

Cervical Ripening and Labor Induction and Augmentation

6th Edition Monograph Updates



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Questions

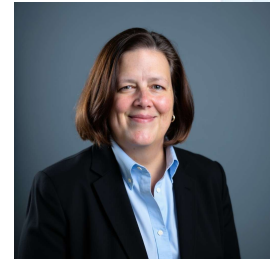
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Presenter

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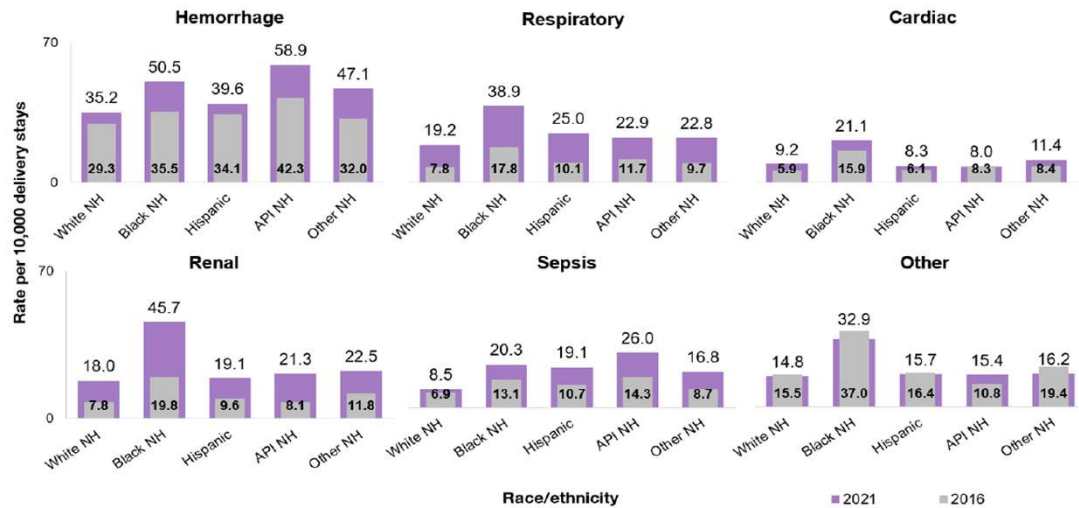
US Labor and Birth Care in 2025

- Patients have more morbidity and are older at first birth
- Interventions are more frequent, including for low-risk patients (nulliparous, term, singleton, vertex)
- Increases in:
 - Severe maternal morbidity
 - Induction of labor
 - Cesarean birth
- Maternal mortality compares unfavorably with other high-income countries



US Maternal Morbidity

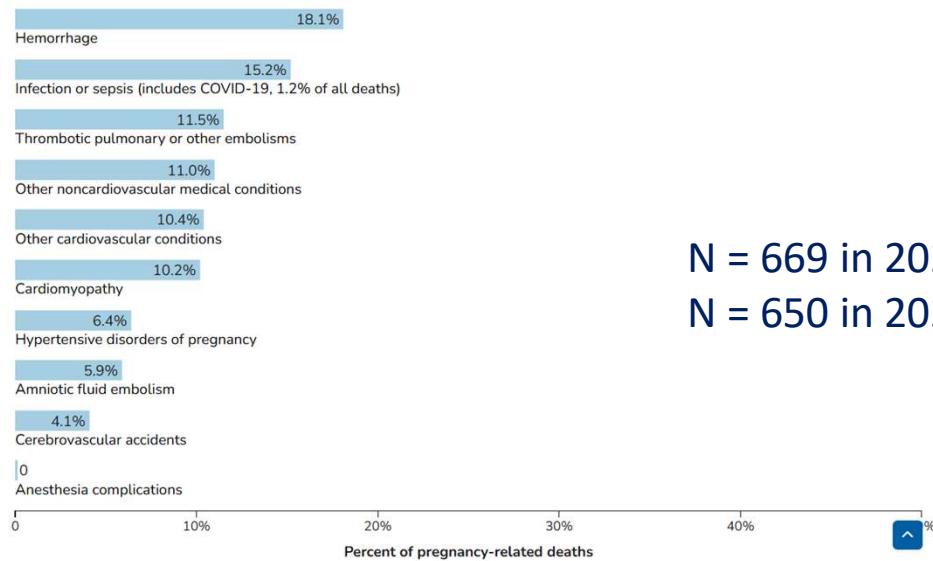
Figure 4. Rate of severe maternal morbidity (SMM) by complication groups and patient race/ethnicity, 2016 and 2021



