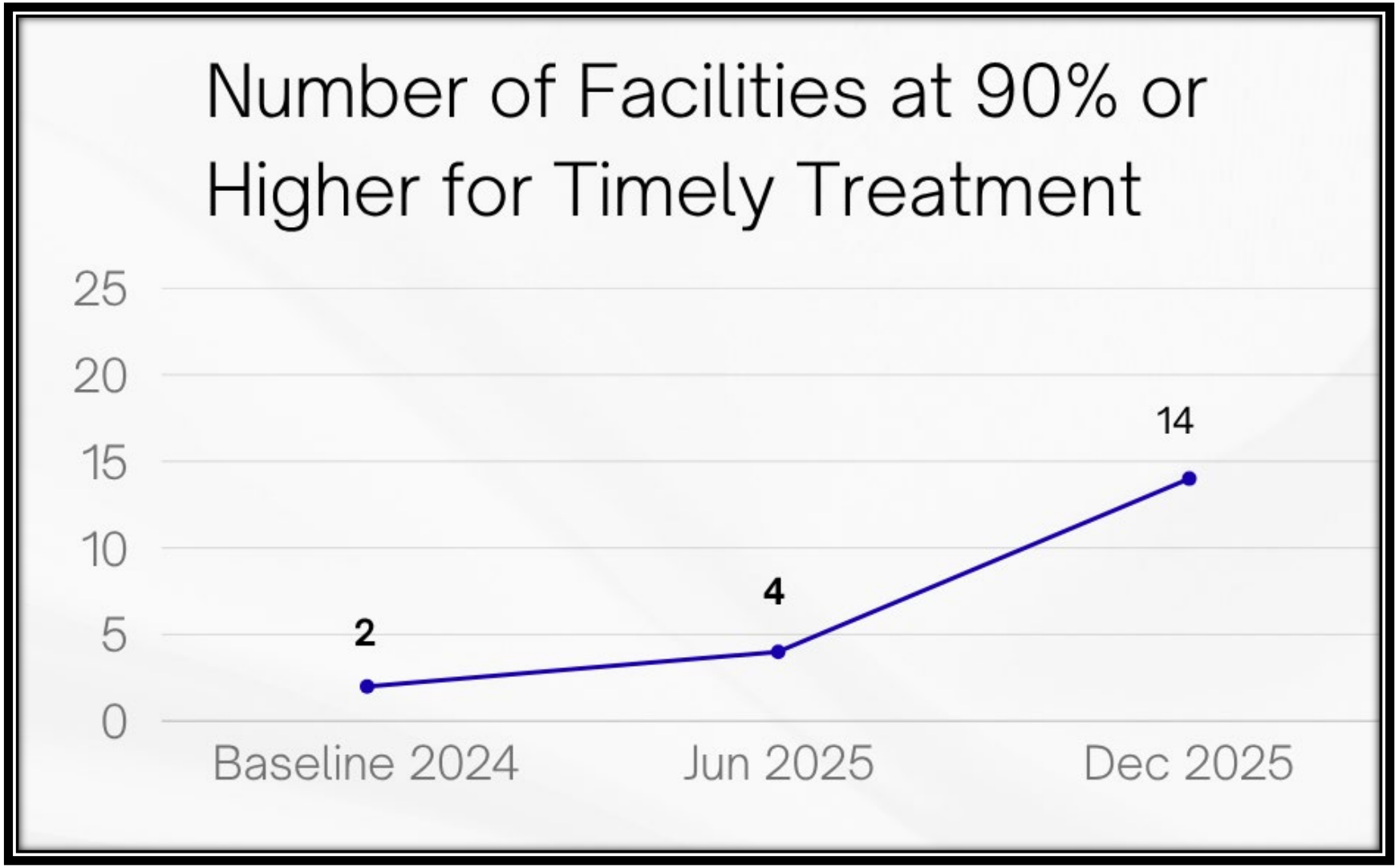

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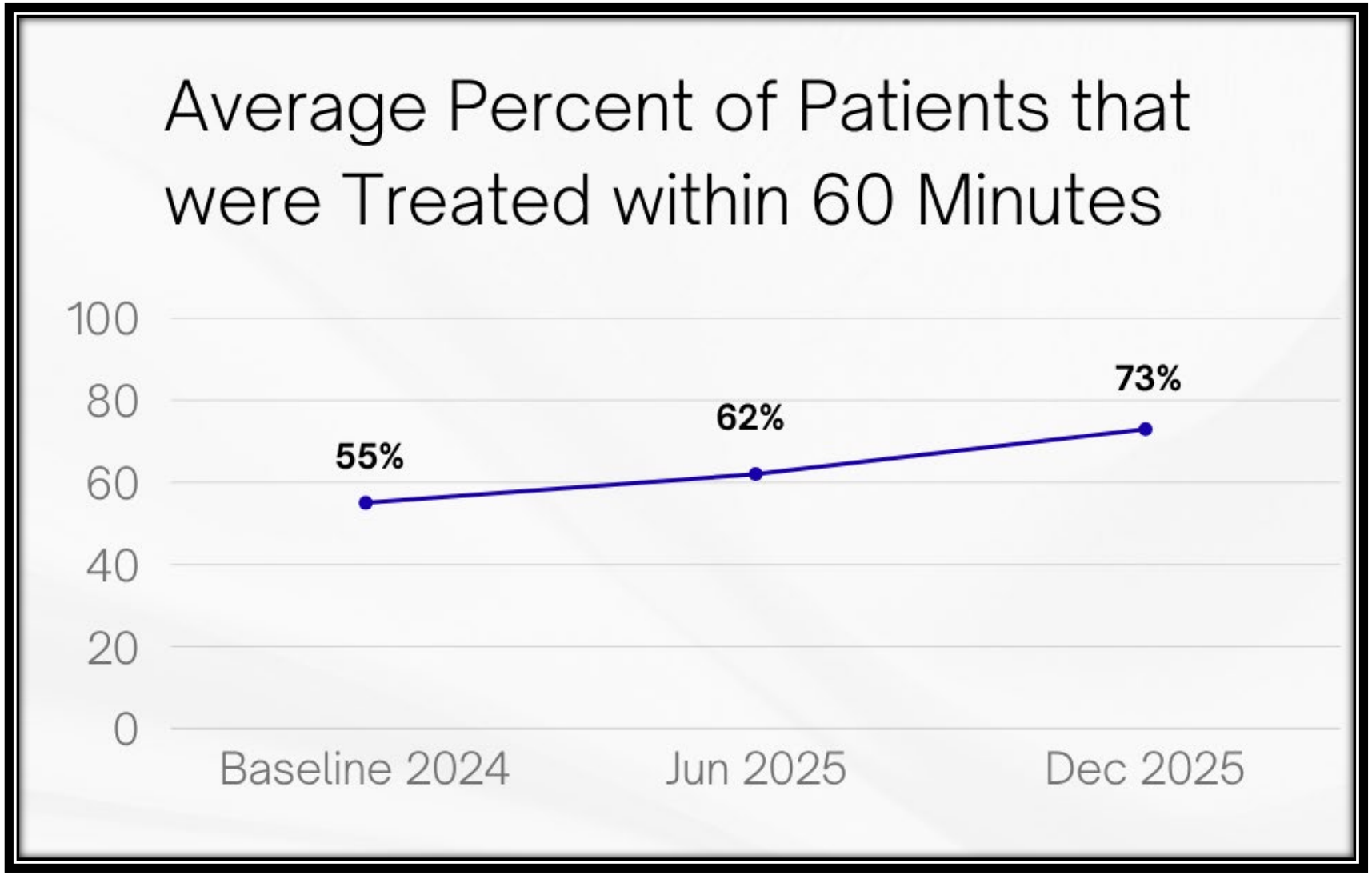

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Hot Topics: Pediatric and Maternal Vaccines, Panel Discussion

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Newborn Care and postpartum interventions

Brandan Kennedy, MD, Pediatric Hospitalist and Clinical Informaticist
Associate Director of Inpatient Health Informatics
Pediatric Hospital Medicine/ Health Informatics and Technology
Physician, Human Factors Collaborative
Children's Mercy Kansas City
Clinical Professor of Pediatrics, UMKC School of Medicine
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Kourtney Bettinger, MD, MPH, FAAP
Associate Professor, University of Kansas School of Medicine
Medical Director, Kansas Medicaid
Medical Director, Kansas Newborn Screening Program
Associate Director of Global Health, Children's Mercy GME
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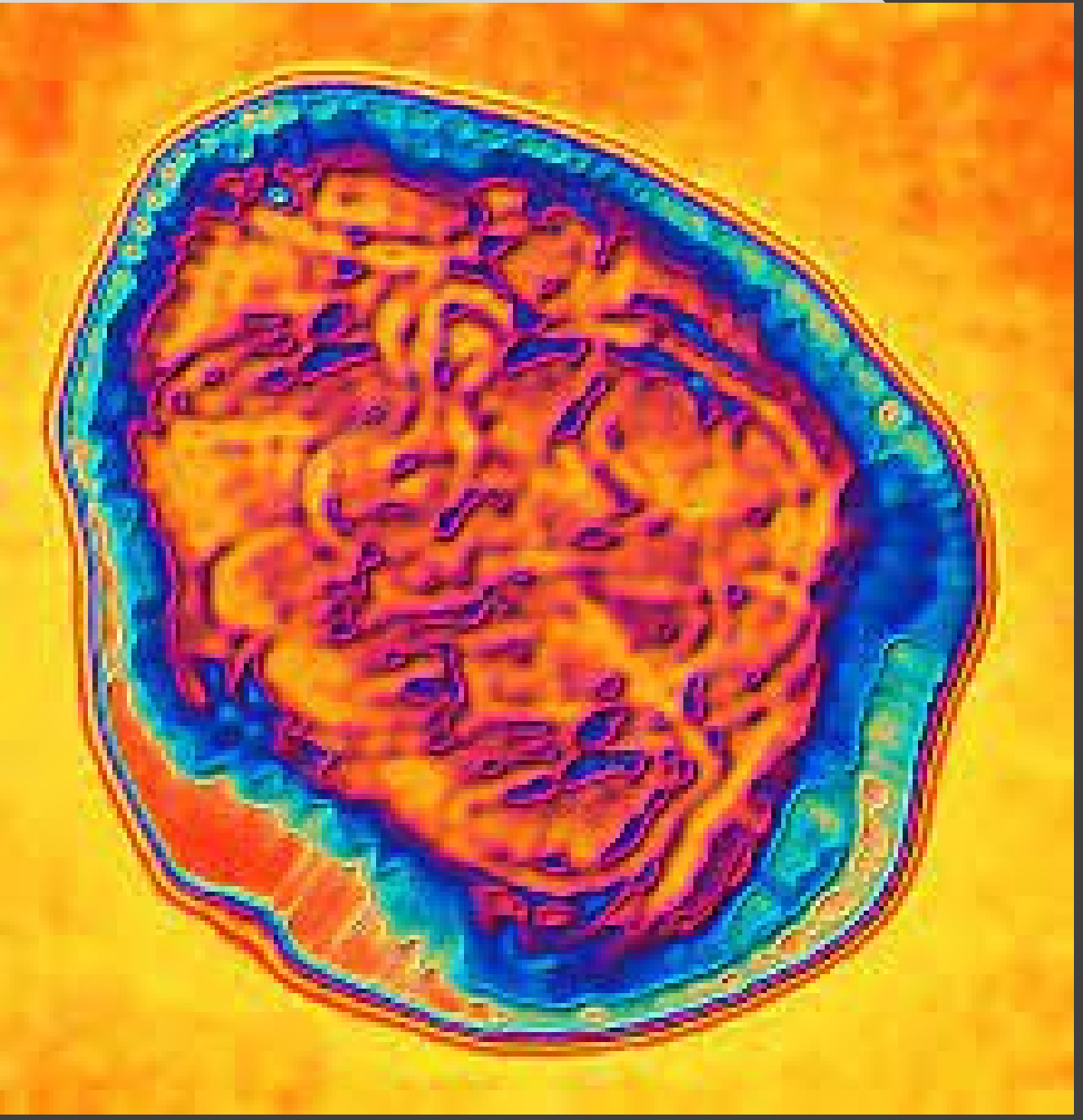


Objectives

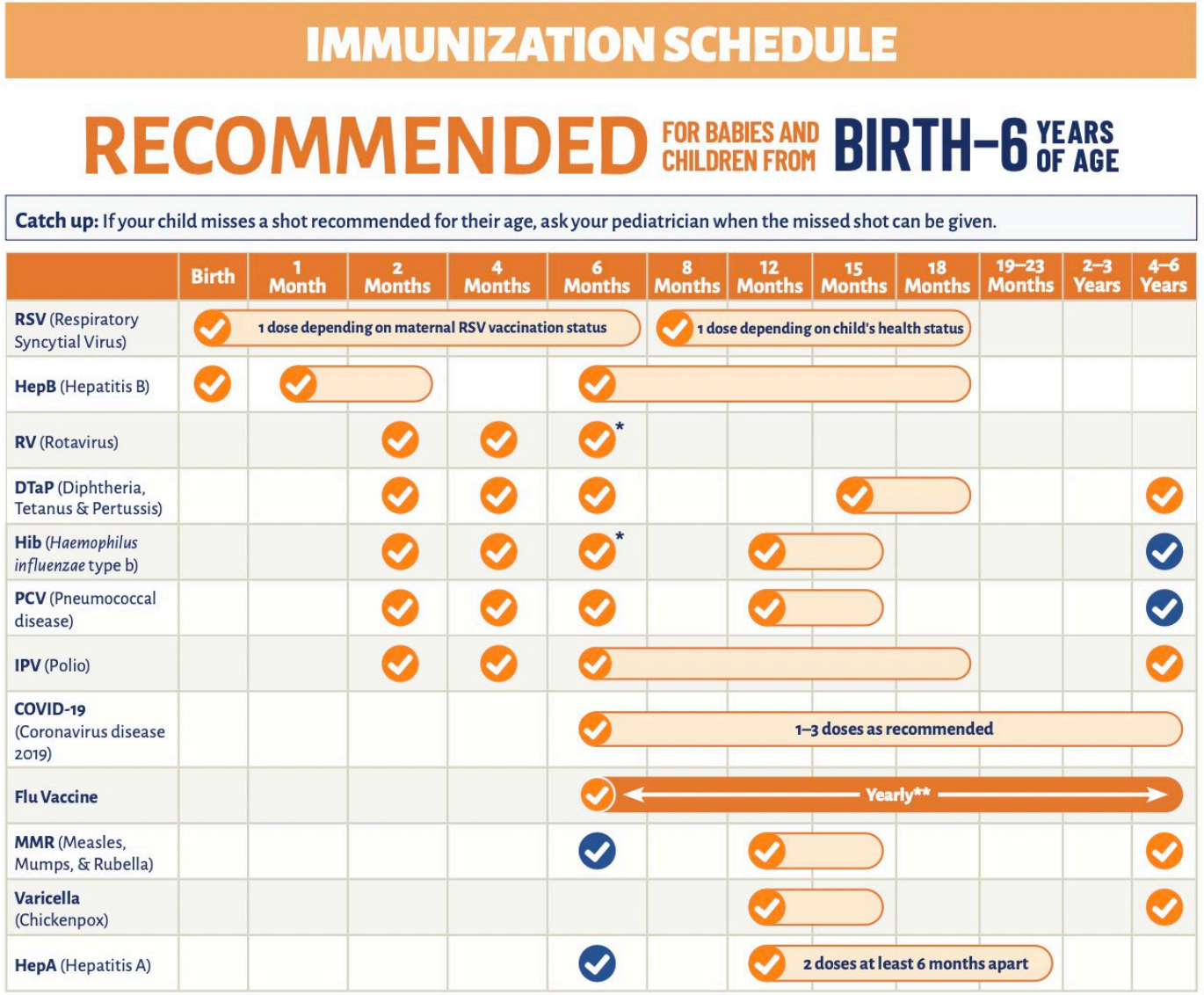
- Review the CDC changes to vaccine recommendations affecting newborns
- Understand the American Academy of Pediatrics recommendations for continued full vaccination of all children
- Understand the impact of vaccine hesitancy on newborn vaccination as well as other newborn interventions undertaken at birth
- Discuss CDC changes to vaccine recommendations affecting newborns

CDC changes to vaccine schedule

Vaccine	Previous Recommendation	Current HHS Recommendation
Hepatitis B	First dose at birth; subsequent doses at 1-2 months old and at 6 months	Newborn vaccination for high-risk groups; shared clinical decision-making (SCDM) for others
Hepatitis A	Recommended	SCDM
Rotavirus	Recommended	SCDM
Meningococcal ACWY (types)	Recommended	SCDM
Meningococcal B	SCDM	SCDM
Influenza	Recommended	SCDM
COVID-19	Recommended	SCDM
Human papillo-mavirus (HPV)	Recommended (2 or 3 doses)	Recommended (1 dose)
Diphtheria, tetanus, pertussis (DTaP; Tdap)	Recommended	Recommended
Haemophilus influen-zae type B (Hib)	Recommended	Recommended
Pneumococcal conju-gate (PCV)	Recommended	Recommended
Inactivated polio	Recommended	Recommended
Measles, mumps, rubella (MMR)	Recommended	Recommended
Varicella (VAR)	Recommended	Recommended
Respiratory syncytial virus (RSV)	Certain high-risk groups	Certain high-risk groups
Dengue	Certain high-risk groups	Certain high-risk groups

Howard, B., By, Howard, B., Writer, S., & 3, M. (2026, March 3). *What you need to know about the updated childhood vaccination schedule*. AAMC. https://www.aamc.org/news/what-you-need-know-about-updated-childhood-vaccination-schedule

American Academy of Pediatrics vaccine schedule



IMMUNIZATION SCHEDULE

RECOMMENDED FOR BABIES AND CHILDREN FROM BIRTH–6 YEARS OF AGE

Catch up: If your child misses a shot recommended for their age, ask your pediatrician when the missed shot can be given.

	Birth	1 Month	2 Months	4 Months	6 Months	8 Months	12 Months	15 Months	18 Months	19–23 Months	2–3 Years	4–6 Years
RSV (Respiratory Syncytial Virus)	✓	1 dose depending on maternal RSV vaccination status				✓	1 dose depending on child's health status					
HepB (Hepatitis B)	✓	✓			✓							
RV (Rotavirus)			✓	✓	✓*							
DTaP (Diphtheria, Tetanus & Pertussis)			✓	✓	✓			✓				✓
Hib (*Haemophilus influenzae* type b)			✓	✓	✓*		✓					✓
PCV (Pneumococcal disease)			✓	✓	✓		✓					✓
IPV (Polio)			✓	✓	✓							✓
COVID-19 (Coronavirus disease 2019)					✓	1–3 doses as recommended						
Flu Vaccine					✓	Yearly**						
MMR (Measles, Mumps, & Rubella)					✓		✓					✓
Varicella (Chickenpox)							✓					✓
HepA (Hepatitis A)					✓		✓	2 doses at least 6 months apart				

*A third dose of rotavirus or *Haemophilus influenzae* type b vaccine at age 6 months depends on the brand used for the previous dose.

**Two doses given at least 4 weeks apart are recommended for children age 6 months through 8 years who are getting the flu vaccine for the first time and for some other children in this age group.

These shaded boxes indicate when the vaccine is recommended for all children unless they cannot safely receive it. Your doctor will tell you if your child cannot safely receive the vaccine.

These shaded boxes indicate that the vaccine is recommended for children whose health condition or situation (eg, travel, outbreak) puts them at high risk for serious diseases. If doses are given earlier than the recommended age because of special circumstances, they may have to be repeated.

See vaccine-specific recommendations at www.cdc.gov/vaccines/hcp/acip-recs/index.html.

Why not delay vaccines or use an alternate schedule?

- Not endorsed by AAP
- AAP's schedule gets babies and children the protection they need as soon as it is safe
- AAP's schedule is longstanding and well child check timing has been created around vaccine timing

- Many of the vaccine preventable diseases are most dangerous for children very early in life making on schedule vaccines vital to keep them safe.
- Preterm infants less than 37 weeks generally should begin vaccinations based on chronological age following the standard schedule

Delays in childhood vaccination begin at birth

Babies who miss the birth dose of hepatitis B vaccine are at risk for missing other vaccines by 18 months...

Created by Agniraj Chatterji from Noun Project

...and by 2 years of age

Created by Delwar Hossain from Noun Project

Conversations about childhood vaccination should start well before a woman becomes pregnant

Created by Vectors Market from Noun Project

Vaccine completion rates for infants who *did* and **did not** receive the birth dose

At 18 months:

44% vs. **23%**

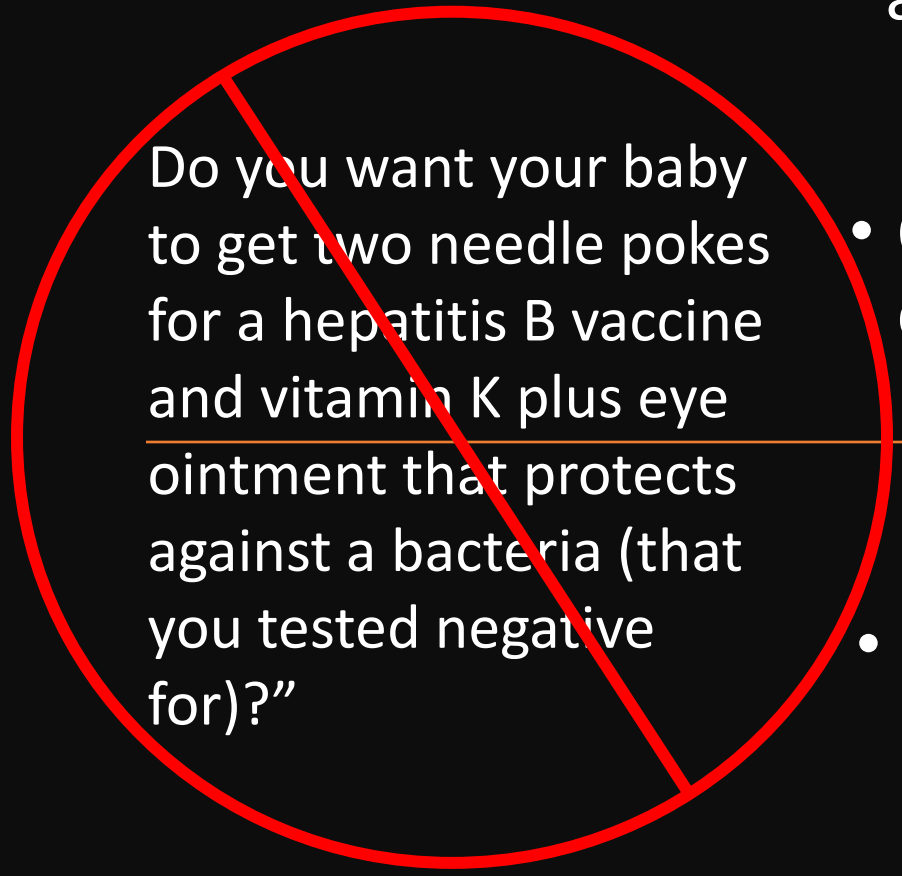
At 2 years:

65% vs. **45%**

Nilson P et al. Missed Hepatitis B Birth Dose Vaccine Is a Risk Factor for Incomplete Vaccination at 18 and 24 Months J Infection, under review. May L-018.