Reid, L. D. (2024, September). *Trends in severe maternal morbidity complications by patient characteristics, 2016–2021* (HCUP Statistical Brief No. 312). Agency for Healthcare Research and Quality, Rockville, MD. <https://hcup-us.ahrq.gov/reports/statbriefs/HCUP-SB312-508.pdf>



Causes of Pregnancy-Related Deaths, 2023 United States



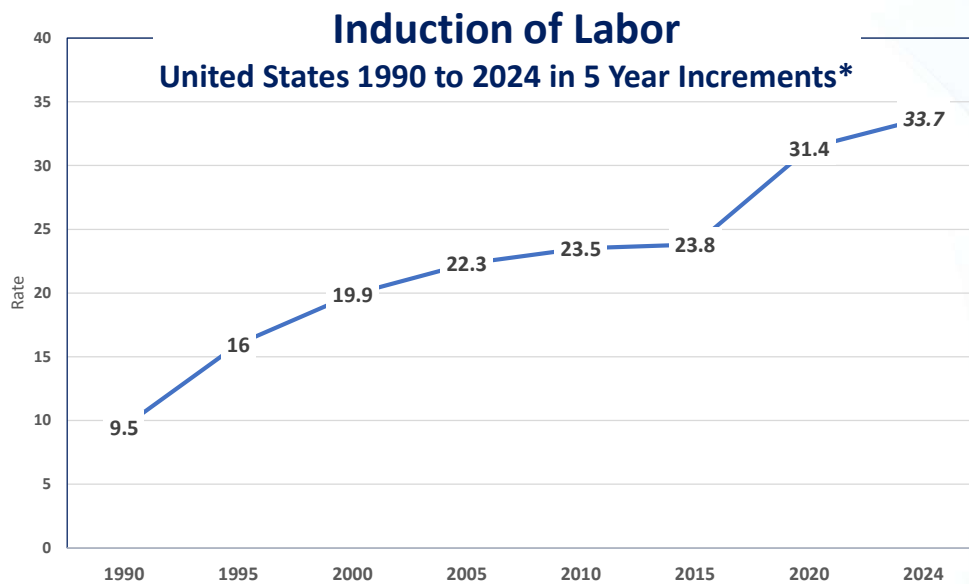
N = 669 in 2023

N = 650 in 2024

CDC, Jan 2025 Pregnancy Mortality Surveillance System United States

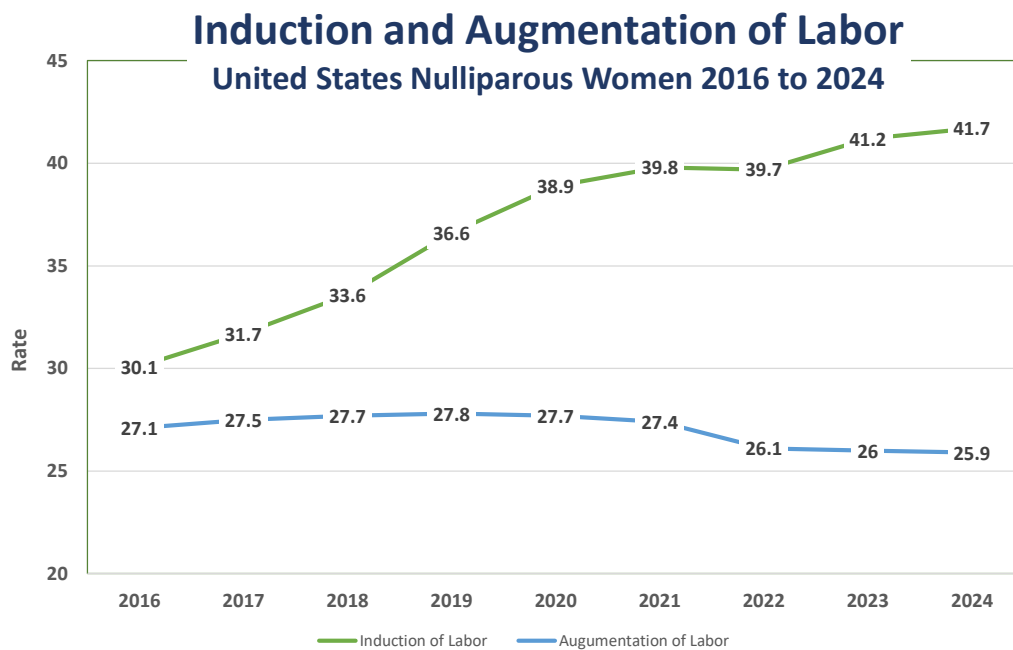
<https://www.cdc.gov/maternal-mortality/php/pregnancy-mortality-surveillance-data/index.html?cove-tab=3>