Importance of Framing Routine Newborn Care

- Listen to parents' concerns and discuss them
- Offer to answer any questions parents have
- Emphasize that we are all on the same team in keeping their baby safe and healthy!



Routine Immediate Newborn care

- Hepatitis B vaccine
- Vitamin K
- Topical Erythromycin eye ointment

Hepatitis B
A Little History: The Impact of Newborn Hepatitis B vaccine on long term incidence of Hepatitis B

1912

nationally notifiable disease in US

- 3-4 million infections annually
- 48,000 hospitalized; 1,000 encephalitis; 400-500 deaths
- 100% infected by 15 years
- 90% household attack rate

1954

measles is isolated from blood of 13 y/o child

1963

vaccine introduced

1968

improved weaker vaccine distributed; still in use today

1978

goal set to eliminate by 1982

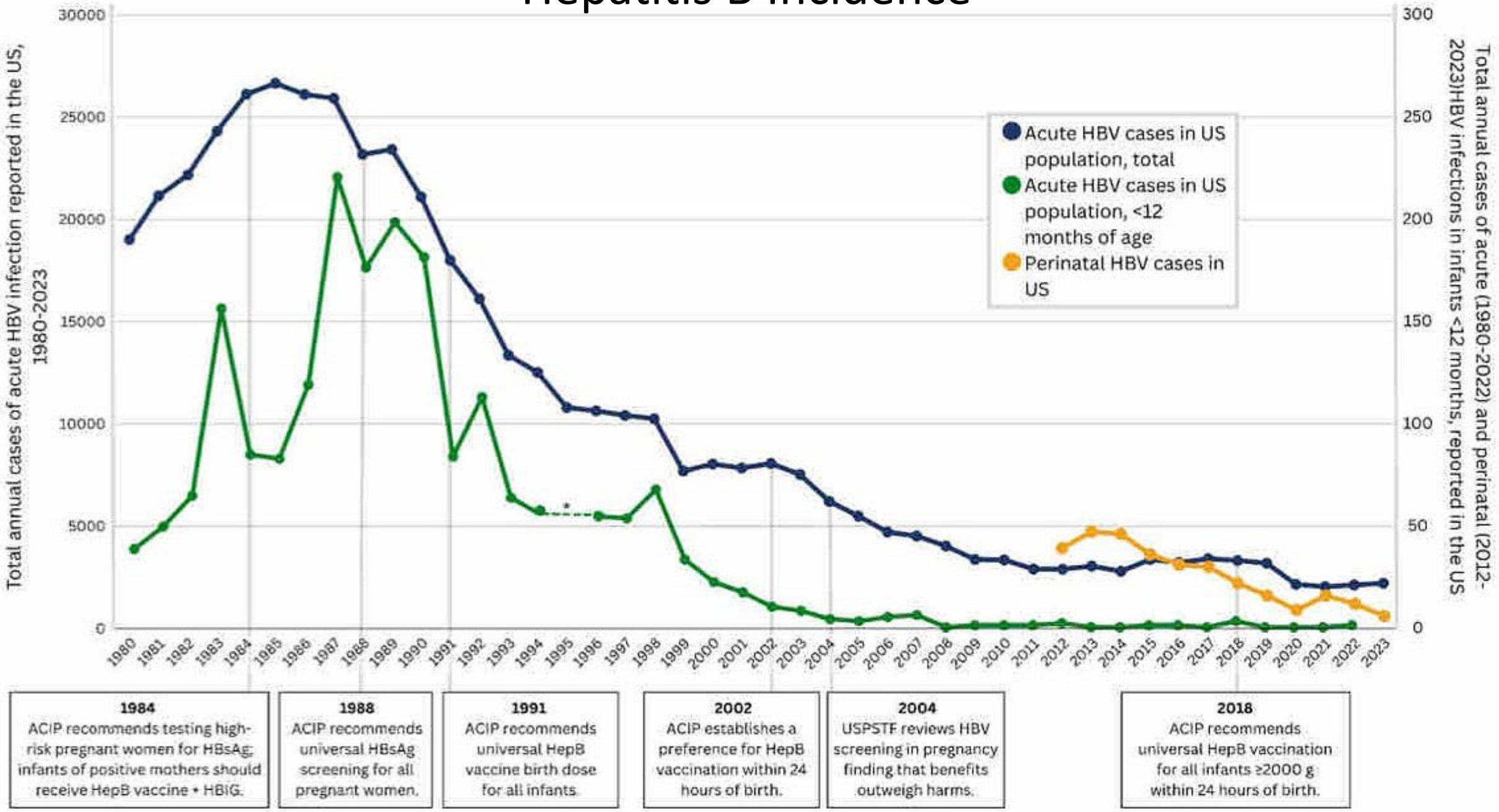
1989

outbreaks among vaccinated children leads to 2nd dose

2000

eliminated in US

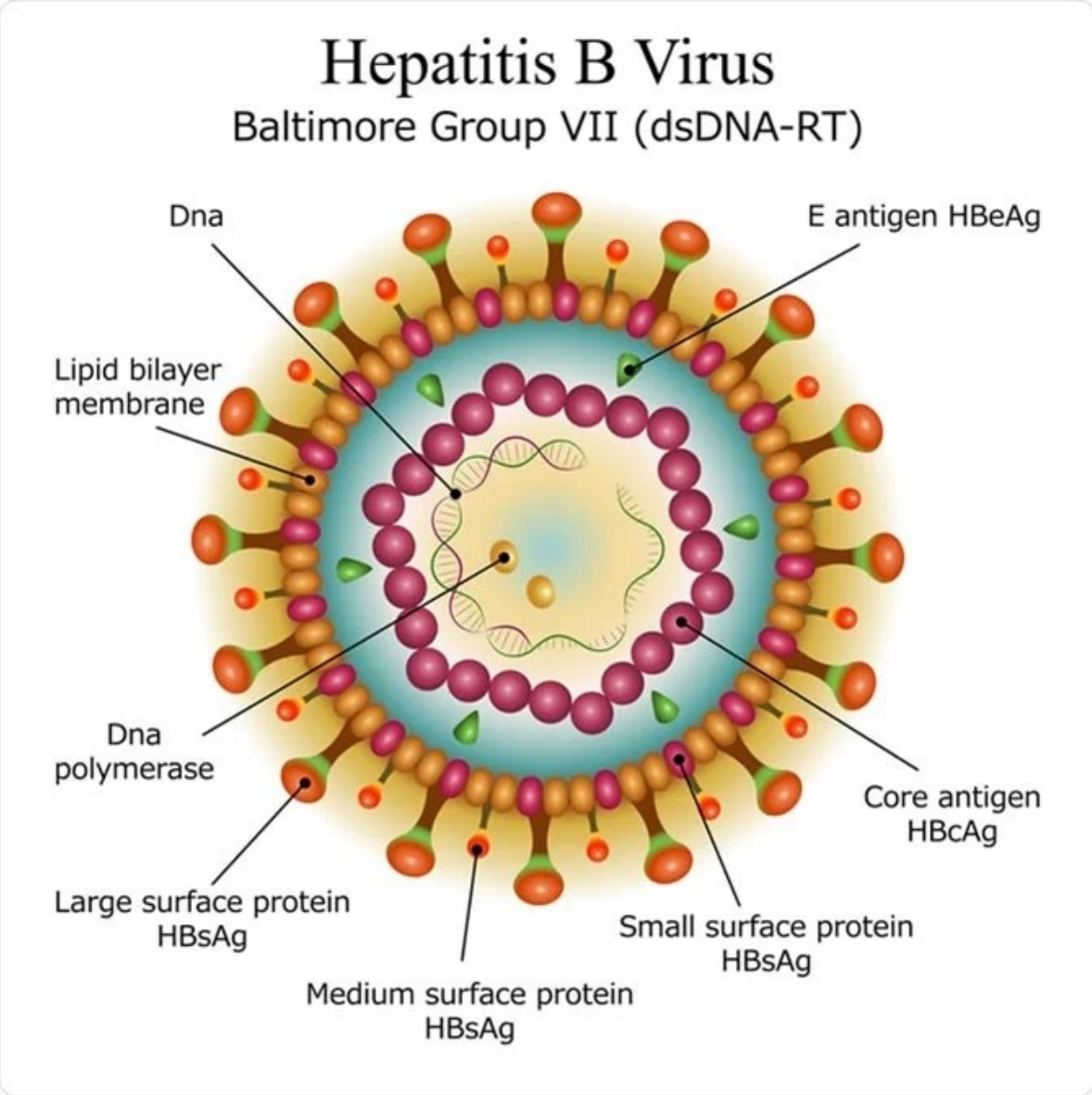
Hepatitis B Incidence



Walensky, Rochelle P. "Universal Hepatitis B Vaccination at Birth—Risks of Revising the Recommendation." *JAMA*, 3 Dec. 2025

Hepatitis B

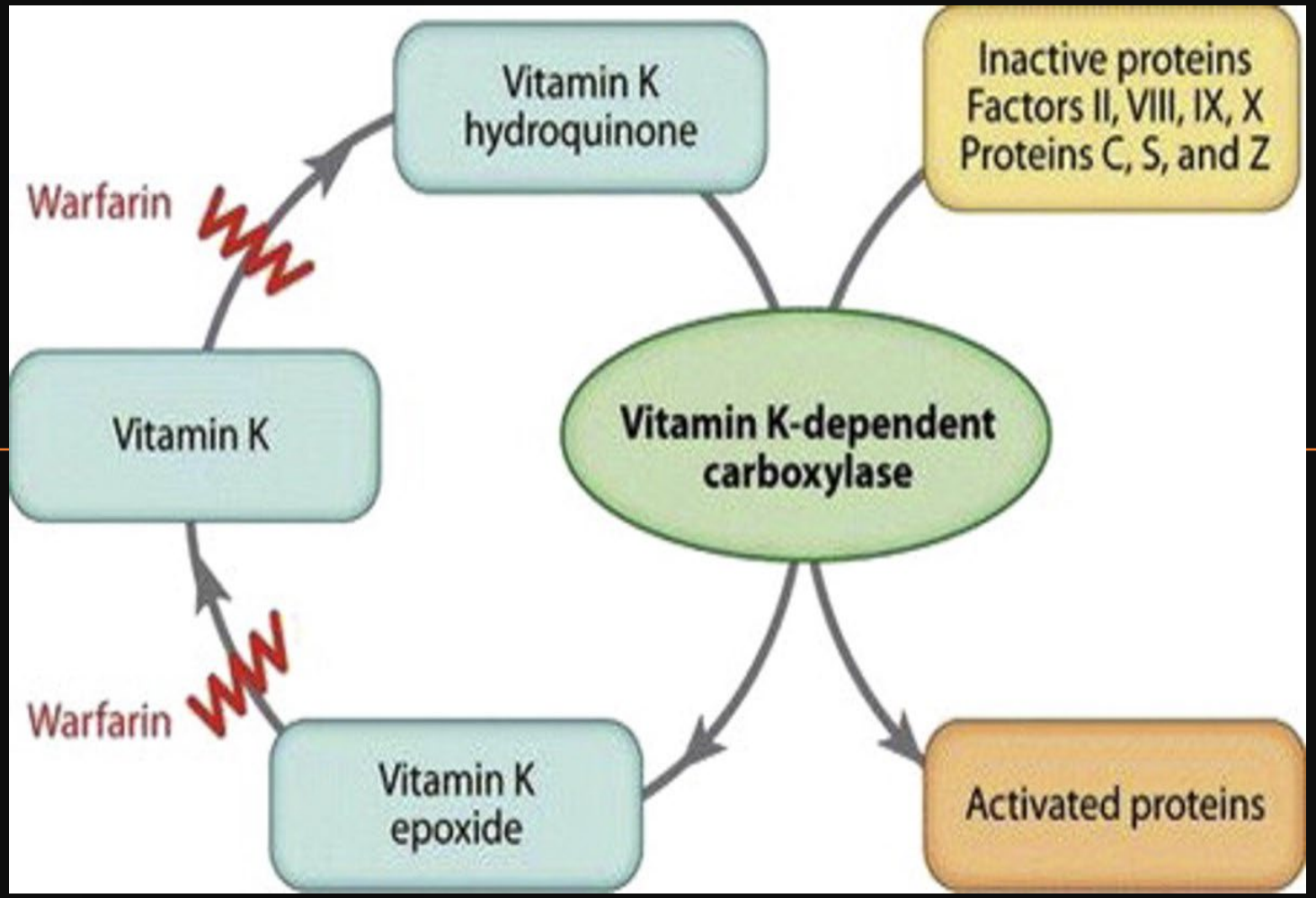
- 90% of infants born to Hepatitis B (HBV) surface antigen-positive mothers will develop chronic infection
- Roughly 25% of these infected infants will eventually die from chronic liver disease, such as cirrhosis or liver cancer, making immediate post-exposure prophylaxis crucial.
- If the mother is positive for both surface antigen (HBsAg) and e-antigen (HBeAg), the risk of transmission to the baby during delivery is 70% to 90%.
- Universal screening for HBV infection in women during pregnancy is standard clinical practice
- As of 2019, 26 states have laws mandating prenatal HBV screening.
- Although rates of maternal screening for HBV infection range from 84% to 88%, screening rates during the first trimester are lower, with 60% of commercially insured and 39% of Medicaid-enrolled women screened during the first trimester.
- 73.2% percent of infants receive HBV vaccination within 3 days of birth down from 83.5% in February of 2023



Vitamin K

- AAP recommends vitamin K 1 mg IM injection x1 for all newborns >1500 gm within first 6 hours of life
- Newborns do not have adequate gut flora to produce their own vitamin K

- IM injection is more effective than PO vitamin K for baby and more effective than giving mother extra vitamin K
- Prevents vitamin K deficiency bleeding, including intracranial hemorrhage



Vitamin K Deficiency Bleeding

Early VKDB

- presents within 24 hours of birth
- infants of mothers taking drugs which inhibit vitamin K: anticonvulsants (carbamazepine, phenytoin and barbiturates), antituberculosis drugs (isoniazid, rifampicin), some antibiotics (cephalosporins) and vitamin K antagonists (coumarin, warfarin).
- The clinical presentation is often severe with cephalic hematoma and intracranial and intra-abdominal hemorrhages.

Classical VKDB

- 24 hours and 7 days of life
- Associated with delayed or insufficient feeding.
- Often mild, with bruises, gastrointestinal blood loss or bleeding from the umbilicus and puncture sites.

Late VKDB

- Associated with exclusive breast-feeding.
- ages of 2 and 12 weeks.
- Clinical presentation is severe, with a mortality rate of 20% and intracranial hemorrhage occurring in 50%.
- In fully breast-fed infants without vitamin K at birth, incidence is between 1/15,000 and 1/20,000.
- Babies with cholestasis or malabsorption syndromes are at greater risk.

Erythromycin ocular prophylaxis for Ophthalmia neonatorum

- Defined as conjunctivitis in the first 28 days of life
- Rate of ophthalmia neonatorum in US 0.4 cases per 100,000 live births per year. Limited resource areas show rates from <1% to 10% (lack of maternal STI screening and treatment and low incidence of eye prophylaxis

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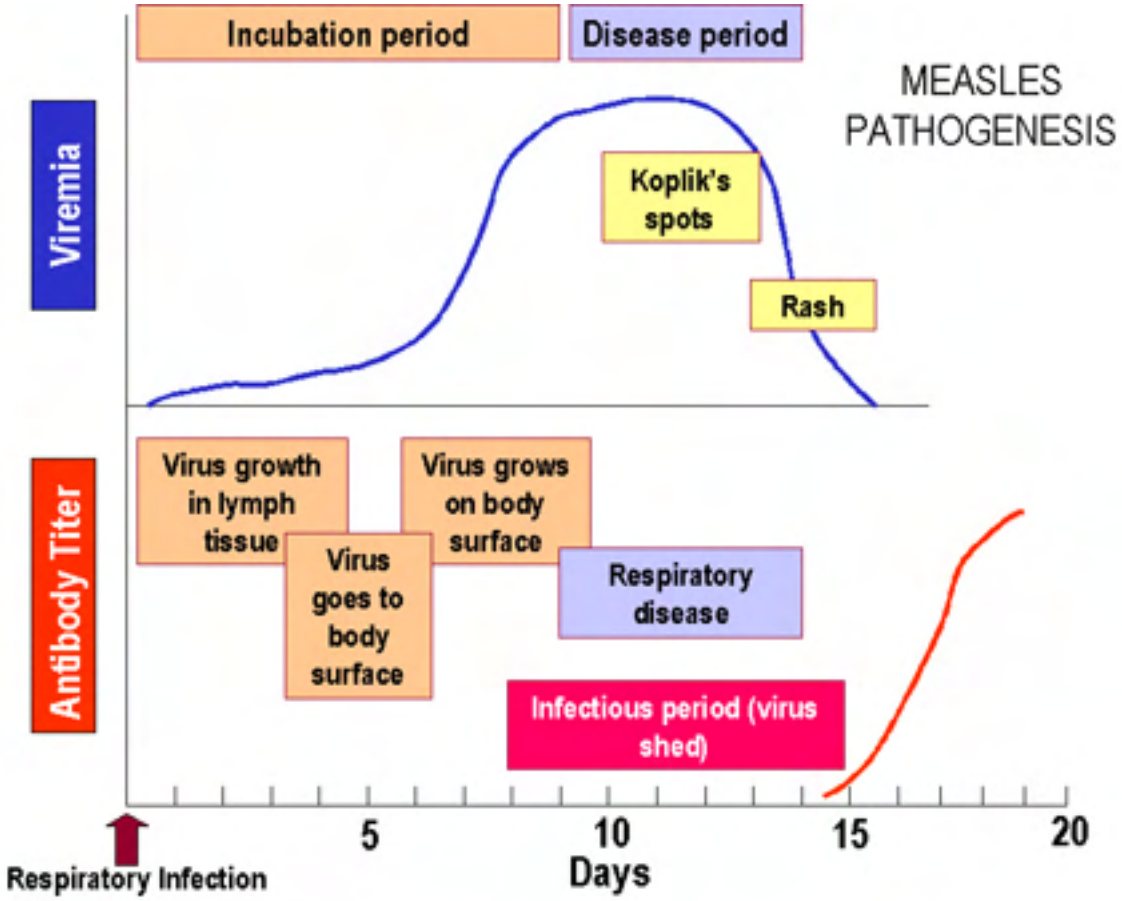
- Microorganisms: Neisseria Gonorrhoeae, Chlamydia Trachomatis, Staph aureus, Streptococcal species, Hemophilus, gram negatives and viruses.
- Gonococcal conjunctivitis is the most concerning and aggressive with copious purulent discharge, eyelid edema, and rapid progression to corneal involvement if untreated.

RSV Vaccination

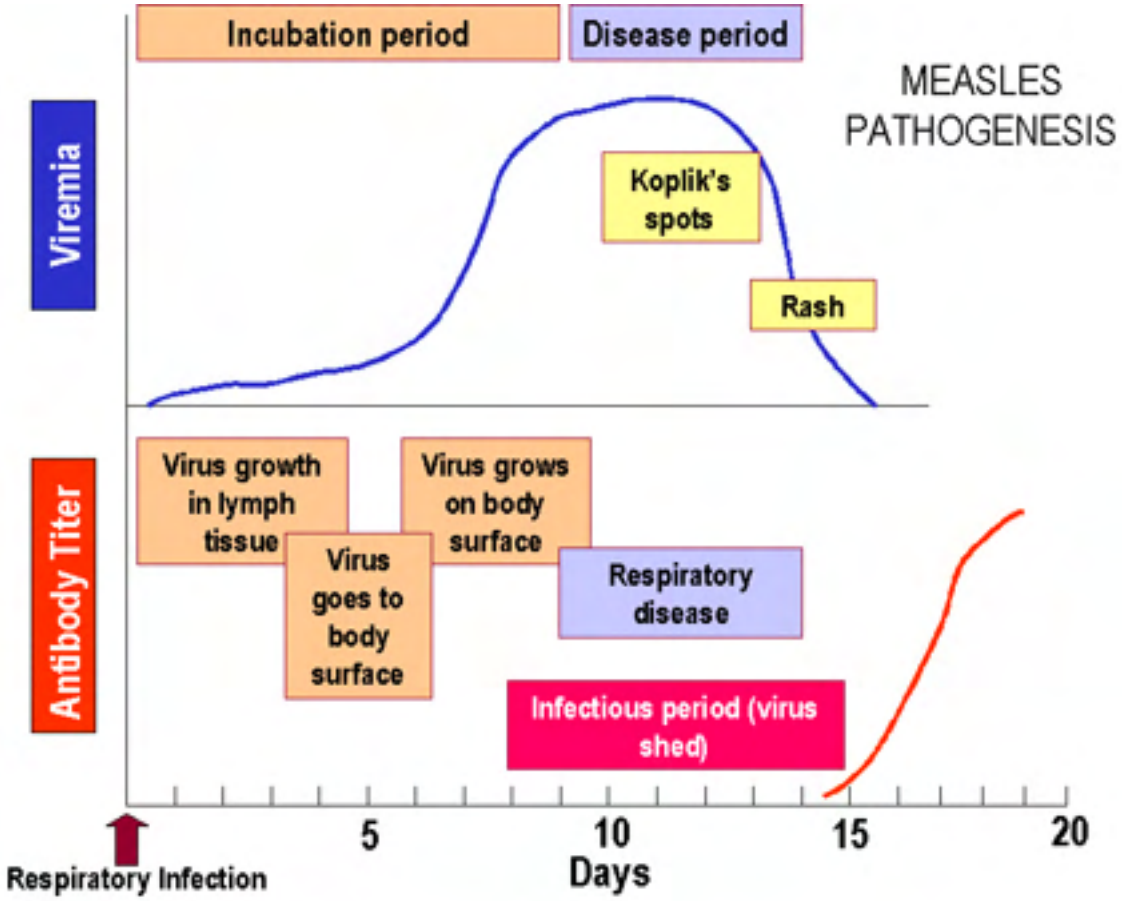
- Indicated seasonally if mother did not receive the RSV vaccine (Abrysvo) at least two weeks prior to delivery
  - This includes babies who are <8 months during respiratory season (typically 10/1-3/31 although extended in KS this year through 4/30)
  - High risk babies are also eligible during second respiratory season
- Has replaced Synagis (palivizumab)

Measles Review: Stages of Infection



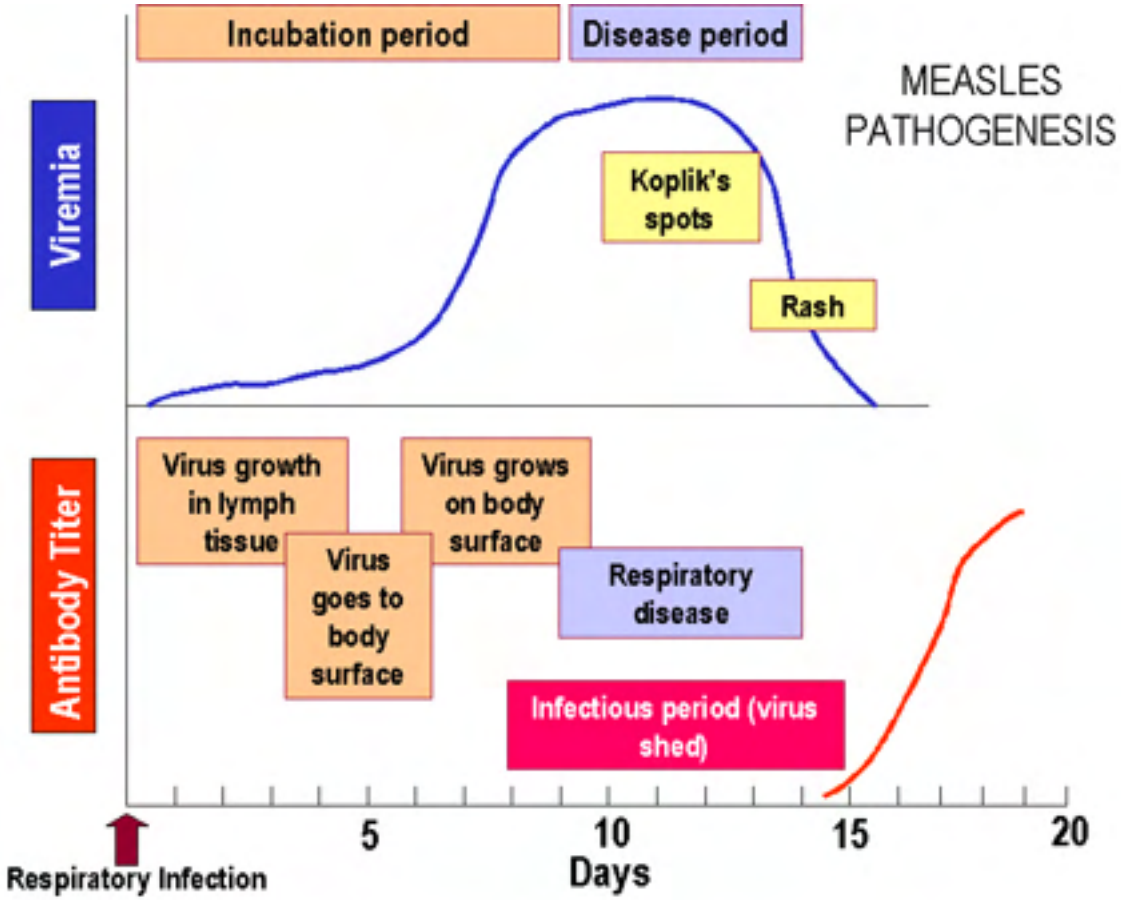
- Incubation
- Prodrome
- Exanthem
- Recovery

Measles: Stages of Infection: Incubation



- The incubation period for measles is 6 to 21 days
- Begins after virus entry via the respiratory mucosa or conjunctivae.
- Contagiousness starts about five days before the appearance of rash to four days afterward.
- Many are asymptomatic during the incubation period

Measles: Stages of Infection: Prodrome

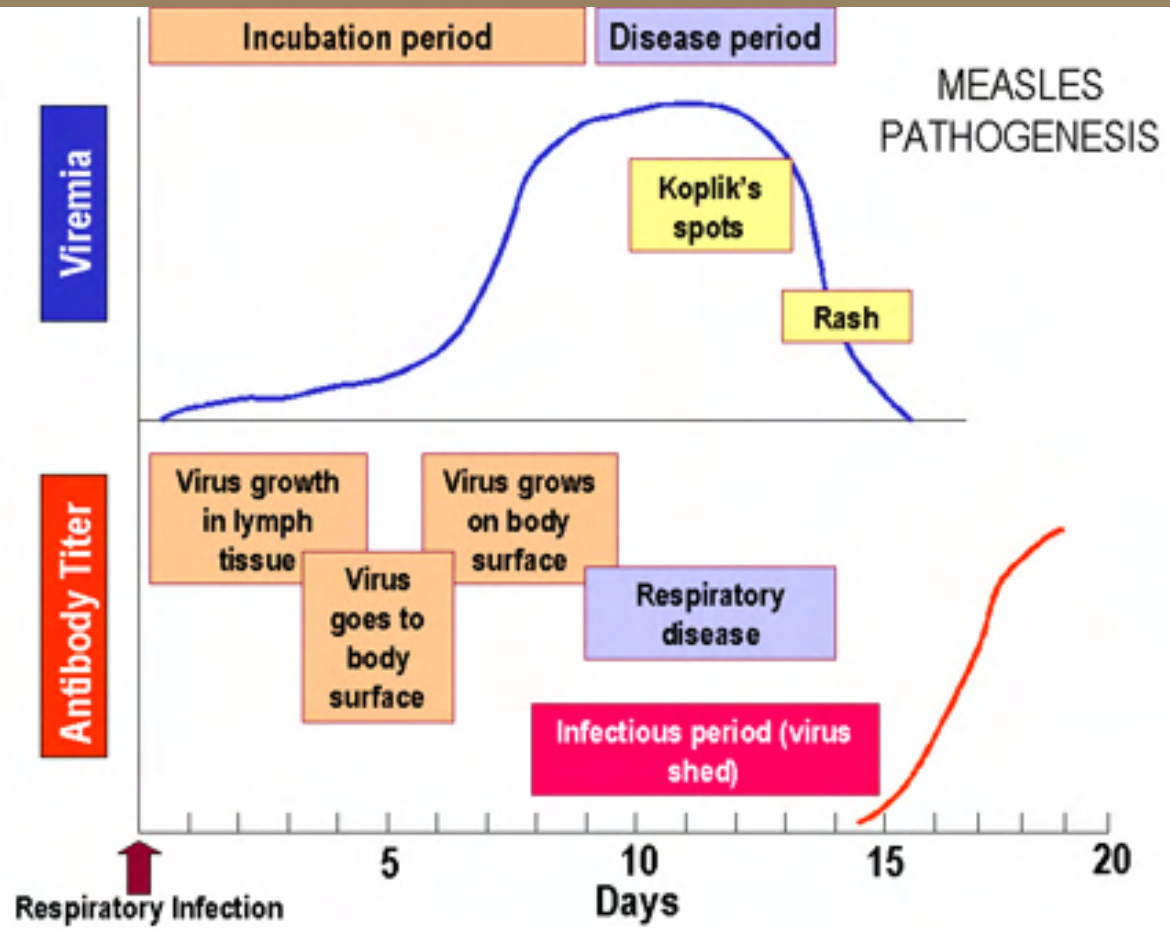


- Lasts for two to four days , but may last up to 8 days
- New symptoms include fever, malaise, and anorexia, followed by conjunctivitis, coryza (rhinitis), and cough.
- Contagiousness starts about five days before the appearance of rash to four days afterward.

Measles: Stages of Infection: Enanthem and Exanthem

- Enanthem begins around 48 hours prior to onset of the exanthem with Koplik spots seen on oral mucosa
- Exanthem or the skin rash starts two to four days after onset of fever.
- Rash begins on the face and spreads descending to involve the neck, upper trunk, lower trunk, and extremities, palms and soles not typically involved.
- Extent of the rash and degree of confluence generally correlate with the severity of the illness.

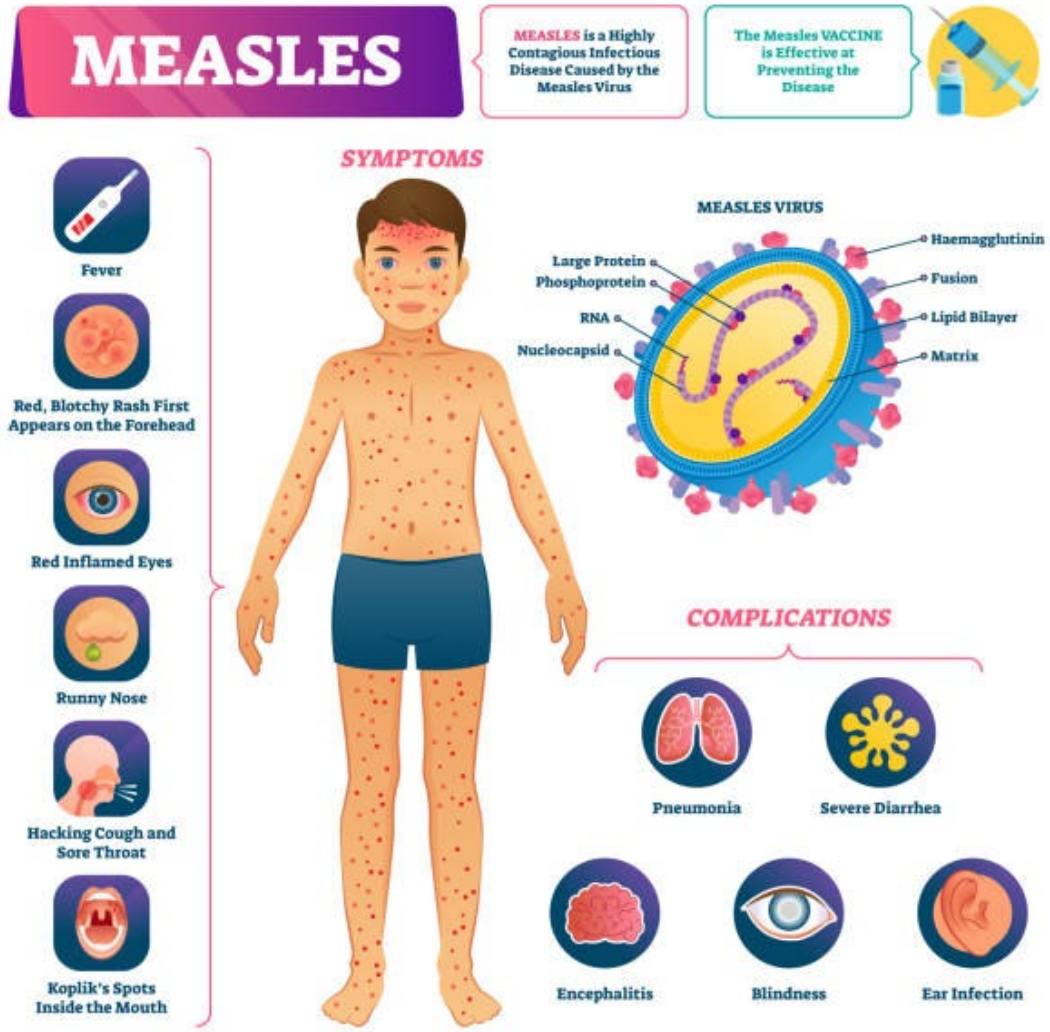
Measles: Recovery



- Clinical improvement typically ensues within 48 hours of the appearance of the rash.
- Rash typically lasts 6-7 days and fades in the order it appeared
- Cough may persist for 1-2 weeks after measles infection.
- Occurrence of fever beyond the 3rd or 4th day of rash suggests a measles associated complication

Measles Complications

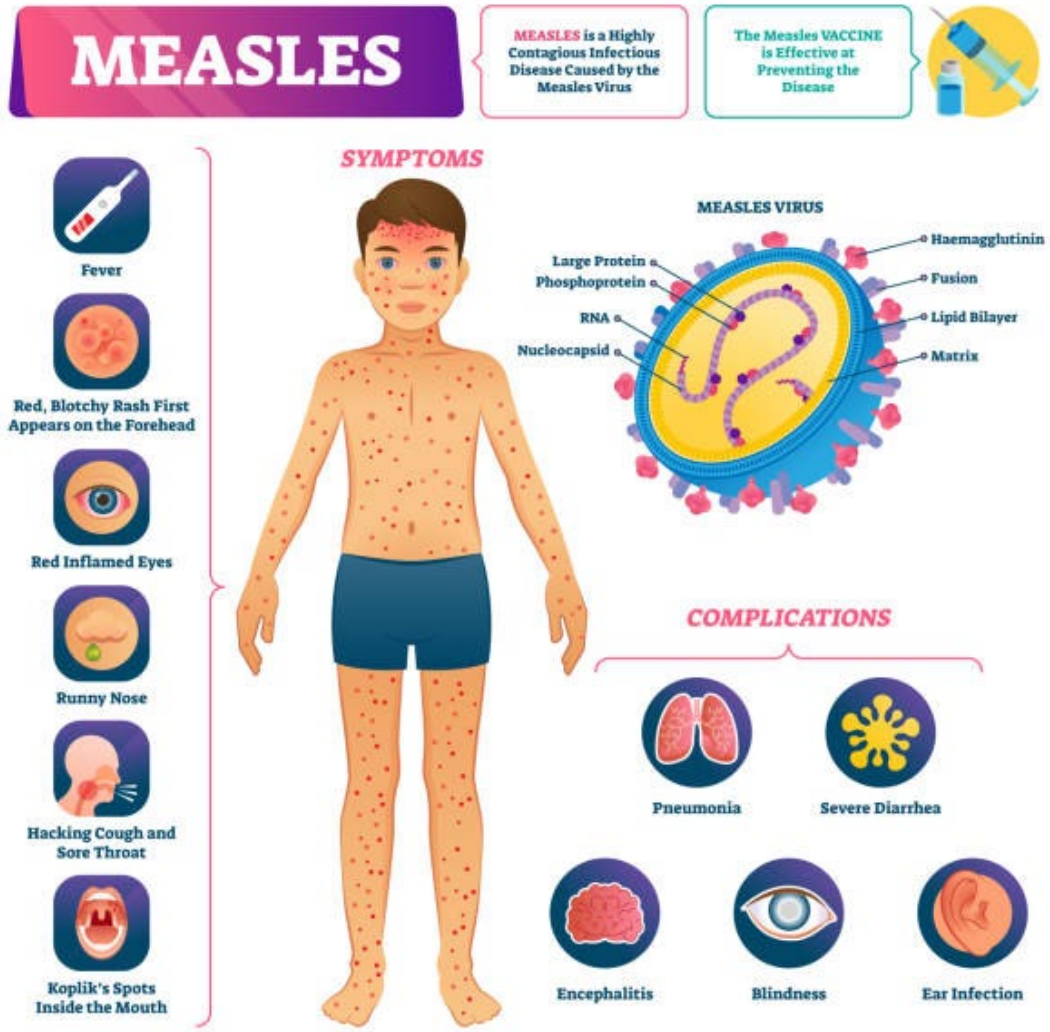
- One or more complications occurs in around 30% of cases.
- Immune suppression and secondary infection. Measles associated immune defects may cause increased risk of death for up to 3 years following infection
- Ocular: keratitis and corneal ulceration can lead to blindness
- Gastrointestinal: Diarrhea is the most common complication 8 % of cases
- Pulmonary: Pneumonia is most common cause of measles associated death in children and occurs in 6% of cases. Most frequent in ages less than 5 years or greater than 20 years
- Neurologic: Encephalitis occurs in 1 per 1000 cases. Of those 25% of children will have long term sequalae. Rapidly progressive fatal disease occurs in 15% of cases



Subacute Sclerosing Panencephalitis (SSPE)

A Rare but Fatal Complication of Measles

- **Cause**:
  - Persistent, mutated measles virus in the brain.
- **Onset**:
  - Occurs **7–10 years after measles infection**, often in children infected before age 2.
- **Symptoms**:
  - Behavioral changes
  - Seizures
  - Cognitive decline
  - Progressive neurological deterioration leading to coma and death
- **Prognosis**:
  - **Almost always fatal** within 1–3 years of symptom onset.
- **Prevention**:
  - **Measles vaccination is the only effective prevention**.



Vaccination

- **High Efficacy**:
  One dose of the **MMR vaccine** is about **93% effective** at preventing measles.
  Two doses effectiveness rises to about **97%**.
- **Long-lasting Protection**:
  Two doses generally provide **lifelong immunity**.

- **Herd Immunity**:
  Required 95% vaccination coverage to prevent outbreaks due to measles' high contagion
- **Impact**:
  Measles vaccination has led to a **73% drop in global measles deaths** between 2000 and 2018. Prevents **millions of cases and deaths** each year.


Questions?
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References

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MATERNAL VACCINATION DURING PREGNANCY

PROTECTING MOTHER AND BABY THROUGH IMMUNIZATION

FOUNDATIONS OF MATERNAL VACCINATION

HOW MATERNAL IMMUNITY PROTECTS THE FETUS AND NEWBORN

•Passive Immunity Transfer

- Maternal IgG antibodies cross the placenta during pregnancy to provide passive immunity to the fetus, especially in the third trimester.

•Protection During Early Life

- Maternal antibodies protect newborns during their first weeks and months when they cannot yet produce strong immune responses.

•Vaccination Timing Importance

- Vaccines given during recommended gestational windows maximize antibody levels for optimal fetal protection.

•Continued Infant Immunization

- Maternal antibodies wane over time, so routine childhood vaccines are essential for lasting protection.

WHY PREGNANT INDIVIDUALS ARE AT HIGHER RISK FROM INFECTIONS

•Physiological Changes in Pregnancy

- Pregnancy causes immune adaptations and cardiovascular, respiratory changes increasing infection vulnerability.

•Increased Risk of Severe Infection

- Pregnant individuals face **higher risks of severe illness** from infections like influenza and COVID-19.

•Impact on Fetal Health

- Infections can cause preterm birth, low birth weight, and developmental disruptions in the fetus.

•Importance of Vaccination

- Vaccination reduces infection risks and protects both maternal health and pregnancy outcomes.

RECOMMENDED AND CONTRAINDICATED VACCINES

INFLUENZA VACCINATION

•Vaccination Safety During Any Trimester

- Inactivated influenza vaccines are safe throughout pregnancy with no increased risk of miscarriage or birth defects.

•Dual Protection Benefits

- Vaccination protects pregnant individuals and provides passive immunity to infants, reducing infant hospitalization rates.

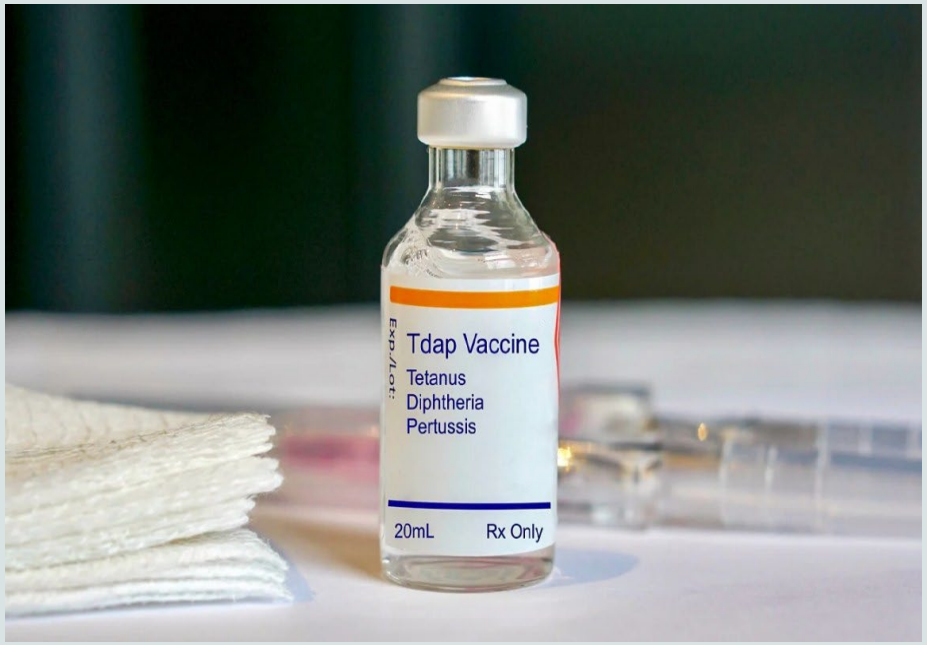
•Timing and Public Health Impact

- Vaccination timing is flexible and helps reduce influenza transmission in communities and households.

COVID-19 VACCINATION

- Pregnancy increases the risk of developing severe illness compared to nonpregnant patients
- Can be given in ANY trimester
  - Emphasis should be on vaccine receipt at the earliest opportunity to maximize maternal and fetal health.
- Safety and Effectiveness
  - Studies confirm mRNA vaccine safety during pregnancy without increasing risks such as preterm birth or hypertension.
- Benefits Neonate in Addition to Mother
  - Has been shown to benefit newborns when administered during pregnancy to reduce hospitalization related to COVID-19, because children are unable to receive these vaccines until 6 months of age.

TETANUS TOXOID, REDUCED DIPHTHERIA TOXOID, AND ACELLULAR PERTUSSIS (TDAP) VACCINATION



•Maternal Tdap Timing

- Tdap vaccination is recommended between 27 and 36 weeks to maximize antibody transfer to the fetus.

•Infant Pertussis Protection

- Maternal Tdap **protects infants from pertussis**, reducing cases and deaths in newborns under two months old.

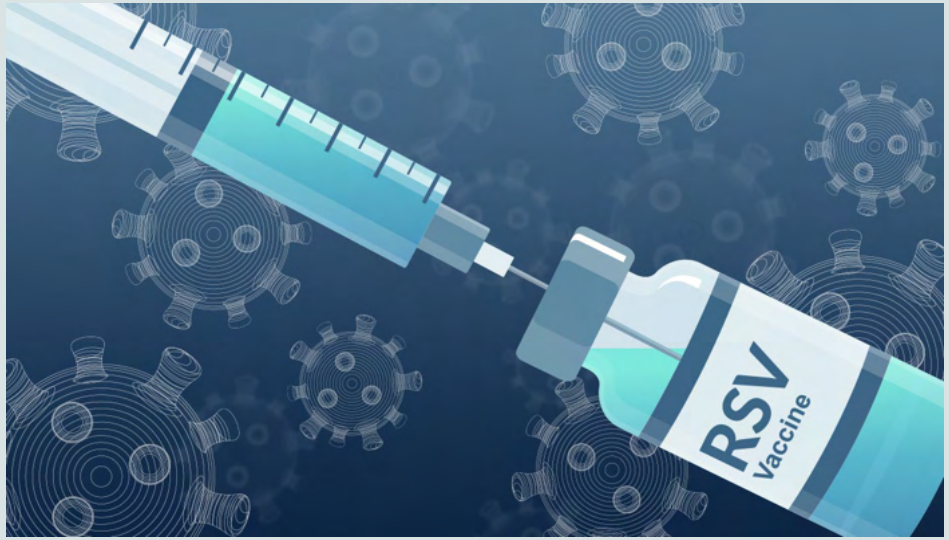
•Safety and Effectiveness

- Studies confirm Tdap safety during pregnancy without increasing risks such as preterm birth or hypertension.