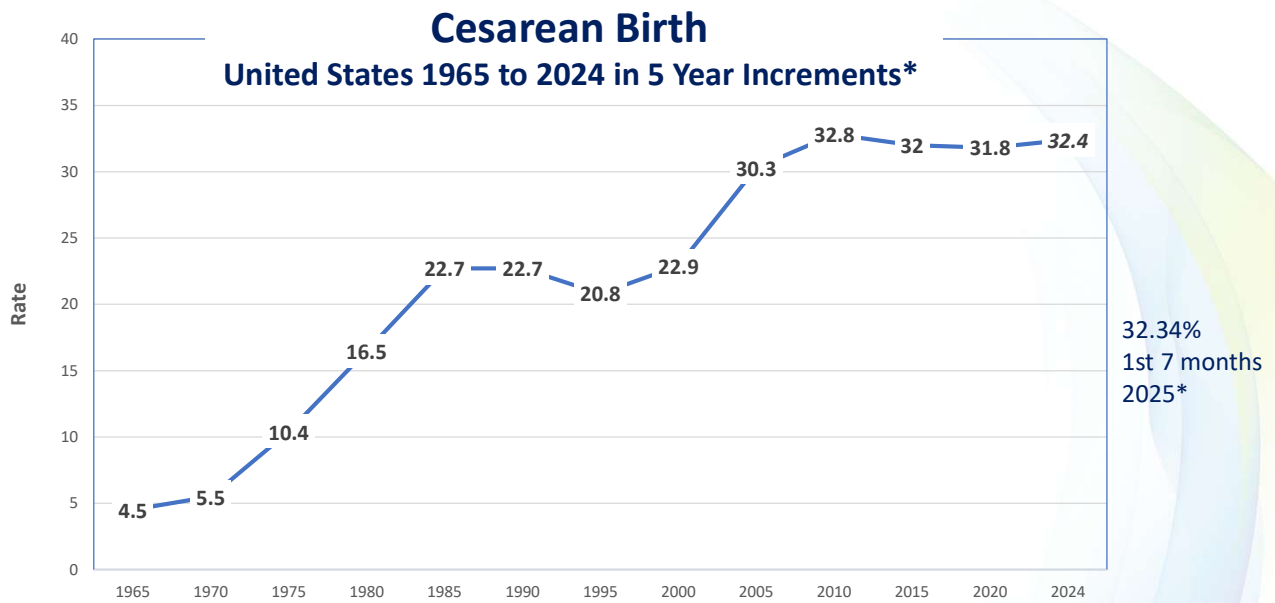
Induction of Labor Data First Collected from US Birth Certificates in 1989; Rate was 9%

Adapted from: Simpson, K. R. (2022). Trends in labor induction in the United States, 1989 to 2020. *MCN, The American Journal of Maternal Child Nursing*, 47(4), 235. <https://doi.org/10.1097/NMC.0000000000000824>



Adapted from Simpson, K. R. (2024). Trends in labor induction and augmentation for women in the United States having their first live birth, 2016 to 2022. *MCN, The American Journal of Maternal Child Nursing*, 49(6), 239. <https://doi.org/10.1097/NMC.0000000000001042>





Cesarean Data First Collected 1965 from National Hospital Discharge Survey Data, then from US Birth Certificates, 1989

From: Simpson, K. R. (2025). *Fetal assessment and safe care during labor*. NCC EFM Monograph.