•Cocooning Strategy

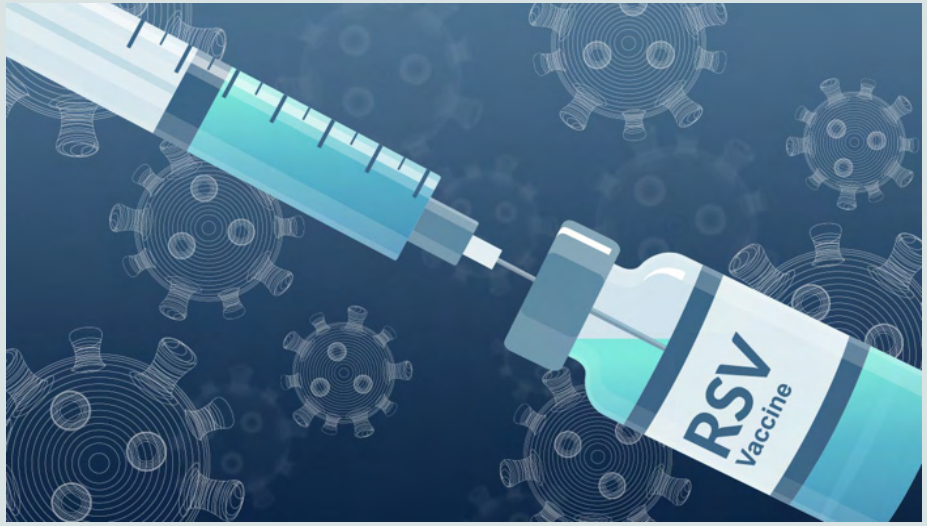
- Vaccinating close contacts further reduces infant exposure but maternal Tdap remains the most effective prevention.

RESPIRATORY SYNCYTIAL VIRUS (RSV) VACCINATION



- Rationale
  - Leading cause of lower respiratory tract illness in children under 5.
  - Before RSV immunization products were widely available in the US, RSV contributed to approximately 58,000 – 80,000 hospitalizations in children under 5 yo, with infants aged 6 months and younger experiencing the most severe morbidity and mortality.
- Recommended 32w0d – 36w6d during RSV season
  - AND at least 2 weeks prior to delivery
  - Should be *not* re-vaccinated if received in a prior pregnancy
- Effectiveness
  - The efficacy of RSV vaccine against medically attended severe RSV-related illness in infants was 82.4% within 90 days of birth, and 70.0% within 180 days of birth.

RESPIRATORY SYNCYTIAL VIRUS (RSV) VACCINATION



- Safety
  - Side effects from maternal vaccination are low
  - Available studies have *not* demonstrated a definitive link between RSV vaccination in pregnancy and preterm birth.
- Patients should be aware of the option for monoclonal antibodies for infant protection against RSV-related illness (nirsevimab and clesrovimaboption).
  - With few exceptions, infants of pregnant patients who received the RSV vaccine should not receive nirsevimab or clesrovimab.
  - Implementation barriers, including cost or product availability, may preclude infant access to the monoclonal antibodies.
  - Patients who opt for nirsevimab or clesrovimab should be advised to confirm availability through their birthing hospital or pediatrician.

Summary of Routinely Recommended Maternal Vaccines

Vaccine	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Tdap	Can be administered at any time											
COVID-19		Administer as soon as available	However, can be administered anytime of the year to eligible individuals									
Influenza		Ideally administer early fall	However, can be administered anytime while the virus is circulating									
RSV		Administer September through January in most of the continental U.S.*										

Tdap Vaccine

Vaccine Product: Any Tdap vaccine product may be administered.

Schedule: Administer a dose of Tdap, preferably during the early part of gestational weeks 27 through 36, during each pregnancy irrespective of the patient's prior Tdap vaccination history.

For more information, see Committee Opinion: Update on Immunization and Pregnancy: Tetanus, Diphtheria, and Pertussis Vaccination.

COVID-19 Vaccine

Vaccine Product: Any COVID-19 vaccine product may be administered.

Schedule: Vaccination may occur in any trimester, and emphasis should be on vaccine receipt as soon as possible to maximize maternal and fetal health.

For more information, see Practice Advisory: COVID-19 Vaccination Considerations for Obstetric–Gynecologic Care.

These vaccines can be safely co-administered.

Influenza Vaccine

Vaccine Product: Only administer inactivated influenza vaccine (IIV) or recombinant influenza vaccine (RIV) products.

Schedule: Administer a dose of IIV or RIV to people who are pregnant during any trimester or will be pregnant during influenza season.

Influenza vaccination should be given before the start of the influenza season, by the end of October, but vaccination at any time during the influenza season is encouraged to ensure protection during the period that virus is circulating in the community.

For more information, see Practice Advisory: Influenza in Pregnancy: Prevention and Treatment.

RSV Vaccine

Vaccine Product: Only administer Pfizer's RSV vaccine (Abrysvo), approved as a one-time dose. Infant monoclonal antibody may be administered to the infant as an alternative to vaccinating during pregnancy and in subsequent pregnancies after a patient has received Abrysvo in a previous pregnancy

Schedule: Administer a dose of Pfizer's RSV vaccine (Abrysvo) only between 32 through 36 weeks of gestation during September through January in most of the continental United States if the patient was not previously vaccinated.

*In jurisdictions with seasonality that differs from most of the continental United States, (eg, Alaska, jurisdictions with tropical climates) health care professionals should follow state, local, or territorial guidance on the timing of administration.

For more information, see Practice Advisory: Maternal Respiratory Syncytial Virus Vaccination.

VACCINES **NOT** RECOMMENDED DURING PREGNANCY

- Live Attenuated Vaccines
  - **MMR and varicella** carry theoretical fetal risks and are avoided during pregnancy.
- Vaccination Timing
  - Vaccination for non-immune pregnant individuals is deferred until postpartum for safety.
- Risk-Based Vaccine Approach
  - Certain vaccines are deferred unless exposure risks justify vaccination during pregnancy.
- Clear Communication Importance
  - Clear guidance reassures patients and builds trust in vaccine safety during pregnancy.

Table 1. Summary of Maternal Immunization Recommendations*

Vaccine	Given During Every Pregnancy	Given to Specific Groups During Pregnancy	Contraindicated During Pregnancy	Can Be Initiated While Breastfeeding and While Postpartum
Routinely recommended vaccines during pregnancy				
Inactivated influenza	X (1)			X (1)
COVID-19	X (2)			X (2)
Tdap	X (4)			X (4)
Maternal RSV (Abrysvo)	Given seasonally in 1st pregnancy; the infant monoclonal antibody should be offered in subsequent pregnancies (3)			
Recommended vaccines based on comorbidities or disease risk factors				
Pneumococcal		X (14)		X (14)
Meningococcal conjugate (MenACWY or MenABCWY) and meningococcal serogroup B		X (15, 16)		X (15, 16)
Hepatitis A		X (17)		X (17)
Hepatitis B		X (17, 18)		X (17, 18)
HPV				X (19)
MMR			X (20)	X (20)
Varicella			X (21)	X (21)

COVID-19, coronavirus disease 2019; Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis; RSV, respiratory syncytial virus; HPV, human papillomavirus; MMR, measles-mumps-rubella.

*"X" indicates that the vaccine can be given in this window.

SUMMARY

- Obstetric care professionals should routinely assess their pregnant patients' vaccination status.
- Individuals who are or will be pregnant during the fall/winter respiratory illness season should receive annual influenza and COVID-19 vaccines.
- All pregnant individuals should receive a Tdap vaccine during each pregnancy, as early in the 27–36 gestational-week window as possible.
- All eligible pregnant individuals who meet criteria should receive the respiratory syncytial virus (RSV) vaccine between 32 and 36 weeks gestation.
- MMR and Varicella are contraindicated during pregnancy, but can be given postpartum while breastfeeding.
- Other vaccines may be recommended during pregnancy depending on the patient's age, prior immunizations, comorbidities, or disease risk factors.

REFERENCES

- Maternal immunizations. Committee Statement No. 26. American College of Obstetricians & Gynecologists. Obstet Gynecol 2026;147:e123–e128.
- RSV Vaccination in Pregnancy, SMFM Statement, September 22, 2025
- Clinical Considerations for the prevention of respiratory syncytial virus disease in Infants, SMFM Statement, October 31, 2023.
- American College of Obstetricians & Gynecologists . COVID-19 vaccination considerations for obstetric–gynecologic care. Practice Advisory . Accessed January 23, 2026.https://www.acog.org/clinical/clinical-guidance/practice-advisory/articles/2020/12/covid-19-vaccination-considerations-for-obstetric-gynecologic-care

Let's Talk: The Lived Experience of Peripartum Cardiomyopathy

Brianna Harris-Henderson

Brianna Harris Henderson is a maternal health advocate and nonprofit leader who uses her lived experience with pregnancy-related heart conditions to educate, raise awareness, and champion better care and support for mothers.

The Untold Story: Peripartum Cardiomyopathy & Other Maternal Cardiac Risk Factors

Angela Martin, MD, FACOG

Dr. Martin is a Clinical Associate Professor of Maternal–Fetal Medicine at the University of Kansas, recognized with multiple national teaching awards. She founded the Pregnancy Heart Team, serves as vice chair of the hospital pharmacy and therapeutics committee, and is the medical director of labor and delivery.

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Maternal Cardiac Disease

Angela Martin, MD, FACOG
Associate Clinical Professor
Maternal-Fetal Medicine
The University of Kansas Health System

Objectives

- Describe the burden of cardiac disease in pregnancy
- Review pregnancy cardiovascular physiology
- Recognize the red flag symptoms suggestive of cardiovascular disease in pregnancy
- Differentiating between normal pregnancy and possible cardiovascular disease
- Apply knowledge through case-based scenarios

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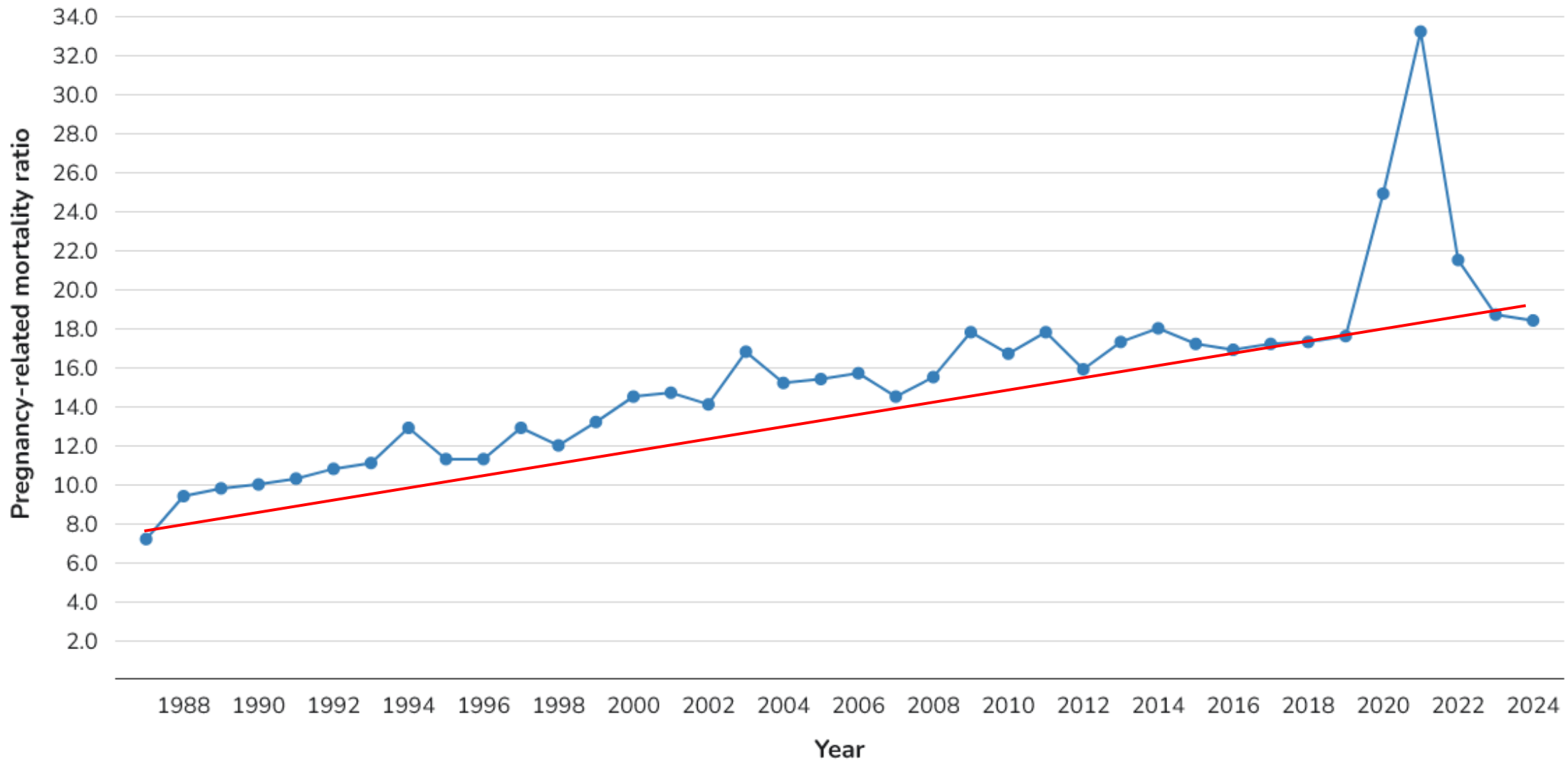
Burden of Cardiac Disease in Pregnancy

Pregnancy-related mortality ratio in the United States: 1987–2024



Causes of pregnancy-related deaths, 2024[a] United States

22.0%
Cardiovascular conditions (includes cardiomyopathy, 10.7% of all deaths, n=71)

15.2%
Other noncardiovascular medical conditions

14.4%
Infection or sepsis (includes COVID-19, 0.6% of all deaths, n=4)

14.1%
Hemorrhage

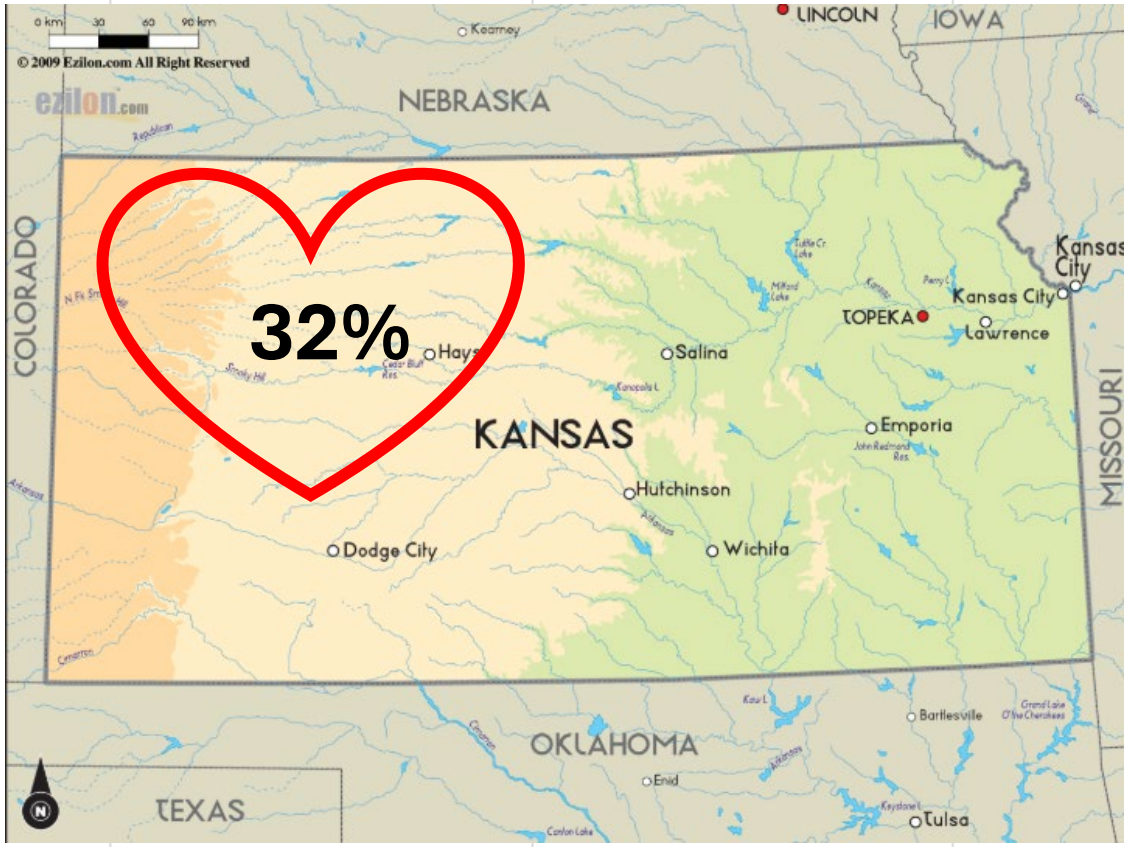
10.7%
Thrombotic pulmonary or other embolisms

7.7%
Hypertensive disorders of pregnancy

5.0%
Amniotic fluid embolism

3.8%
Cerebrovascular accidents

0.3%
Anesthesia complications



0 10% 20% 30% 40% 50%

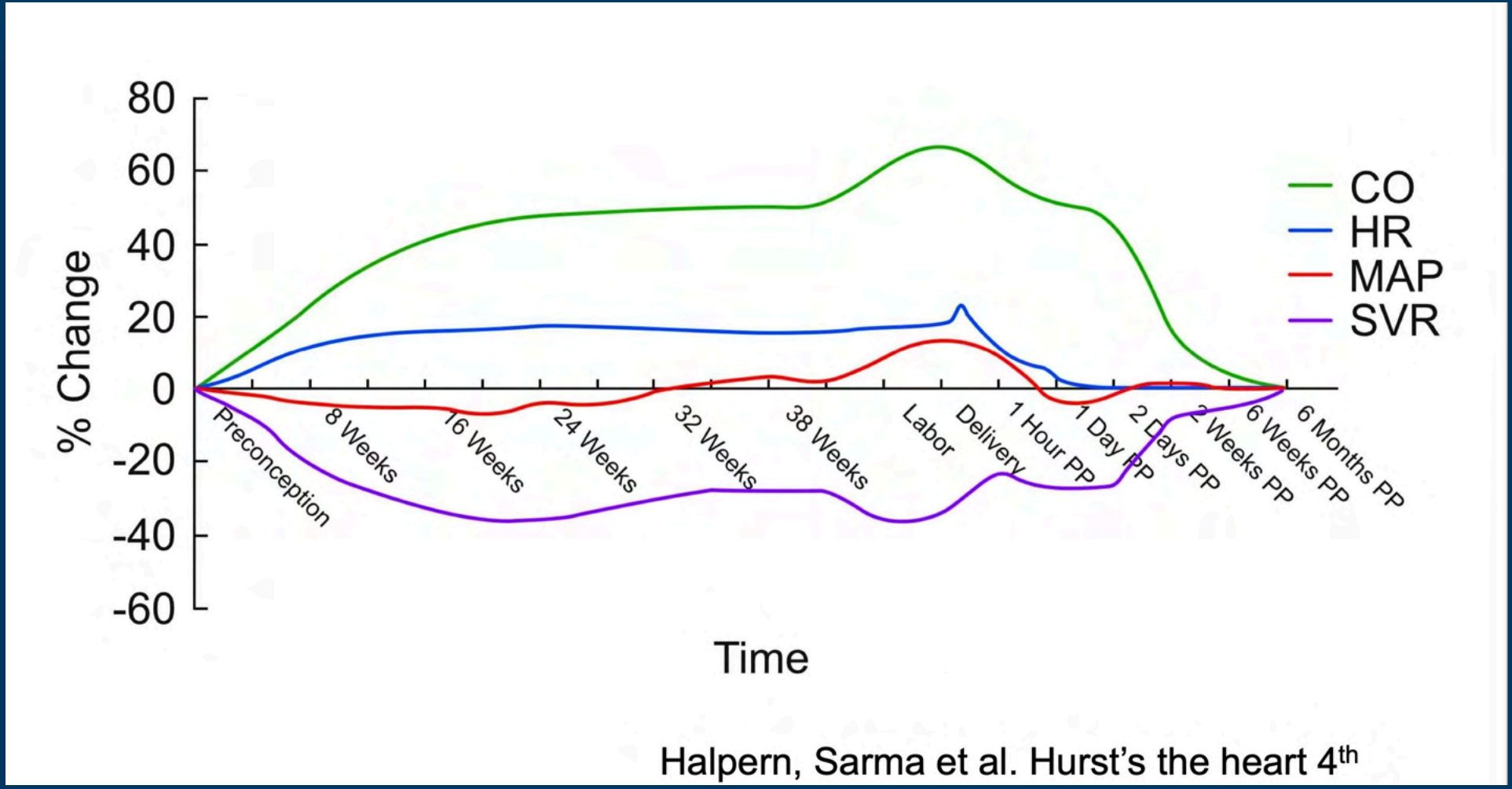
Percent of pregnancy-related deaths

Normal Pregnancy Hemodynamics

Poll Question

- How much blood flow does the term utero-placental unit receive per minute?
  a) 100 mL/min
  b) 250 mL/min
  c) 400 mL/min
  d) 600 mL/min

Hemodynamic Physiology



Hemodynamics in Labor

- During a contraction
  - 300-500 mL blood enters circulation
  - Increase in HR, SV, and CO

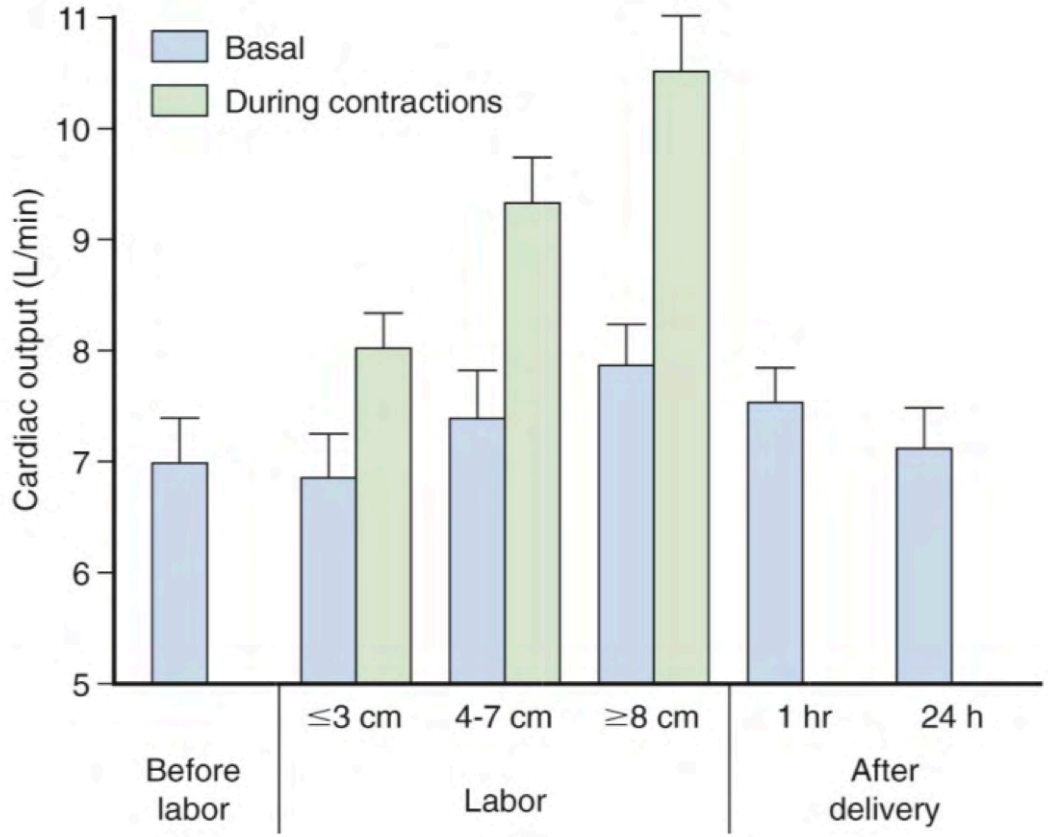


Figure: Changes in cardiac output during labor
Hunter S, Robson SC. Adaptation of the maternal heart in pregnancy. Br Heart J. 1992 Dec;68(6):540-3.