US Cesarean Birth Rates by Type

2016 to 2024

	2016	2017	2018	2019	2020	2021	2022	2023	2024
All	31.9	32.0	31.9	31.7	31.8	32.1	32.1	32.3	32.4
Primary	21.9	21.7	21.6	21.9	22.3	22.5	22.5	22.8	22.9
NTSV	25.7	26.0	25.9	25.6	25.9	26.3	26.3	26.6	26.7

Simpson, K. R. (2025). Rates of induction of labor and cesarean birth for low-risk nulliparous (NTSV) women in the United States, 2016 to 2024. *MCN, The American Journal of Maternal Child Nursing*, 50(5), 311-312. <https://doi.org/10.1097/NMC.0000000000001116>



Influence of the ARRIVE Trial (Grobman et al., 2018)

Main Finding

- It is safe for healthy nulliparous women to await spontaneous labor

Since publication of the ARRIVE Trial

- Induction of labor and cesarean birth in total and for low risk (NTSV) women has increased
- Hope of NTSV cesarean rates decreasing as more low-risk patients are induced at 39 weeks has not been realized

Potential Reasons

- Researchers estimated 28 women would need to plan to be induced at 39 weeks to avoid 1 cesarean
- All maternity units are not using labor management guidelines suggested for sites in the trial
 - a) cervical ripening for a modified Bishop score <5,
 - b) at least 12 hours in the latent phase after completion of cervical ripening,
 - c) rupture of membranes, and
 - d) use of oxytocin before considering the induction failed.

Simpson, K. R. (2025). Rates of induction of labor and cesarean birth for low-risk nulliparous (NTSV) women in the United States, 2016 to 2024. *MCN, The American Journal of Maternal Child Nursing*, 50(5), 311-312. <https://doi.org/10.1097/NMC.0000000000001116>



Clinical Controversies

- High dose vs low dose oxytocin
- Oxytocin half-life
- Outpatient cervical ripening



High Dose vs Low Dose Oxytocin Studies

Common Outcomes Studied

- Cesarean birth
- Tachysystole
- Length of labor
- Chorioamnionitis

Less Commonly Studied

- Effects on the fetus
 - Newborn outcomes (usually under powered)
 - Patient consent and understanding
 - Patient experience
- 

High Dose vs Low Dose Oxytocin Studies

Challenges in interpretation of findings in systematic reviews

- Differences in definition of high dose (amount, increase interval, or both)
 - Tachysystole (all acknowledge increase but some don't consider it a problem; others cite it as a reason for recommendation of low dose for patient safety)
 - Slightly shorter labor (differences in measuring duration of labor)
 - Less chorioamnionitis (no consistent definition; most use clinician diagnosis in labor with no follow-up on mother, baby, or laboratory results)
 - Many comparative studies conducted outside the US where practice is quite different in staffing, personnel, and patient mobility in labor
 - Inclusion and exclusion criteria used in systematic reviews and meta-analysis can add bias to results
- 

Oxytocin Half-Life

- Study Participants (women or men; pregnant or not)
- Timing of Measurement (nonpregnant, pregnant, labor, postpartum, post-menopause)
- How Oxytocin Dose was Given (**IV**, IM, sublingual, vaginally)
- Measurement Technique (traditional “gold standard” radioimmunoassay [RIA] used in studies from the 1970s to the 1990s or enzyme-linked immunosorbent assay)



Oxytocin Half-Life

Study Participants and Timing of Measurement:

- **Laboring women** (Amico et al, 1984; Dawood, 1995; Seitchik et al. 1984)
 - 8 to 12 minutes; 12.3 to 17.4 minutes
- Nonpregnant and pregnant women (Ryden & Sjöholm, 1969)
 - 3 to 5 minutes
- Pregnant women near term (Saameli, 1963)
 - 3 to 4 minutes
- Postpartum women (Gibbens et al., 1972)
 - 3 minutes
- Postmenopausal women (Nielsen et al., 2017)
 - 5.5 minutes
- Men (Legros et al., 1984; Vankrieken et al., 1983)
 - 5 to 6 minutes



Oxytocin Half-Life

Study factors account for differences in reported half-lives by oxytocin manufacturers: 3 to 20 minutes (Buckley et al., 2023)

All but one of the various manufacturer's product information (package inserts) did not give a citation for the half-life reported

30 to 40 minutes to reach steady state concentration

(Amico et al., 1984; Dawood, 1995; Seitchik et al. 1984)

Buckley, S., Uvnas-Moberg, K., Pajalic, Z., Luegmait, K., Ekstrom-Bergstrom, A., Dencker, A.,...Magistretti, C. M. (2023). Maternal and newborn plasma oxytocin levels in response to maternal synthetic oxytocin administration during labour, birth and postpartum – A systematic review with implications for the function of the oxytocinergic system. *BMC Pregnancy and Childbirth*, 23, 137. <https://doi.org/10.1186/s12884-022-05221-w>



Outpatient Cervical Ripening

Agency for Healthcare Research and Quality (McDonagh et al., 2021)

- 30 RCTs, 10 cohort studies (73% fair quality) with 9,618 patients
- Evidence is most applicable to women aged 25 to 30 yrs with singleton, vertex presentation and low-risk pregnancies
- No studies on fetal surveillance
- Limitations: quantity, quality, and sample sizes of trials for specific interventions, particularly rare harm outcomes
- **May be safe, but evidence is low strength, and future studies are needed to confirm these findings (AHRQ, 2021)**



Outpatient Cervical Ripening

ACOG (2025)

- Applies to term, singleton, vertex pregnancies with membranes intact, because this is the population in whom most studies were conducted
- Meta-analysis on pharmacologic methods of outpatient cervical ripening (42 trials; 6,093 patients; majority [24] outside US including Iran [8], France [4], Scotland [2], Sweden [2], India [2], Nigeria [1], Sri Lanka [1], Egypt [1], Netherlands [1], Israel [1])
- Most of the comparative studies were conducted in low-resource countries where practice is quite different from the US



Outpatient Cervical Ripening

ACOG (2025)

- Concluded vaginal misoprostol at 25 mcg most effective at reducing time to vaginal birth; not associated with a change in odds of cesarean birth, need for additional ripening methods, or adverse perinatal outcomes (Vilchez et al., 2025)
- Absence of an indication for maternal or fetal monitoring during cervical ripening is an inclusion criterion for these studies; affects generalizability of findings
- Suggests outpatient cervical ripening is safe, effective way to reduce time from admission to birth in low-risk patients (**conditional recommendation**; high quality evidence); **however, most of the supportive evidence is from studies conducted outside the United States in low resource countries where practice is quite different; applying this to clinical practice in the US would be challenging**



New Publications from ACOG

Jan 2024	First and second stage labor management (Clinical Practice Guideline No. 8)
Jan 2025	Management of full-term nulliparous individuals without a medical indication for delivery (Clinical Practice Update)
May 2025	Quality-improvement strategies for safe reduction of primary cesarean birth (Committee Statement No. 17)
July 2025	Cervical ripening in pregnancy (Clinical Practice Guideline No. 9)
Oct 2025	Intrapartum fetal heart rate monitoring: Interpretation and management (Clinical Practice Guideline No. 10).



Promoting Evidence-Based Care

- Knowledge and skill in interpretation of research about fetal assessment and care during labor is necessary for making evidence-based decisions
- Read beyond the abstract and authors' conclusions
- Consider what was studied, the methodology, study participants, settings, and sample size, what outcomes were considered important and what outcomes were not, consistent definitions of those outcomes, results, number of patients needed to treat to potentially achieve those results
- Apply that information to clinical practice and unit policy and protocol in a collaborative approach are critical skills to promoting safe care



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Questions

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