Hemodynamics in Labor

With Valsalva

- Increased intrathoracic pressure → decreased preload
  - Poorly tolerated in pre-load dependent cardiac lesions like aortic and mitral stenosis
- Increased MAP → increased arterial shear stress
  - Increased risk for aortopathies

Consider assisted second stage

Hemodynamics Immediately Postpartum

- Maximum CO in the *immediate* postpartum period
  - 60-80% increase from pre-labor baseline

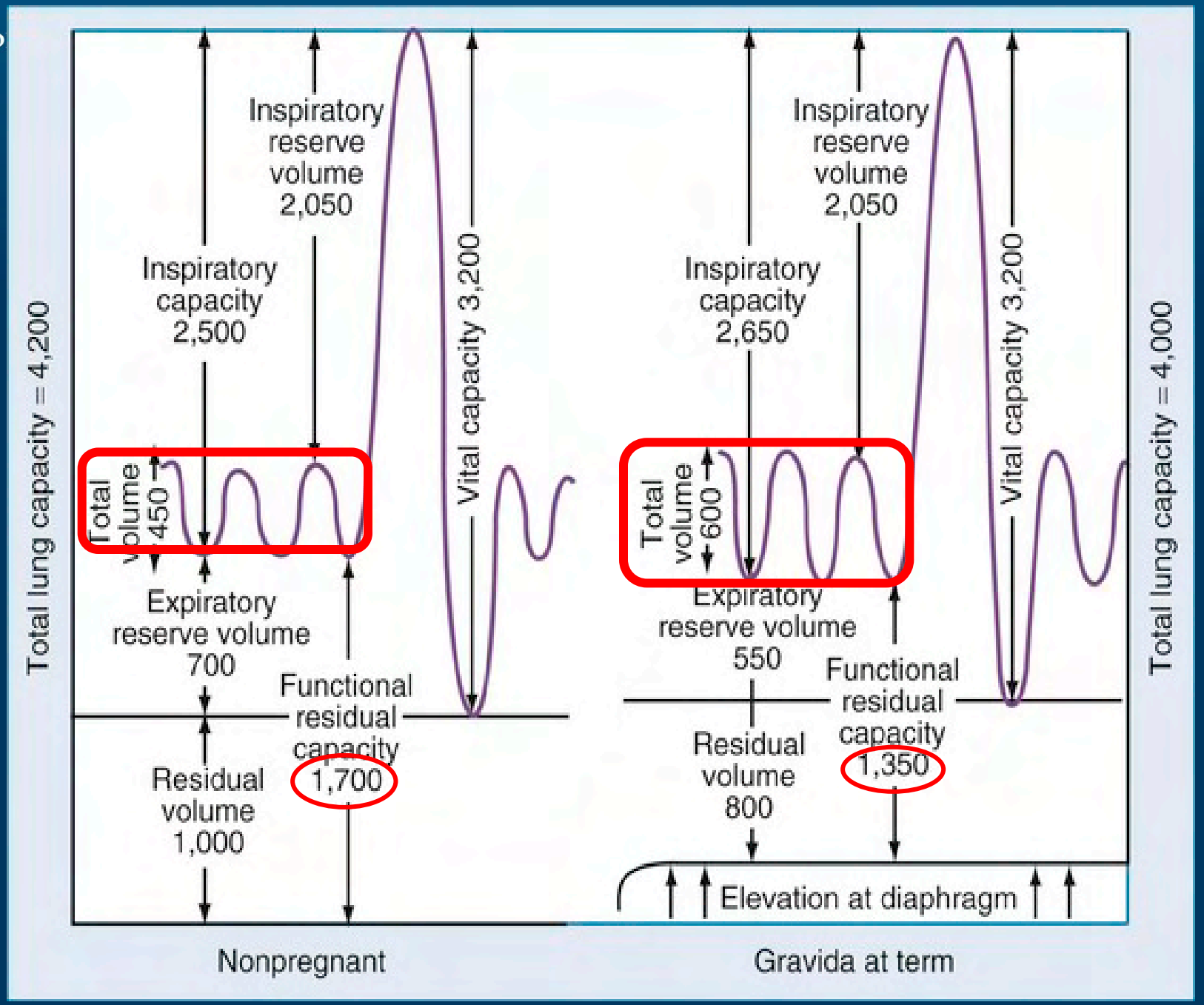
- Increased venous return to heart → increased SV due to…
  - Autotransfusion of uteroplacental blood
  - Release of IVC compression
  - Rapid mobilization of extravascular fluid

- High risk time for pulmonary edema (mitral stenosis)
- High risk time for RV failure (pulmonary artery hypertension)

Maternal Respiratory Physiology

- Respiratory Alkalosis
- ↑ Tidal Volume
- ↓ Functional residual capacity
- ↑ Diameter of chest cavity

- Upward displacement of diaphragm
- Rapid desaturation
- More difficult intubation


Total lung capacity = 4,200
Inspiratory reserve volume 2,050
Inspiratory capacity 2,500
Vital capacity 3,200
Total volume 450
Expiratory reserve volume 700
Functional residual capacity 1,700
Residual volume 1,000
Nonpregnant
Inspiratory reserve volume 2,050
Inspiratory capacity 2,650
Vital capacity 3,200
Total volume 600
Expiratory reserve volume 550
Functional residual capacity 1,350
Residual volume 800
Elevation at diaphragm
Gravida at term
Total lung capacity = 4,000

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Know the Red Flag Symptoms

STATE NEWS

Virginia Depa
deaths are ger

Crystal Graham

Published date: November 24, 2
Updated: November 24, 2025 | 3

In response to maternal deaths in the state, the Virginia Department of Health has launched a new website to provide information and resources

Medscape Medical News

Most Mate
Preventable

Brittany Vargas
January 29, 2026

1 8

Most perinatal maternal deaths from infection ar
CDC's Maternal Mortality Review Committee.

MENU

TIME

SUBSCRIBE

IDEAS HEALTH

Maternal Mortality is a Humanitarian Emergency

ADD TIME ON GOOGLE

by Jacinda Ardern and David Miliband

MAR 21, 2026 4:00 AM CT

Suspended Image—Getty Images

Monday, September 19, 2022

Facts

- Most deaths occur in people with no prior history of CVD
- 25-50% of cardiovascular deaths in pregnancy and postpartum are preventable
- Failure to recognize symptoms, delay in diagnosis, and delay in referral are frequent contributors

Table 1. Modified WHO Classification of Maternal Cardiovascular Risk

WHO Pregnancy Risk Category	Risk Description	Maternal Risk Factors
I	No detectable increase in maternal mortality and no/mild increase in morbidity risk	Uncomplicated small/mild pulmonary stenosis, PDA, mitral valve prolapse
		Successfully repaired simple lesions (ASD, VSD, PDA, anomalous pulmonary venous drainage)
		Atrial or ventricular ectopic beats, isolated
II	Small increase in maternal mortality and moderate increase in morbidity risk	If otherwise well and uncomplicated:
		Unoperated ASD, VSD
		Repaired TOF
		Most arrhythmias
II–III	Moderate increase in maternal mortality morbidity risk	Mild LV impairment
		Hypertrophic cardiomyopathy
		Native or tissue valvular disease (not considered risk category I or IV)
		Marfan syndrome without aortic dilation
		Aortic dilation <45 mm in bicuspid aortic valve aortopathy
		Repaired coarctation
III	Significantly increased maternal mortality or severe morbidity risk. Expert counseling required. In the event of pregnancy, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the puerperium.	Mechanical valve
		Systemic RV
		Fontan circulation
		Cyanotic heart disease (unrepaired)
		Other complex CHD
		Aortic dilation 40–45 mm in Marfan syndrome
		Aortic dilation 45–50 mm in bicuspid aortic valve aortopathy
IV	Extremely high maternal mortality or severe morbidity risk. Pregnancy is contraindicated. In the event of pregnancy, termination should be discussed. If pregnancy continues, care should follow class III recommendations.	Pulmonary arterial hypertension (of any cause)
		Severe systemic ventricular dysfunction (LV ejection fraction <30%, NYHA class III-IV)
		Previous peripartum cardiomyopathy with any residual impairment of LV function
		Severe mitral stenosis, severe symptomatic aortic stenosis
		Aortic dilation >45 mm in Marfan syndrome
		Aortic dilation >50 mm in bicuspid aortic valve aortopathy
		Native severe coarctation

AS indicates aortic stenosis; ASD, atrial septal defect; CHD, congenital heart disease; LV, left ventricular; NYHA, New York Heart Association; PDA, patent ductus arteriosus; RV, right ventricle; TOF, tetralogy of Fallot; VSD, ventricular septal defect; and WHO, World Health Organization.

I

2-5% event rate
Cardiology referral

II

6-10% event rate
MFM referral
Cardiology evaluation first/third trimester

II-III

11-19% event rate
MFM/Pregnancy heart team
Cardiology evaluation every trimester
Delivery at appropriate level hospital

III

20-27% event rate
MFM/Pregnancy heart team referral
Cardiology evaluation every trimester
Delivery at appropriate level hospital

IV

>27% event rate
MFM/Pregnancy heart team referral
Cardiology evaluation every trimester
Delivery at appropriate level hospital

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		Repaired TOF
		[illegible]
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		Other complex CHD
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		[illegible]
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		Previous peripartum cardiomyopathy with any residual impairment of LV function
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Screening for Undiagnosed CVD

- Risk factors: Non-Hispanic Black, > 40 yo, HTN, Obesity
  - Sickel cell disease, Diabetes, Substance use, History of chemotherapy
- Symptoms: SOB, Palpitations, Dizziness, Syncope, Chest pain, Fatigue
- Vital signs: HR, BP, RR, SpO2

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Is This Normal?!

Red Flag Signs and Symptoms – Immediate Evaluation

- Shortness of breath at REST
- Orthopnea ≥ 4 pillows
- Exertional or unprovoked syncope

- Crackles in lungs
- Marked edema

- HR > 120
- SBP > 160
- Resting RR > 30
- SpO2 < 94%

Normal Signs & Symptoms - Reassurance

- Shortness of breath with exercise/heavy exertion
- No orthopnea
- Dizziness only with prolonged standing, dehydration
- Rare & self-limited palpitations without lightheadeness

- HR < 90
- SBP < 140
- Resting RR 12-15
- SpO2 > 97%

And Everything In-Between?

- **More evaluation** with short-term follow-up &/or referral
  - EKG
  - B-type natriuretic peptide (BNP)
  - Troponins
  - CXR
  - Echo
  - Heart rhythm monitors

Consider Implementing a Protocol

- Kansas Perinatal Quality Collaborative (KPQC)
- Society of Maternal-Fetal Medicine (SMFM)
- Alliance for Innovation on Maternal Health Consensus Bundle on Cardiac Conditions in Obstetric Care (AIM)
- California Maternal Quality Care Collaborative (CMQCC)

Other Fourth Trimester Initiative Resources

Breastfeeding Resources

Emergency Dept/OB Treatment Algorithms

- Acute Hypertension in Pregnancy and Postpartum Algorithm
- Cardiovascular Disease (CVD) in Pregnancy and Postpartum Algorithm
- Eclampsia Algorithm
- Emergency Care for Patients During Pregnancy and the Postpartum Period: Emergency Nurses Association and Association of Women's Health, Obstetric and Neonatal Nurses Consensus Statement
- OB Emergencies – Pregnancy Status Sign
- Obstetric Emergencies During Pregnancy and the Postpartum Period: Information for Emergency Medical Services Practitioners

Intimate Partner Violence

Birth Equity

Maternal Mental Health Resources

Maternal Warning Signs Resources

Safe Sleep, Miscarriage, and Stillbirth Resources

KPQC
Kansas Perinatal Quality Collaborative

Cardiovascular Disease (CVD) in Pregnancy & Postpartum Algorithm

Ask your patient:

"Are you pregnant or have you been pregnant in the last 12 months?"

If yes, symptoms may be related to pregnancy and can occur up to 12 months postpartum.

CVD can happen in this patient group regardless of age. Don't ignore red flags!

Red Flags for Cardiovascular Disease

- Shortness of breath at rest
- Chest pain at rest, with minimal exertion or ripping/tearing in quality
- Palpitations associated with near syncope
- Severe orthopnea
- Resting HR ≥ 120 bpm
- Resting systolic BP ≥ 160 or < 90
- Resting RR ≥ 25
- Oxygen saturation ≤ 94%, with or without personal history of CVD
- Loud systolic murmur, diastolic murmur, S3, or S4
- Wheezing, crackles on lung exam
- Distended neck veins

Consider in your differential diagnosis:

Myocardial infarction (including spontaneous coronary artery dissection), peripartum cardiomyopathy, congestive heart failure, arrhythmia, aortic dissection

Key Work-up

EKG, BNP, chest X-ray, and troponin

If testing is abnormal, CVD is a possible diagnosis:

- Obtain echocardiogram, consider transferring patient to obtain if not available at your facility
- Consult with cardiology and obstetrics or maternal–fetal medicine, if available
- Consider treatment and admission or transfer as clinically indicated

Treatment

Most medications for the treatment of cardiovascular emergencies do not have robust data surrounding their use in pregnancy and breastfeeding. These medications should **not** be withheld from a pregnant or breastfeeding patient in a life-threatening emergency if they are otherwise indicated. However, long-term use of certain medications should be avoided or may be contraindicated in pregnant or lactating patients; consult a pharmaceutical reference, obstetrics, or cardiology for further considerations.

Other Signs and Symptoms

may be vague but can include:

Chief Complaints

- Dyspnea
- Edema
- Cough
- Change in exercise tolerance
- Paroxysmal nocturnal dyspnea (PND)

Physical exam findings

- Desaturation with ambulation
- Murmur
- Peripheral edema

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Society for Maternal-Fetal Medicine Special Statement: Checklists for triage and work-up of persons with symptoms suggestive of cardiovascular disease in pregnancy and postpartum

Society for Maternal-Fetal Medicine

Item	Reassuring Features	Concerning Findings, Check if Present	Red Flags, Check if Present
Symptoms			
Shortness of breath	Dyspnea only with heavy exertion; no interference with activities of daily living	☐ Dyspnea with minimal activity or exertion ☐ Asthma unresponsive to therapy ☐ Orthopnea (2-3 pillows)	☐ Dyspnea at rest ☐ Severe orthopnea (≥ 4 pillows) or sleeping upright
Palpitations	Self-limited palpitations, a few seconds duration; absence of lightheadedness or syncope	☐ Palpitations more than a few seconds duration or associated with near-syncope	☐ Palpitations, multiple episodes per day
Dizziness	Dizziness only with standing rapidly, prolonged standing, or dehydration	☐ Other dizziness	
Syncope		☐ Single episode orthostatic or vasovagal syncope	☐ Single unexplained syncope or repeated episodes
Chest pain	Typical gastroesophageal reflux symptoms responding to treatment or sporadic pleuritic pain (brief sharp pain with inspiration)	☐ Other chest pain with exertion	☐ Other chest pain at rest
Fatigue	Mild fatigue		☐ Extreme fatigue interfering with daily activities
Risk Factors			
Maternal age		☐ 40 years or more	
Race (exposure to racism)		☐ Black or African American[a]	
Body mass index, obesity		☐ 35 kg/m^2 or more	
Diabetes		☐ Pregestational (Type 1 or Type 2)	
Hypertension (HTN)		☐ Chronic or pregnancy-related HTN	
Substance use		☐ Nicotine, cocaine, amphetamine, alcohol	
Sickle cell anemia		☐ Documented disease or patient reports	
History of chemotherapy		☐ Patient reports	
Exam Findings			
Resting heart rate	Less than 90 beats per minute	☐ 110 to 119 per minute	☐ 120 per minute or more
Systolic blood pressure	Less than 140 mmHg	☐ 140 to 159 mmHg	☐ 160 mmHg or more
Respiratory rate	Less than 15 per minute	☐ 24 to 29 per minute	☐ 30 per minute or more
Oxygen saturation	97% or more	☐ 95% or 96%	☐ 94% or less
Edema	Pedal or pretibial edema	☐ Edema of hands or face	
Heart auscultation	Mild systolic flow murmur (during pregnancy)		☐ Loud murmur or diastolic murmur
Lung auscultation			☐ Basilar crackles (rales)
Recommended Actions			
		☐ 1 or more boxes checked in each of Symptoms, Risk Factors, and Exam Findings: Work-up per Figure 2.	☐ Any red flag: Prompt evaluation or admission for acute symptoms. Work-up per Figure 2.
		☐ 4 or more boxes checked: Work-up per Figure 2.	
		☐ Less than 3 boxes checked: Reassure, schedule follow-up	

Pregnancy, Volume: 1, Issue: 6, First published: 18 October 2023, DOI: (10.1002/preg2.70120)

	Work-Up Element	Indications
	Tests	
	☐ Electrocardiogram (ECG)*	All patients with work-up recommended per Figure 1
	☐ B-type natriuretic peptide (BNP) or N-terminal-pro-BNP*	All patients with work-up recommended per Figure 1
Additional tests, perform only if indicated	☐ Troponin I, troponin T or "high sensitivity" troponin*	Chest pain, pain or pressure radiating to neck or arm, unexplained dyspnea or sweating
	☐ Chest X-ray*	Unexplained dyspnea, cough, chest pain, crackles (rales), elevated BNP, refractory asthma
	☐ Echocardiogram*	Elevated BNP, elevated troponin, murmur, arrhythmia confirmed on ECG, O2 saturation 94% or less, clinical evidence of volume overload, or other suspicion of heart failure or valve disease. Obesity (BMI ≥35 kg/m^2) may be considered an indication because of increased rate of false-negative BNP. Some experts consider echocardiogram to be indicated for any patient with 4 or more boxes checked on the triage checklist.
	☐ Heart rhythm monitor (Holter or similar)* Duration determined by cardiologist (e.g., 24 hrs, 72 hrs, 1 week, event monitor)	Palpitations or other suspicion of arrhythmia, such as lightheadedness or syncope
	If indicated: ☐ Complete blood count ☐ Comprehensive metabolic panel ☐ Arterial blood gases ☐ Urine drug test, with informed consent ☐ Thyroid stimulating hormone	Consider if clinically appropriate
	Consultations	
	☐ Maternal-fetal medicine	Abnormal result in the first 6 tests above (indicated with *)
	☐ Cardiology or primary care	Abnormal test result in the first 6 tests above (indicated with *) -OR- Crackles (rales) -OR- New-onset murmur (except mild systolic flow murmur during pregnancy)
	Follow-up	
	☐ Tests completed within 1 week and consultations arranged	Indications for consultations as above
	☐ If all tests negative and signs and symptoms resolved: Reassure, routine follow-up	

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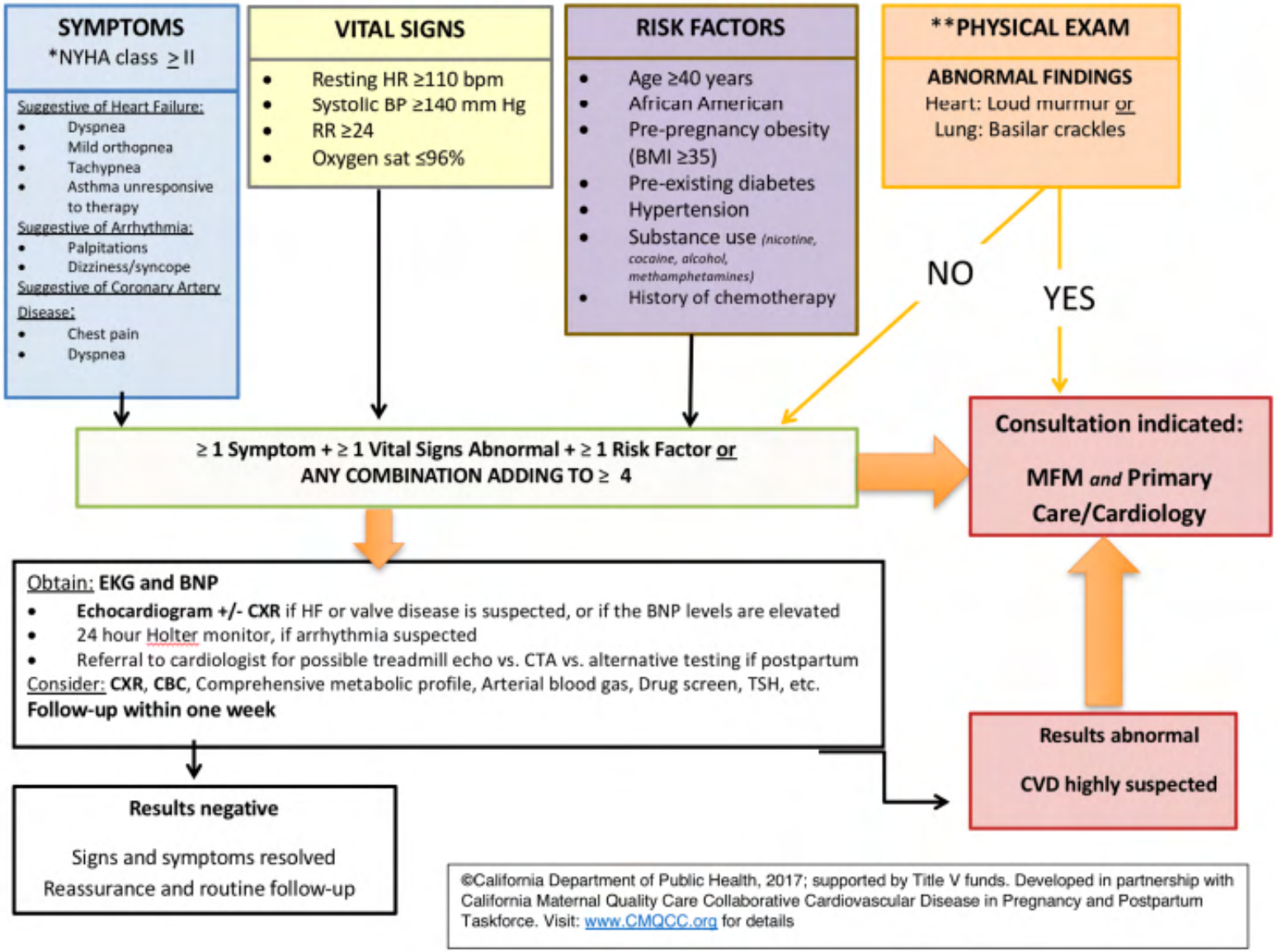
CMQCC
California Maternal Quality Care Collaborative



©California Department of Public Health, 2017; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: www.CMQCC.org for details

THE UNIVERSITY OF KANSAS HEALTH SYS

Alliance for Innovation on Maternal Health Consensus Bundle on Cardiac Conditions in Obstetric Care

	ROUTINE CARE	CAUTION*†	STOP†‡
	Reassurance	Nonemergent Evaluation	Prompt Evaluation Pregnancy Heart Team
History of CVD	None	None	Yes
Self-reported symptoms	None or mild	Yes	Yes
Shortness of breath	No interference with activities of daily living; with heavy exertion only	With moderate exertion, new-onset asthma, persistent cough, or moderate or severe OSA§	At rest; paroxysmal nocturnal dyspnea or orthopnea; bilateral chest infiltrates on CXR or refractory pneumonia
Chest pain	Reflux related that resolves with treatment	Atypical	At rest or with minimal exertion
Palpitations	Few seconds, self-limited	Brief, self-limited episodes; no lightheadedness or syncope	Associated with near syncope
Syncope	Dizziness only with prolonged standing or dehydration	Vasovagal	Exertional or unprovoked
Fatigue	Mild	Mild or moderate	Extreme
Vital signs	Normal		
HR (beats per minute)	<90	90–119	≥120
Systolic BP (mm Hg)	120–139	140–159	≥160 (or symptomatic low BP)
RR (per minute)	12–15	16–25	≥25
Oxygen saturation	>97%	95–97%	<95% (unless chronic)
Physical examination	Normal		
JVP	Not visible	Not visible	Visible >2 cm above clavicle
Heart	S3, barely audible soft systolic murmur	S3, systolic murmur	Loud systolic murmur, diastolic murmur, S4
Lungs	Clear	Clear	Wheezing, crackles, effusion
Edema	Mild	Moderate	Marked

Implementation of a Screening Process

- Implement what will work!
- Make it readily available to providers
- Minimize errors of omission
- Standardize care to reduce variability and implicit bias

THE UNIVERSITY OF KANSAS HEALTH SYSTEM

Case Presentations

Jaime

- 32 yo G2P1001 at 16 weeks, c/o fatigue and SOB at prenatal visit
- PMH: rheumatic heart disease with mitral stenosis s/p valve balloon valvuloplasty as a child.
- OBHx: Tolerated first pregnancy well, term SVD
- More info?
  - BP 102/70, HR 87, SpO2 96%
  - Trace lower extremity edema
  - SOB with minimal activity, stops to rest after walking into store from parking lot
  - Sleeping in recliner

Jaime

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  - BP 102/70, HR 87, SpO2 97%
  - Trace edema
  - SOB with minimal activity, stops to rest after walking into store from parking lot
  - Sleeping in recliner

Jamie

- You order NT-pro-BNP, EKG, Echo
- NT-proBNP 716
- EKG NSR
- Echo: Massively dilated left atrium, severe/critical mitral stenosis, moderate aortic regurgitation, severe pulmonary hypertension

- Admitted to ICU, medically optimized, discharged with close surveillance
- Worsening heart failure in third trimester, re-admitted to ICU
- Delivered 32-week neonate in the cardiac ICU with ECMO and CT surgery on standby
- Valve replacement 12-weeks postpartum

Amy

- 40 yo G3P2103 s/p IOL and SVD at 38 weeks due to preE
- PPD #5 – Calls clinic with unusual fatigue & SOB when walking around her house
- PPD #7 – goes to urgent care with persistent fatigue, worsening SOB, non-productive cough – especially at night
  - Afebrile, BP 138/96, HR 105, RR 24, SpO2 94%
  - Exam: Heart sounds are normal, bilateral lower lung crackling sounds, moderate LE edema
  - Sent home with antibiotics for suspected URI
- PPD #9 – syncope, 911, dilated cardiomyopathy!

Amy

- 40 yo G3P2103 s/p IOL and SVD at 38 weeks due to preE
- PPD #5 – Calls clinic with unusual fatigue & **SOB when walking around her house**
- PPD #7 – goes to urgent care with persistent fatigue, worsening SOB, **cough – especially at night**
  - Afebrile, BP 138/96, **HR 105**, RR 24, **SpO2 94%**
  - Exam: Heart sounds are normal, **bilateral lower lung crackling sounds**, **moderate LE edema**
  - Sent home with antibiotics for suspected URI
- PPD #9 – syncope, 911, dilated cardiomyopathy!

Peripartum Cardiomyopathy (PPCM)

- Incidence 1 in 1,000-4,000 deliveries in USA
- Risk factors: African-American, AMA, HTN/PreE, multifetal gestations
- Diagnosis of exclusion
- Heart failure due to left ventricular systolic dysfunction
  - EF < 45% with or without LV dilation
- Towards the end of pregnancy or in the months following delivery
- Pathophysiology unknown
  - Systemic angiogenic imbalance
  - Genetic predisposition
  - Altered prolactin processing

Management Options for PPCM

During Pregnancy:

- Beta-blockers, loop diuretics, hydralazine/isosorbide dinitrate, digoxin, low-molecular-weight heparin
- (No ACE/ARB/aldosterone receptor antagonists)
- MCS for severe heart failure/cardiogenic shock
- Consider early delivery if unstable

Delivery:

- Plan ahead with a Cardio-Obstetrics Team
- If unstable, consider hemodynamic monitoring and optimization
- Caution for fluid overload, especially after delivery

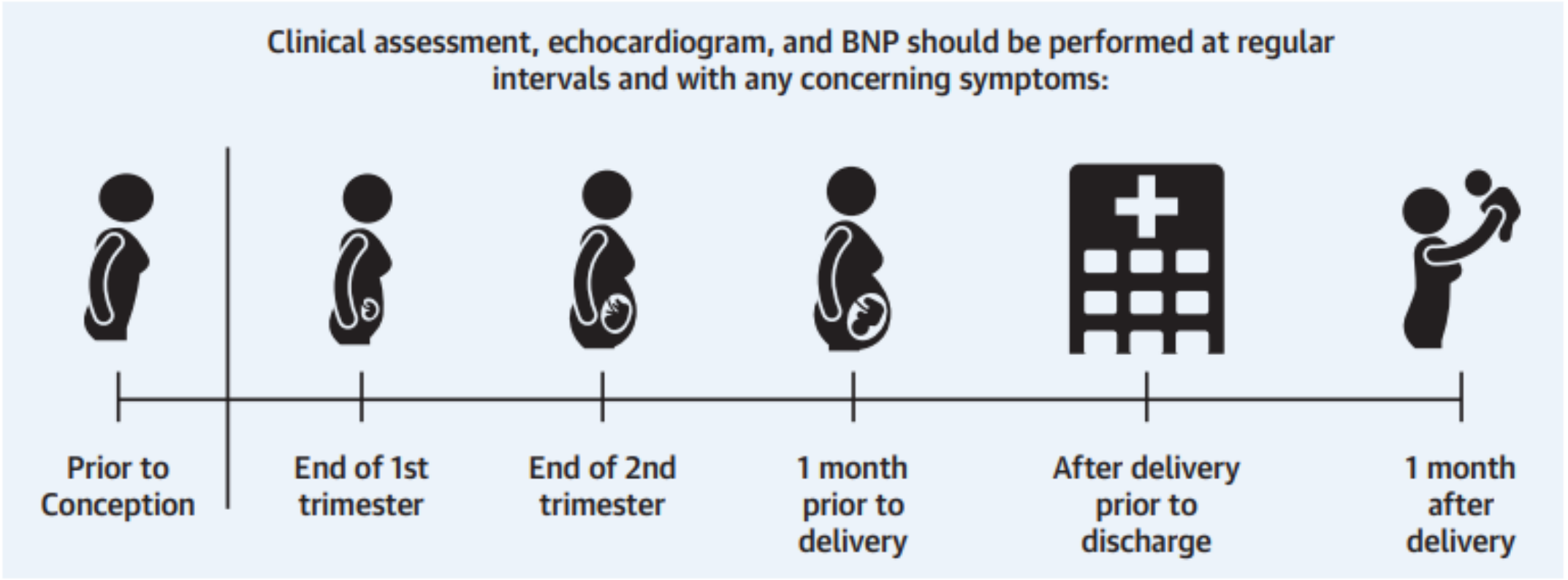
After Pregnancy:

- Heart failure management. Beta-blockers, enalapril, and spironolactone are compatible with breastfeeding.
- Anticoagulation for LV thrombus; consider if severe LV dysfunction (LVEF <35%)
- Consider a wearable cardioverter/defibrillator if severe LV dysfunction
- Discuss Contraception

PPCM Prognosis

- ~ 60% will have full recovery!
- If full recovery achieved, risk of relapse in subsequent pregnancy 20-25%
- If LV function did *not* recover, risk of relapse in subsequent pregnancy 35-40%
  - Especially high-risk if LV at diagnosis was < 25%

FIGURE 3 Serial Monitoring During a Subsequent Pregnancy



Proposed outline for serial testing during a subsequent pregnancy. BNP = brain natriuretic peptide.

Summary

- Maternal mortality is rising and many deaths related to CVD are preventable
- Screen patients for CVD at the initial OB visit with medical history, symptoms, and VS
- Refer any patient with mWHO class II or above to cardiology and MFM
- Know the red flag symptoms
- Consider implementing checklist/algorithm protocol for pregnant patients with cardiac symptoms

Red Flag Signs and Symptoms - ED

- Shortness of breath at REST
- Orthopnea ≥ 4 pillows
- Exertional or unprovoked syncope

- Crackles in lungs
- Marked edema

- HR > 120
- SBP > 160
- Resting RR > 30
- SpO2 < 94%

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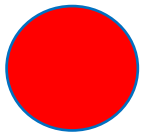
THE UNIVERSITY OF KANSAS MEDICAL CENTER
SCHOOLS OF MEDICINE · NURSING · HEALTH PROFESSIONS

Lunch and Celebration of Success

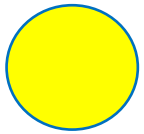
Enrolled Sites Workday: Breakout Sessions & Open Mic Discussion

Breakout sessions:



Protocols/Timely Treatment (Terrah & Kari) Powerhouse

- Identify barriers to implementing protocols for facilities
- Evaluate protocol inclusion: Defining severe hypertension in pregnancy (≥160 systolic or ≥110 diastolic) and differentiate between chronic hypertension, gestational hypertension, preeclampsia and eclampsia.
- Identify barriers to timely treatment per protocol for severe hypertension (within 30-60 minutes)
- Develop education to support safe selection and administration of antihypertensive medications (e.g. labetalol, hydralazine and nifedipine)



OB-ED collaborations and challenges, Transfer Protocol (Abbie Weatherly) Powerhouse

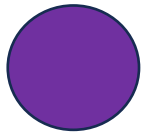
- Define collaboration between OB and ED departments in the antepartum and postpartum setting
- Review and analyze the use of shared protocols for emergency management of hypertensive disorders and eclampsia
- Evaluate quality improvement processes used to assess timely treatment of severe range blood pressure readings in ED for pregnant and postpartum patients

Breastfeeding: Pumping/Hand Expression Protocols, High 5 & Baby Friendly questions (Michelle Finn, Dana Deters) Overflow

- Identify the correct timing for initiation of hand expression and/or pumping for the postpartum dyad with extended separation
- Summarize current trends in High 5 for Mom & Baby and Baby Friendly hospitals
- Identify the updated resources available for Substance Abuse Disorder in the setting of lactation postpartum
- Evaluate breastfeeding protocols that include hand expression and/or pumping best practice models at birthing hospitals

Intimate Partner Violence (Maggie Clevenger, Terrah Stroda, Hannah Figgs-Hoard) Powerhouse

- Describe components of the Intimate Partner Violence Workflow document as well as the Community Partnership Agreement
- Develop strategies for how each enrolled hospital will add or continue CUES as part of the standard workflow for IPV identification and referral
- Formulate how each hospital will complete the Community Partnership Agreement in collaboration with IPV agencies in their community or region

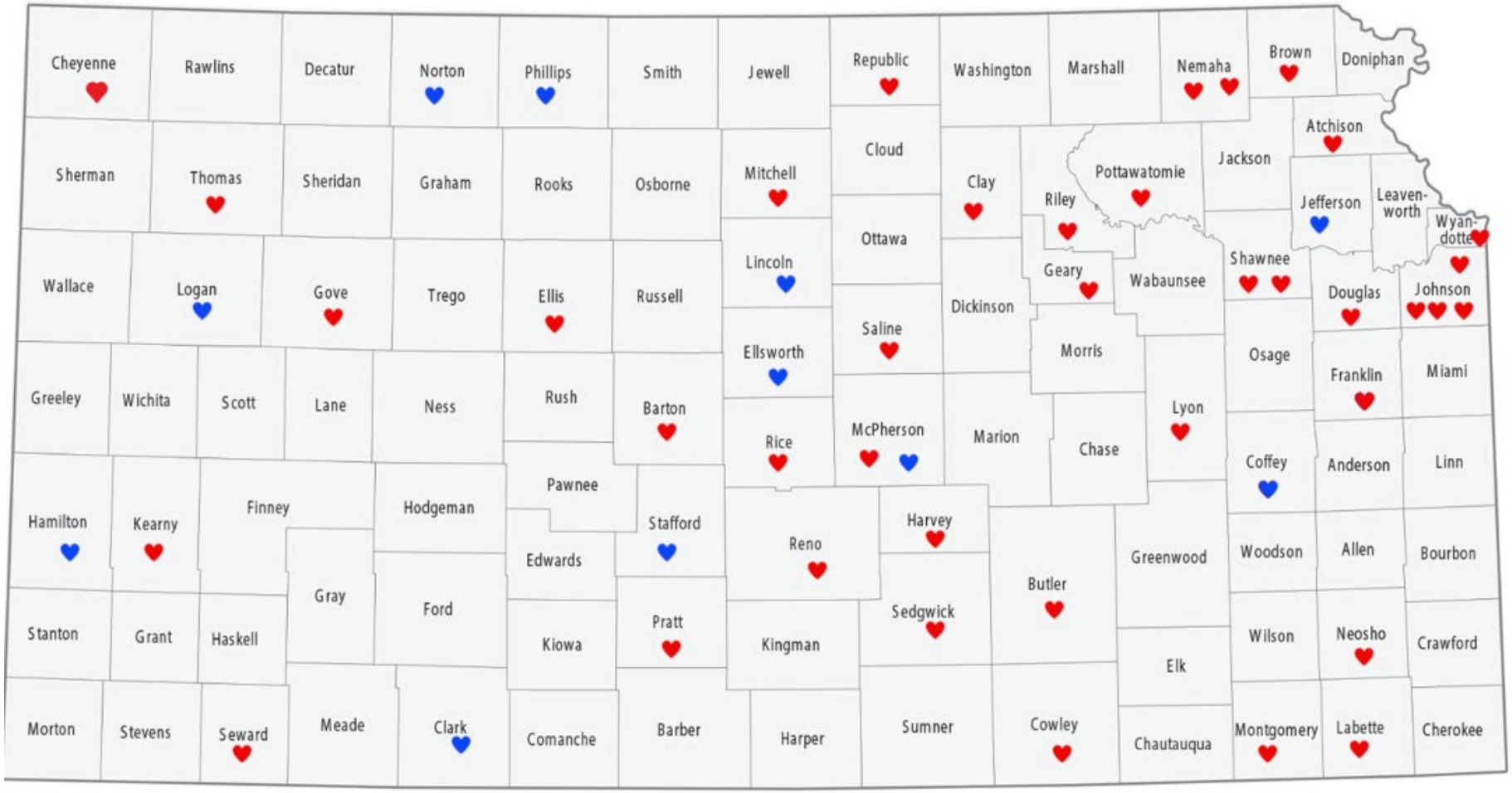


Maternal Mental Health (Jennifer Guarino, Alexis Tibbitts) Overflow

- Analyze current trends in birthing and non-birthing hospitals around maternal mental health
- Evaluate use of the Kansas Connecting Communities team for improving patient screening and referral for both outpatient and inpatient obstetric settings
- Collaborate to identify solutions for local challenges impacting maternal mental health outcomes
- Analyze the KCC Provider Line and other resources of assistance

Impacting 83% of all births in KS

- 39 Birthing Facilities
- 11 Non-birthing Facilities



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SHTN in Pregnancy Safety Bundle

Preventing Pregnancy-Related Cardiovascular Disease Burden

A Report From the National Academies of Sciences, Engineering, and Medicine

Table. Clinical Preventive Services With Established or Emerging Evidence to Reduce Pregnancy-Related Cardiovascular Adverse Outcomes

Table. Clinical Preventive Services With Established or Emerging Evidence to Reduce Pregnancy-Related Cardiovascular Adverse Outcomes

Preventive service	Recommendation
Preventive services supported by substantial or moderate evidence[a]	
Prenatal BP threshold and target	For women with prepregnancy chronic hypertension, implement or continue pregnancy-safe antihypertensive therapy to achieve a BP standard of less than 140/90 mm Hg during pregnancy.
Enhanced postpartum hypertension management	Strengthen structured postpartum hypertension management for women with chronic hypertension or other hypertensive disorders of pregnancy, incorporating remote or home self-measured BP monitoring with timely clinical review and treatment adjustment.
Promising preventive services requiring additional evidence for large-scale implementation[a]	
Urgent maternal warning signs	Limited evidence suggests inpatient maternal early warning systems modestly improve process measures such as timely treatment of hypertension and sepsis. No direct evidence shows that outpatient education, patient self-screening, or improved community awareness of urgent maternal warning signs reduces maternal cardiovascular morbidity or mortality.
Cardiovascular risk assessment tools	Moderate evidence suggests that cardiovascular disease screening tools, such as the California Maternal Quality Care Collaborative algorithm, identify pregnant and postpartum women with previously unrecognized cardiovascular disease or elevated cardiovascular risk. Insufficient evidence exists on whether screening improves maternal cardiovascular outcomes.
Comprehensive cardiovascular risk assessment using Life's Essential 8	Insufficient evidence exists on whether using the Life's Essential 8 as a screening and management framework for women of reproductive age reduces maternal cardiovascular morbidity or mortality. However, strong evidence supports addressing many of its components (eg, hypertension, dyslipidemia, diabetes, tobacco use, obesity) in women with adverse pregnancy outcomes.
Integrated cardio-obstetrics care models	Limited evidence suggests that integrated cardio-obstetrics care models may improve select short-term intermediate, process, or use outcomes among pregnant women with preexisting cardiovascular disease cared for in specialized centers. Limited evidence exists on these models' effects on severe maternal morbidity and mortality.
Telehealth	Moderate evidence exists that prenatal and postpartum remote or self-measured BP monitoring with structured clinical response improves process outcomes and short-term BP control. For other telehealth interventions, some studies have shown modest benefits in glycemic metrics or process outcomes, but insufficient evidence exists on their effects on maternal cardiovascular morbidity or mortality.
Supportive services	Moderate evidence suggests that supportive services such as navigation and doula support, when initiated before delivery and continued with repeated active outreach in the postpartum period, lead to improvements in processes of care that mitigate future cardiovascular risk. Limited direct evidence exists on whether these services improve maternal cardiovascular outcomes.
Transitions of care in the postpartum period	Limited evidence suggests that interventions designed to improve the transition from postpartum care improve short-term process outcomes. Insufficient evidence exists on whether they reduce maternal cardiovascular morbidity or improve outcomes in subsequent pregnancies.

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Preventing Pregnancy-Related Cardiovascular Disease Burden: A Report From the National Academies of Sciences, Engineering, and Medicine | Pregnancy | JAMA | JAMA Network

Kansas SHTN Cuff Project
Improved Identification to Treatment

Access to Early and Consistent OB Care

Prevention (ASA daily)

Education: POSTBIRTH

Identification of Need for Home BP monitoring

Home Blood Pressure Monitoring

Education: Home BP Protocol, POSTBIRTH, and Follow-Up

Increased Maternal/Fetal Surveillance

Health Related Social Needs: screenings and referrals

OB Navigation

OB or ED Triage

Timely Treatment (<60 min)

Delivery or Antepartum Follow-Up

Outpatient Follow-Up (72 hours, 7 days)

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Reminder ☺

Severe HTN Bundle completion= December 2026

SHTN Bundle Update!

aka YOUR hard work ☺

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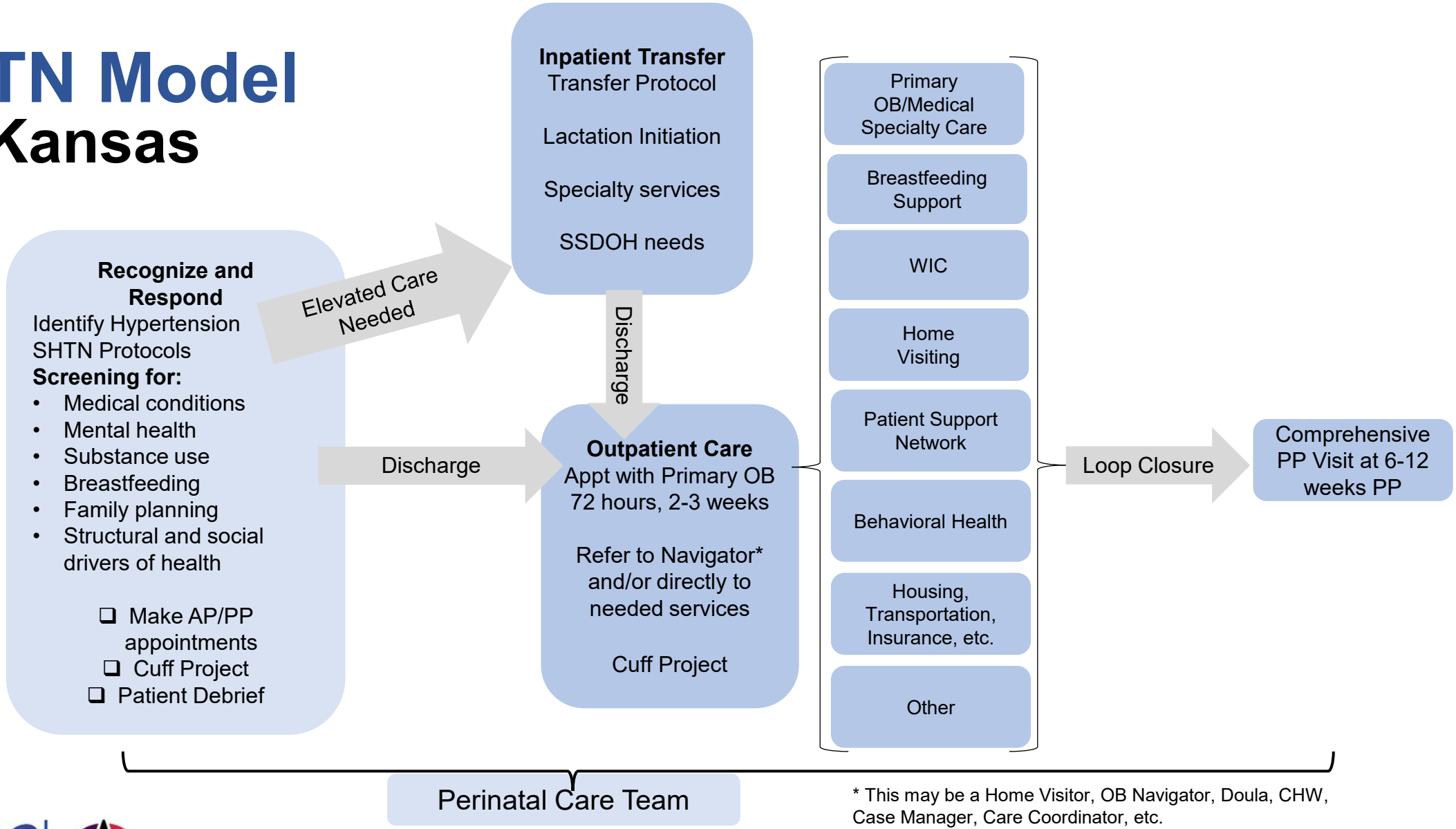
SHTN Model for Kansas



* This may be a Home Visitor, OB Navigator, Doula, CHW, Case Manager, Care Coordinator, etc.

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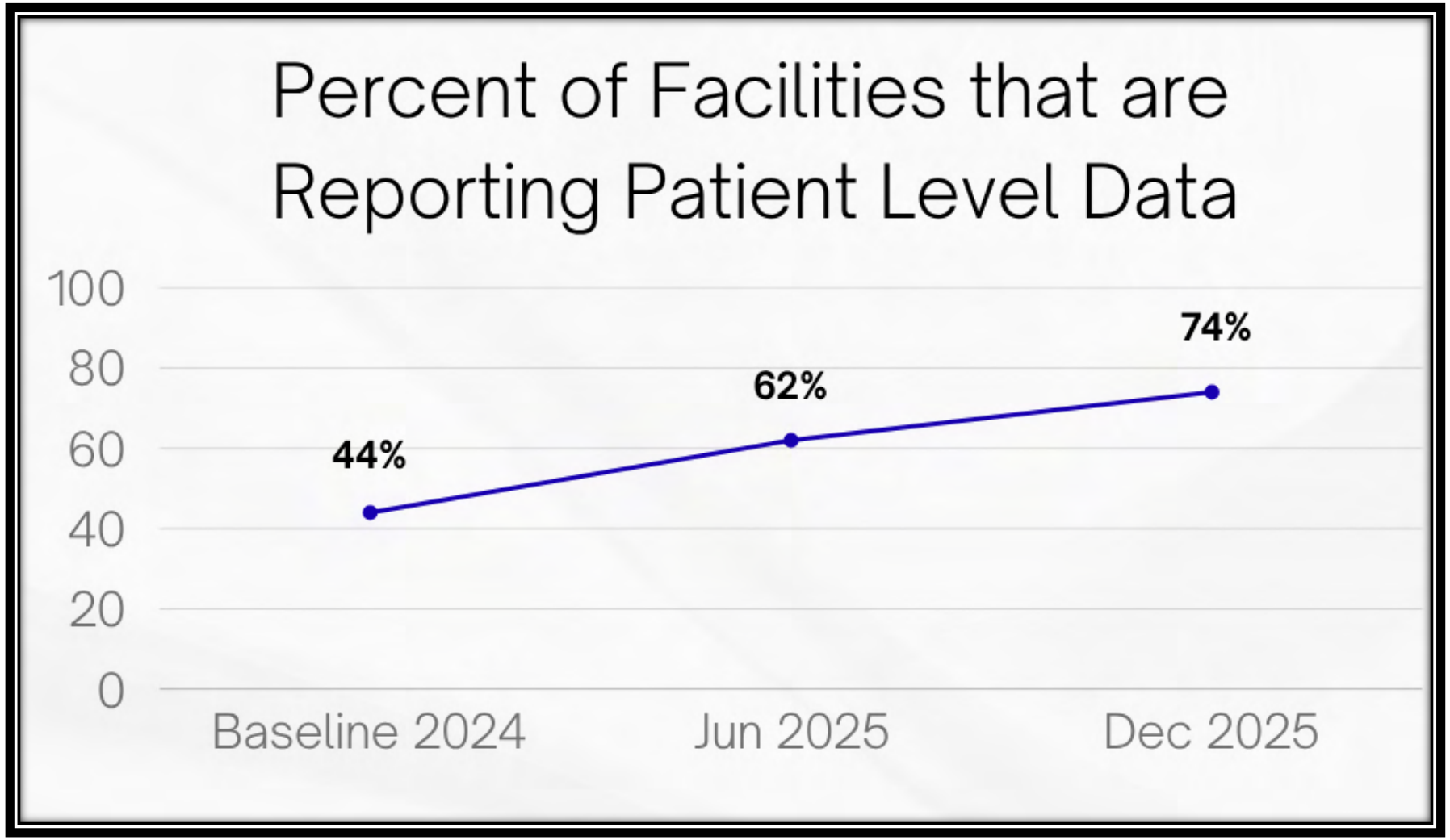
SHTN Bundle Update!

Data…



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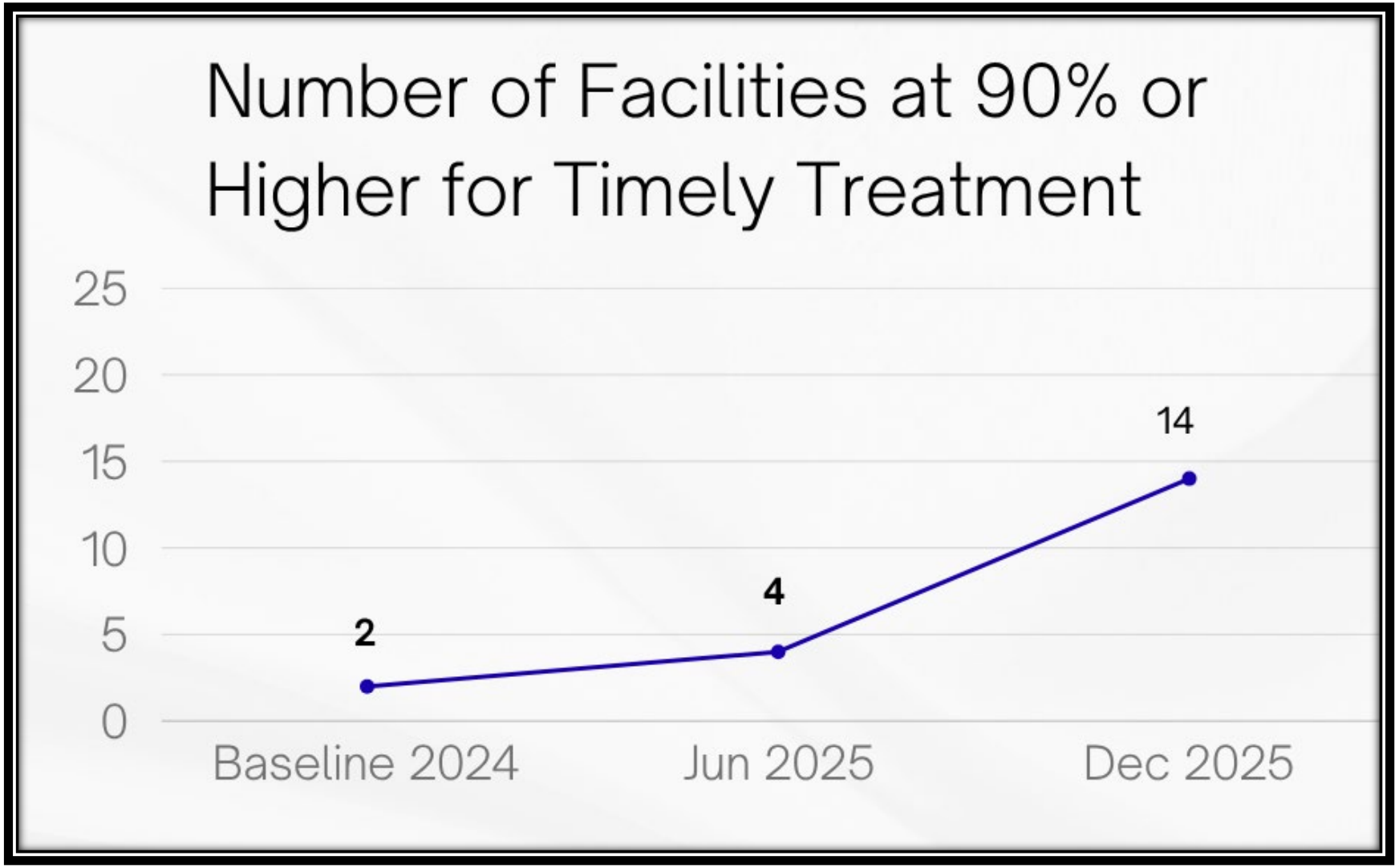
SHTN Bundle Update!

Timely Treatment



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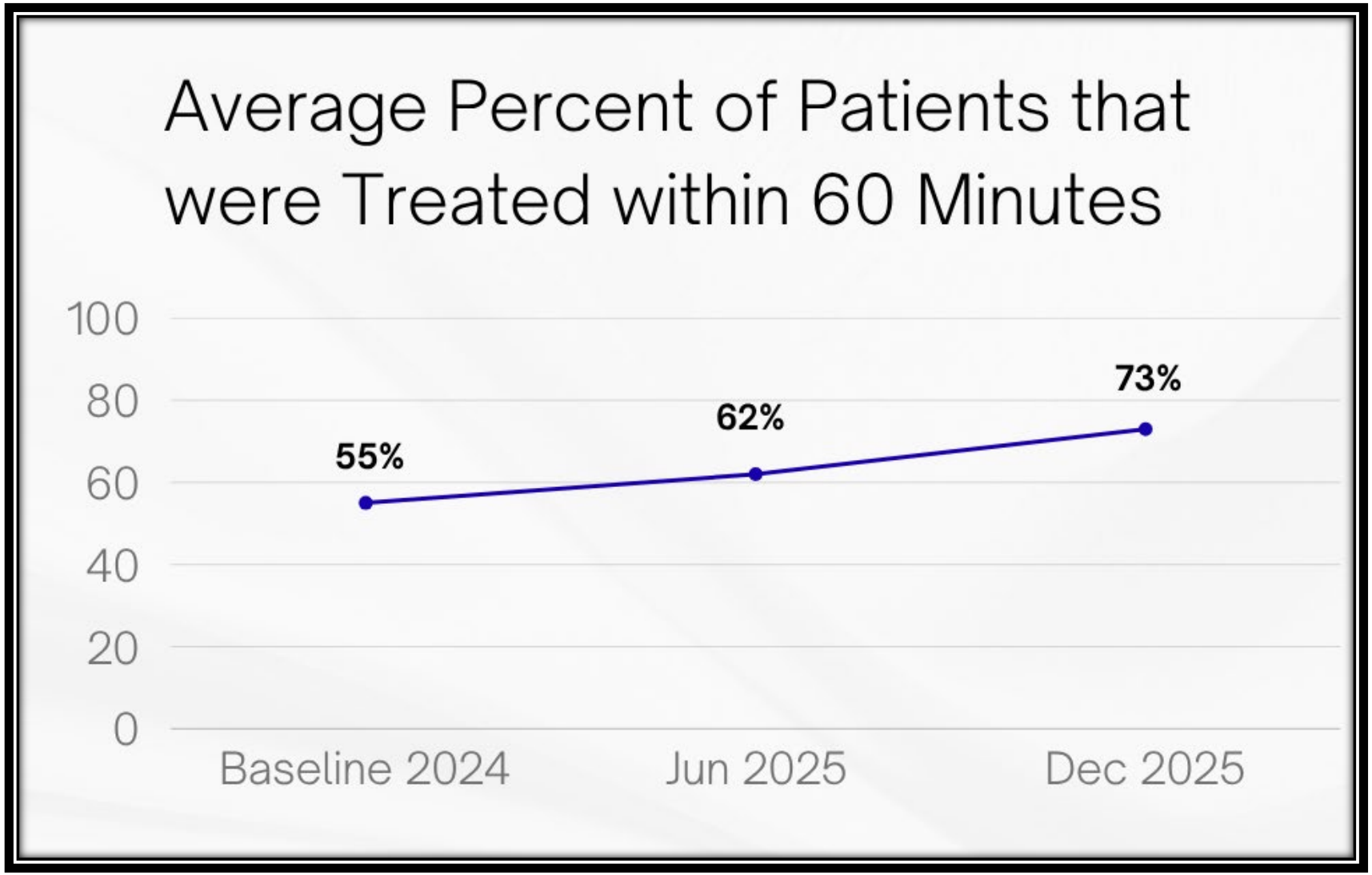

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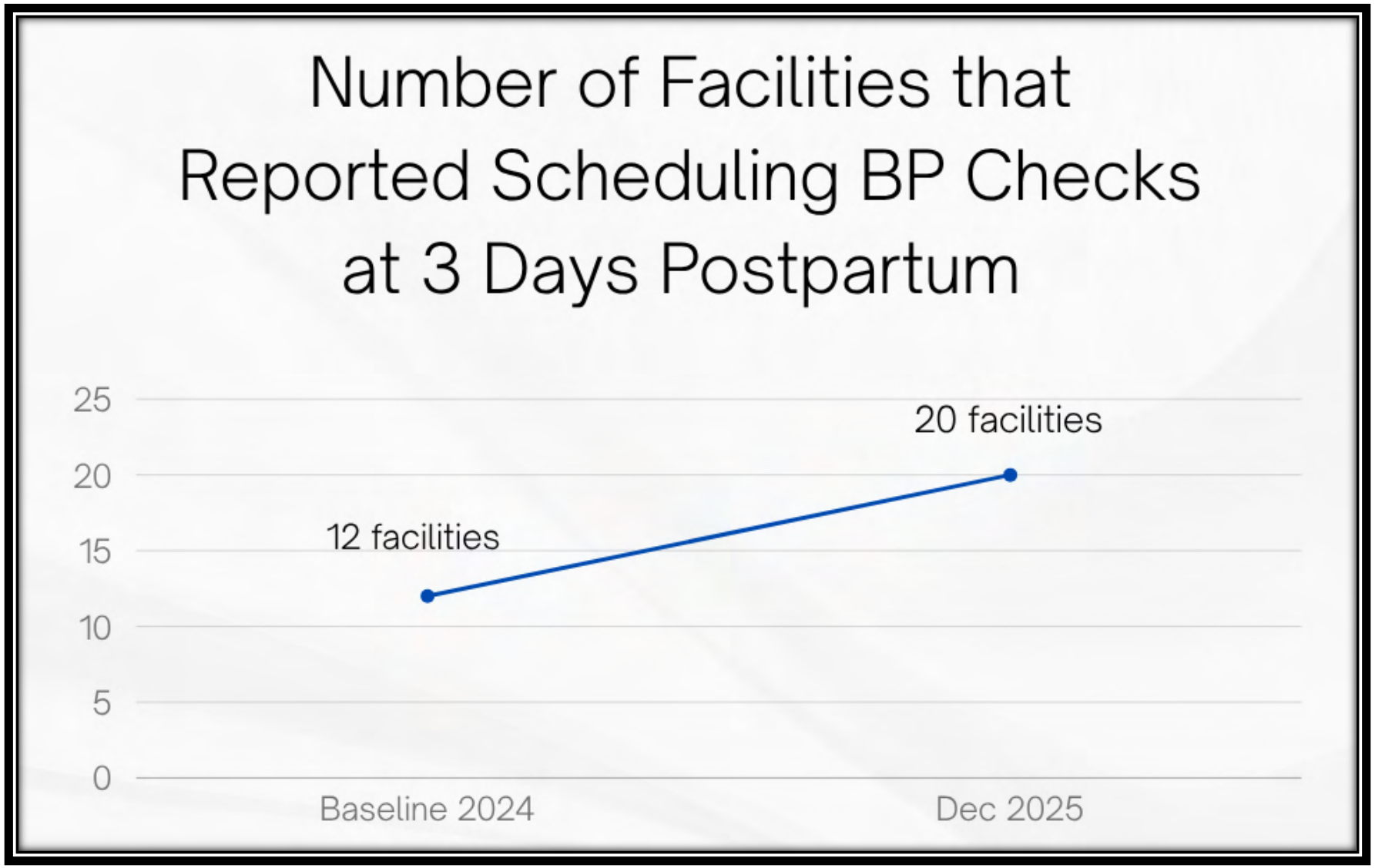
SHTN Bundle Update!

Postpartum BP checks



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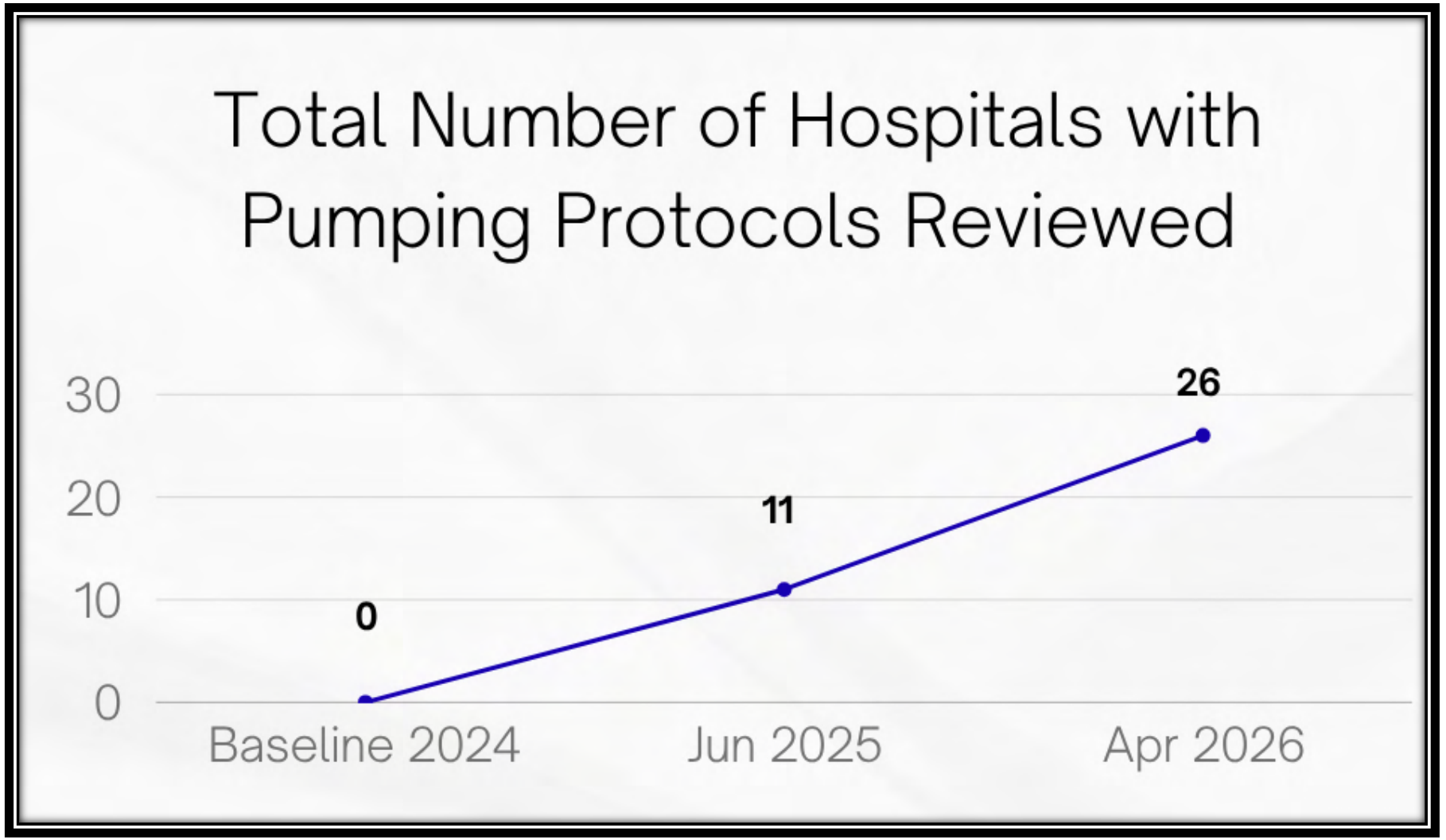
SHTN Bundle Update!

Breast Pumping/Hand Expression Protocols



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OB Simulations… plan of attack across KS

23 of 39 birthing facilities completing OB simulations!

<u>Next steps</u>:

Partnership for Perinatal Excellence- 7 non-birthing facilities!

Overland Park Regional: outreach happening!

KU Care Collaborative: more!

KPQC
Kansas Perinatal Quality Collaborative

OB Simulations… plan of attack across KS

Perinatal Excellence
Christy Evers

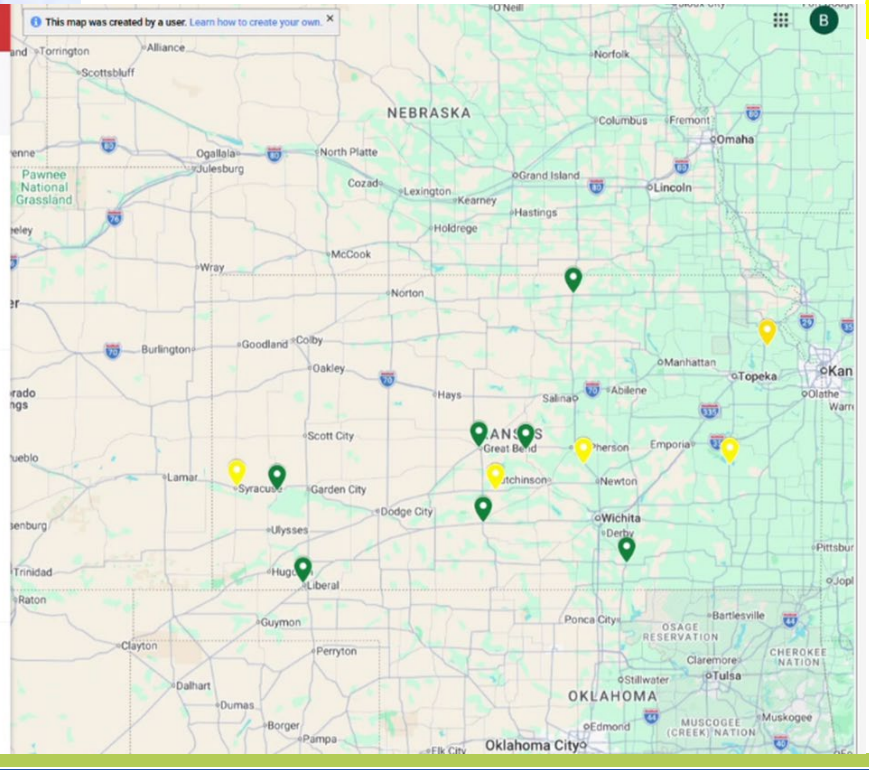
16 views
Published yesterday at 9:14 PM
SHARE

First Stage

- Hamilton County Hospital: Emergency Room
- Stafford County Hospital
- Coffey County Hospital
- FW Huston Medical Center
- Mercy Hospital

Second Stage

- The University of Kansas Health System Great ...
- William Newton Hospital
- Southwest Medical Center
- Republic County Hospital and Belleville Medica...
- Pratt Regional Medical Center
- Kearny County Hospital
- Rice Community Hospital



UPDATE

Kansas Perinatal Quality Collaborative

POSTBIRTH seats… the Re-Launch!

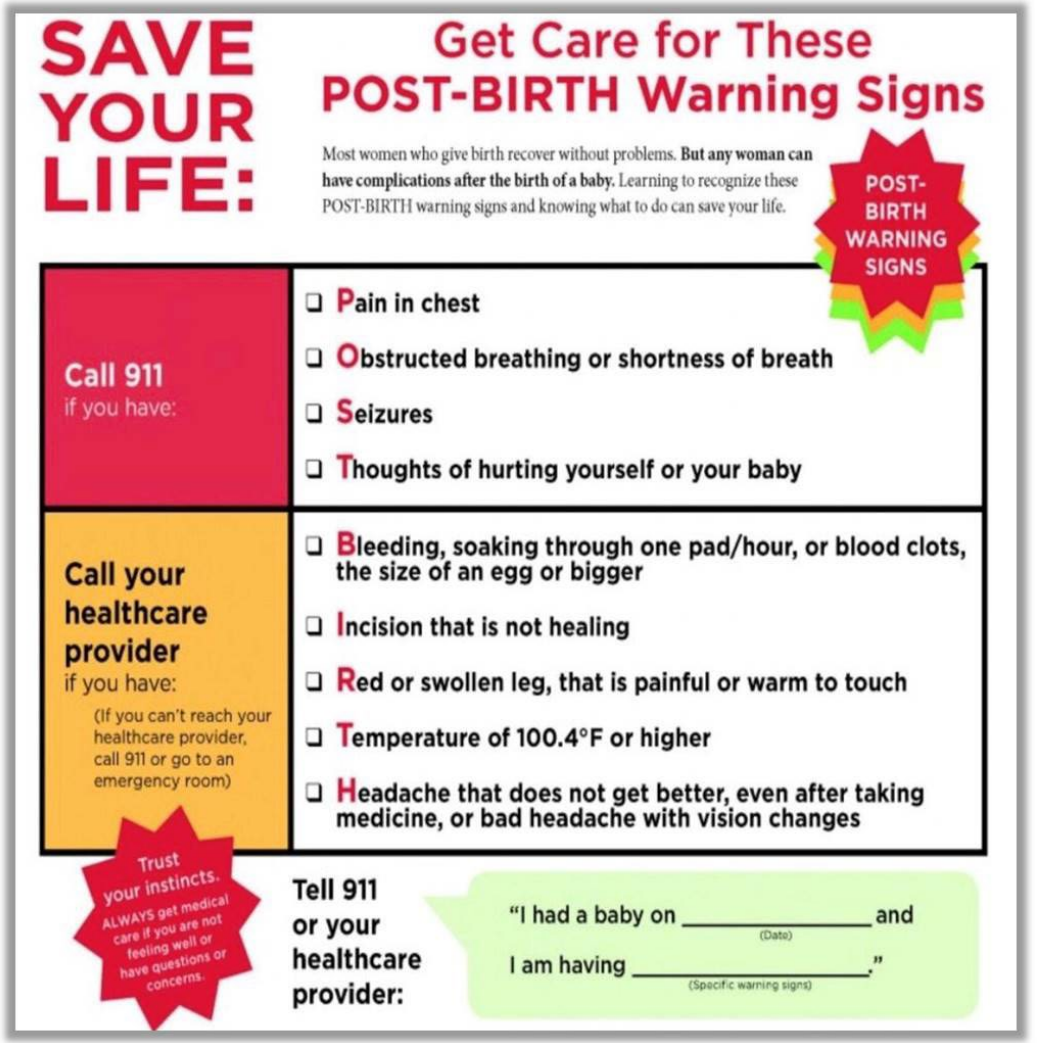
Email sent Jan 2026

Each of 50 hospitals will receive TWO or THREE free seats

Share with ED, EMS, Outpatient Clinics

- Completion: Summer 2026

- How do you plan to use YOUR seats?



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Cuff Pilot Project - Update

- Cuff Pilot Project launched December 2025
  - **2000** cuff kits were purchased with grant funding
    - **1600** disseminated to participating sites for distribution
      - **110** cuffs have been given to patients meeting criteria

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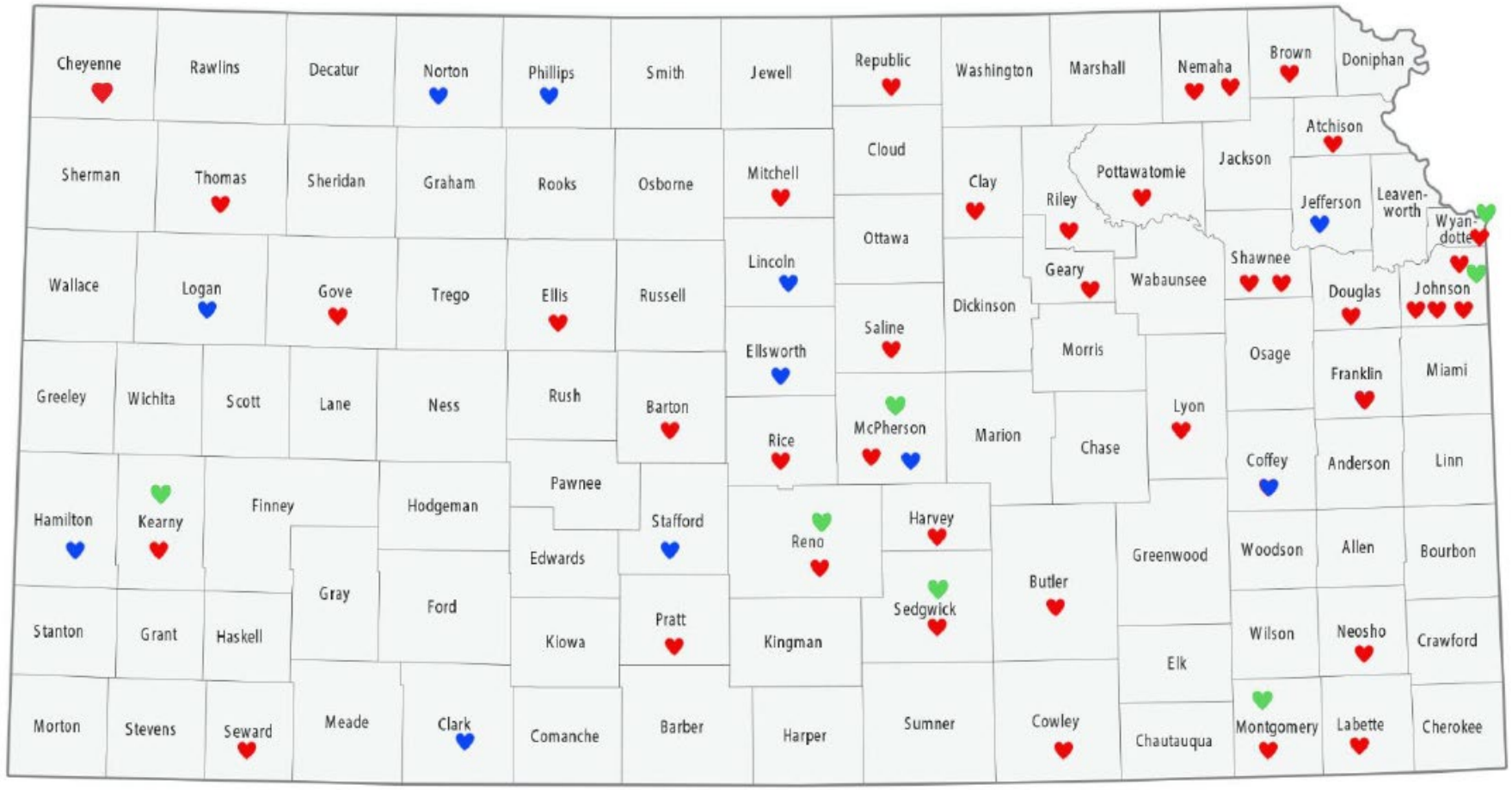
KPQC Severe Hypertension in Pregnancy



39 Birthing Facilities, 11 Non-Birthing Facilities, 7 Cuff Pilot Project Sites

Green hearts are locations participating in the Cuff Pilot Project

Red hearts are birthing facilities enrolled in the AIM Severe Hypertension Safety Bundle

Blue hearts are non-birthing facilities enrolled in the AIM Severe Hypertension Safety Bundle

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"You cannot get through a single day without having
an impact on the world around you.
What you do makes a difference, and you
have to decide what kind of difference
you want to make."

-Jane Goodall

It’s time for Collaboration!

Who drove the furthest?

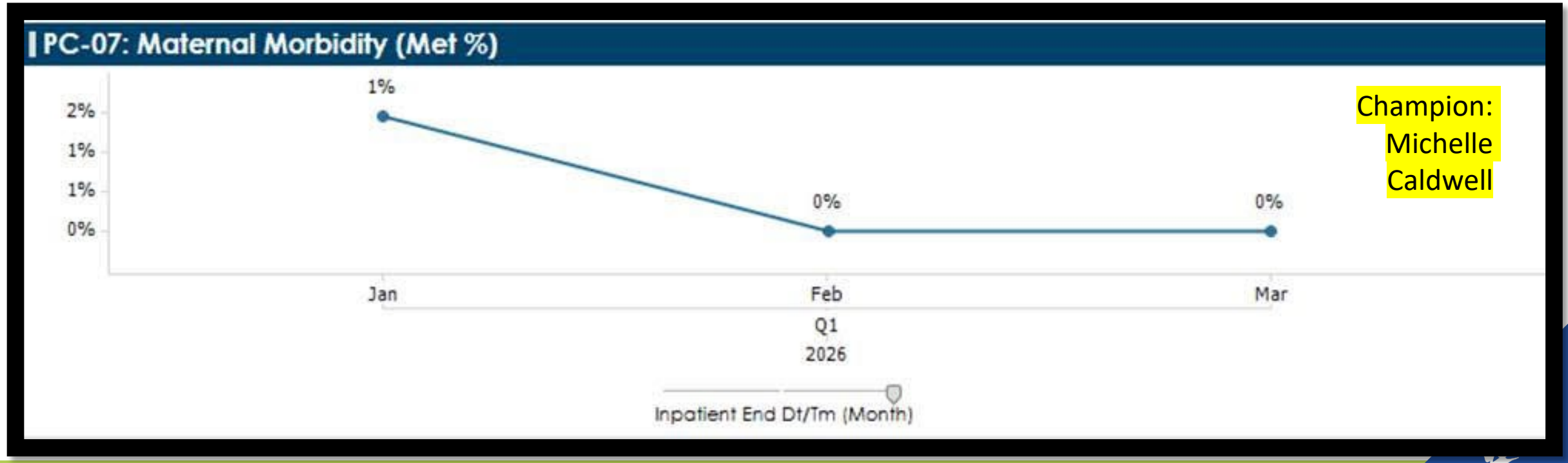
Who has had amniotic fluid on their shoes within the past 48 hours?

Who attended a delivery where the baby was >10lbs in the past week?

Case Studies from the field:
Timely Treatment

Birthing center spotlight: LMH

Timely treatment & Data collection



Champion: Michelle Caldwell

Birthing center spotlight: LMH

Timely treatment (Jan-March 2026)

Jan 2026: 100%

Antihypertensive given within 1	F/U 2-3 d scheduled	Pt seen	DX	RACE
yes	yes	yes	SHTN	white
yes	yes	yes	SHTN	White
No labetalol 9:23 Dx: 06:55	Yes-ordered	FP	SHTN	Declined
No but N/A BP NOT SEVERE	yes	yes	SGHTN	White
YES Procardia 10 @1310	Yes	YES	HELLP	other/hisp
N/A not severe	NA	NA	HTN	White
Transfer to KUMED/AFI 47.8				

Feb 2026: 1 fall out

Antihypertensive given <60 min of Dx
DX: 10:34 YES Procardia 2 10:56
DX: 12:30 None given
Dx: 10:10 YES Labetalol at 10:33

Birthing center spotlight: LMH

Timely treatment (Jan-March 2026)

March 2026: 1 fall out

Antihypertensive given within 1 hr	F/U 2-3d scheduled	Pt seen	DX	RACE	Other	Payer
yes labetalol	N/A transfer to KU		SHTN	White	33w	BCBS
no just mag	yes	yes	SHTN	White	35w/PUPP	Cigna
N/A didn't meet severe range, but on MA	yes	no show i	Spre E	white	PPD2, PPH	AARP
yes labetalol	yes	yes	SHTN	white	A1GDM	BCBS
yes labetalol	Yes	Yes	HELLP	white	30w	Tricare

Case Studies from the field:
Timely Treatment & Staff Education

Birthing center spotlight: **Pratt**

Timely treatment & Education

PLUS Provider Adherence

Maranda Rebel= Champion

For the “Timely Treatment” portion of the SHTN bundle, we are experiencing ongoing challenges with consistency in practice. While the protocol for treating severe range blood pressures within 60 minutes is established, adherence is variable among providers.

A key barrier has been resistance to the associated education. Some providers have expressed that they do not feel the education is necessary, and in a few instances, it has been directly dismissed. This has translated into delays in treatment, as severe range blood pressures are at times not being acted on per protocol. Instead, they may be attributed to factors such as patient anxiety, improper positioning (e.g., semi-Fowler’s rather than fully upright with feet on the floor), or concerns about the accuracy of the reading. As a result, repeat measurements, further observation, or even dismissal may occur without timely pharmacologic intervention, even when criteria for treatment are met.

From a workflow perspective, nursing staff are identifying and communicating severe range blood pressures appropriately, but escalation does not always lead to treatment within the 60 minute window. We are continuing to reinforce the protocol expectations and the importance of timely intervention for patient safety, and would love suggestions to improve provider engagement and accountability.

Regarding postpartum blood pressure follow up, we are meeting the goal of evaluation within 3 days of discharge. All patients are scheduled for a well mom/well baby visit within 2–3 days, which is completed by nursing staff on our unit. During these visits, blood pressure checks and symptom assessments are performed. If any abnormalities are identified, the nurse contacts the provider to request physician evaluation and further management as needed.

Thank you,
Maranda Rebel and Kaitlyn Longbine

Case Studies from the field:
Triage & Postpartum Follow Up appts

Birthing center spotlight: **UKHS St Francis**

Education & Triage

Shelly Hooker= Champion

I've created a folder with all our resources that KPQC has provided (PowerPoint presentation on all things HTN and all the algorithms from ACOG/CMQCC) so staff can access it always. I've also added the treatment algorithms laminated to every labor room so that this resource is within reach always. I had a win a few weeks ago actually where one of our nurses was triaging a patient for a pre-e workup, and the provider wanted to discharge the patient home. The nurse disagreed with the provider, went and grabbed my resource folder that had the diagnostic criteria for pre-e, and after showing it to the provider, it was decided not only to not let the patient go home, but to admit her and put her on Magnesium sulfate and induce her. It helped me feel like I was finally getting somewhere!

Birthing center spotlight: UKHS St Francis

Postpartum Follow Up

As for Postpartum visits, there is something we just started trialing. Our lactation counselors see a lot of infants usually the day after discharging up to a few days after discharge for weight checks and breastfeeding assistance. They always comb through the patient's charts to see if they have a hx of hypertension of any kind as this can affect milk supply. They will start the practice of, when they schedule their follow up lactation visits with patients prior to discharge, they are adding into their discharge directions directing them to go directly to the office to get their blood pressures checked right before they come to lactation appointments. Previously what they were doing were BP checks in the lactation clinic, but we found that sometimes this was getting forgotten, or the charting wasn't getting done around it, which obviously makes it hard to audit. If the patients don't make it before their lactation appointments, lactation will strongly encourage them to go directly to the clinic as soon as their lactation appointment is over. The OB clinic and lactation visits are in the same building making it easier for the patients to do both while they are already there.

Things that we have already implemented at the hospital to help promote this are:
-adding a smart text statement to our discharge education that tells the patients to go get their BP check done when and why. The discharge nurse is supposed to highlight that information and go over it with the patient prior to discharge.
-The OB clinic has pretty open office hours for patients to come in when it works best for them for their "nurse visit" appointment. They are open Monday through Friday from 8-5 for walk-in appointments.

Barriers that we have had are:
-Our discharge nurses can't make the appointments for the patients on their own through EPIC, they would need to contact the office to create a "Nurse visit" appointment on a specific date/time. If the patient has an actual "Nurse Visit" appointment scheduled, then when we print the discharge paperwork for the patient, it will show up on future appointments, I think helping to remind the patients to attend this visit. Our nurses are short staffed, over-worked, and this workflow is a hard one for them to call the clinic to schedule this appointment for individual patients.
-Our doctors are short staffed and over-worked. They don't feel it's a feasible workflow to send a message to their nurses in EPIC to scheduled a "nurse visit" appointment for each individual appointment that meets the criteria.

Ultimately, it comes down to patient accountability, and even though you tell them they need to get their blood pressures done, regardless of education you provide, some patients will come do it and some won't.

Case Studies from the field:
Non-birthing Facilities!

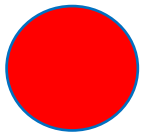
Birthing center spotlight: **Stafford County**

ED SHTN Protocols

Nikki Pretorius= Champion

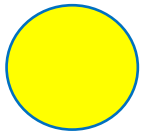
**Not in attendance

Breakout sessions:



Protocols/Timely Treatment (Terrah & Kari) Powerhouse

- Identify barriers to implementing protocols for facilities
- Evaluate protocol inclusion: Defining severe hypertension in pregnancy (≥160 systolic or ≥110 diastolic) and differentiate between chronic hypertension, gestational hypertension, preeclampsia and eclampsia.
- Identify barriers to timely treatment per protocol for severe hypertension (within 30-60 minutes)
- Develop education to support safe selection and administration of antihypertensive medications (e.g. labetalol, hydralazine and nifedipine)



OB-ED collaborations and challenges, Transfer Protocol (Abbie Weatherly) Powerhouse

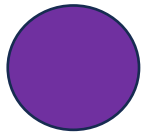
- Define collaboration between OB and ED departments in the antepartum and postpartum setting
- Review and analyze the use of shared protocols for emergency management of hypertensive disorders and eclampsia
- Evaluate quality improvement processes used to assess timely treatment of severe range blood pressure readings in ED for pregnant and postpartum patients

Breastfeeding: Pumping/Hand Expression Protocols, High 5 & Baby Friendly questions (Michelle Finn, Dana Deters) Overflow

- Identify the correct timing for initiation of hand expression and/or pumping for the postpartum dyad with extended separation
- Summarize current trends in High 5 for Mom & Baby and Baby Friendly hospitals
- Identify the updated resources available for Substance Abuse Disorder in the setting of lactation postpartum
- Evaluate breastfeeding protocols that include hand expression and/or pumping best practice models at birthing hospitals

Intimate Partner Violence (Maggie Clevenger, Terrah Stroda) Powerhouse

- Describe components of the Intimate Partner Violence Workflow document as well as the Community Partnership Agreement
- Develop strategies for how each enrolled hospital will add or continue CUES as part of the standard workflow for IPV identification and referral
- Formulate how each hospital will complete the Community Partnership Agreement in collaboration with IPV agencies in their community or region



Maternal Mental Health (Jennifer Guarino, Alexis Tibbitts) Overflow

- Analyze current trends in birthing and non-birthing hospitals around maternal mental health
- Evaluate use of the Kansas Connecting Communities team for improving patient screening and referral for both outpatient and inpatient obstetric settings
- Collaborate to identify solutions for local challenges impacting maternal mental health outcomes
- Analyze the KCC Provider Line and other resources of assistance

KPQC-morning sessions

KPQC-afternoon sessions

Next Steps

Learning Forums

Individual TA

Next Bundle!

Kansas Perinatal Quality Collaborative