



Induction of Labor

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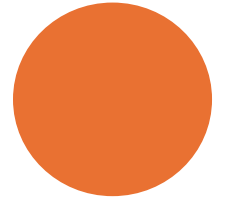
History of the labor curve

Labor

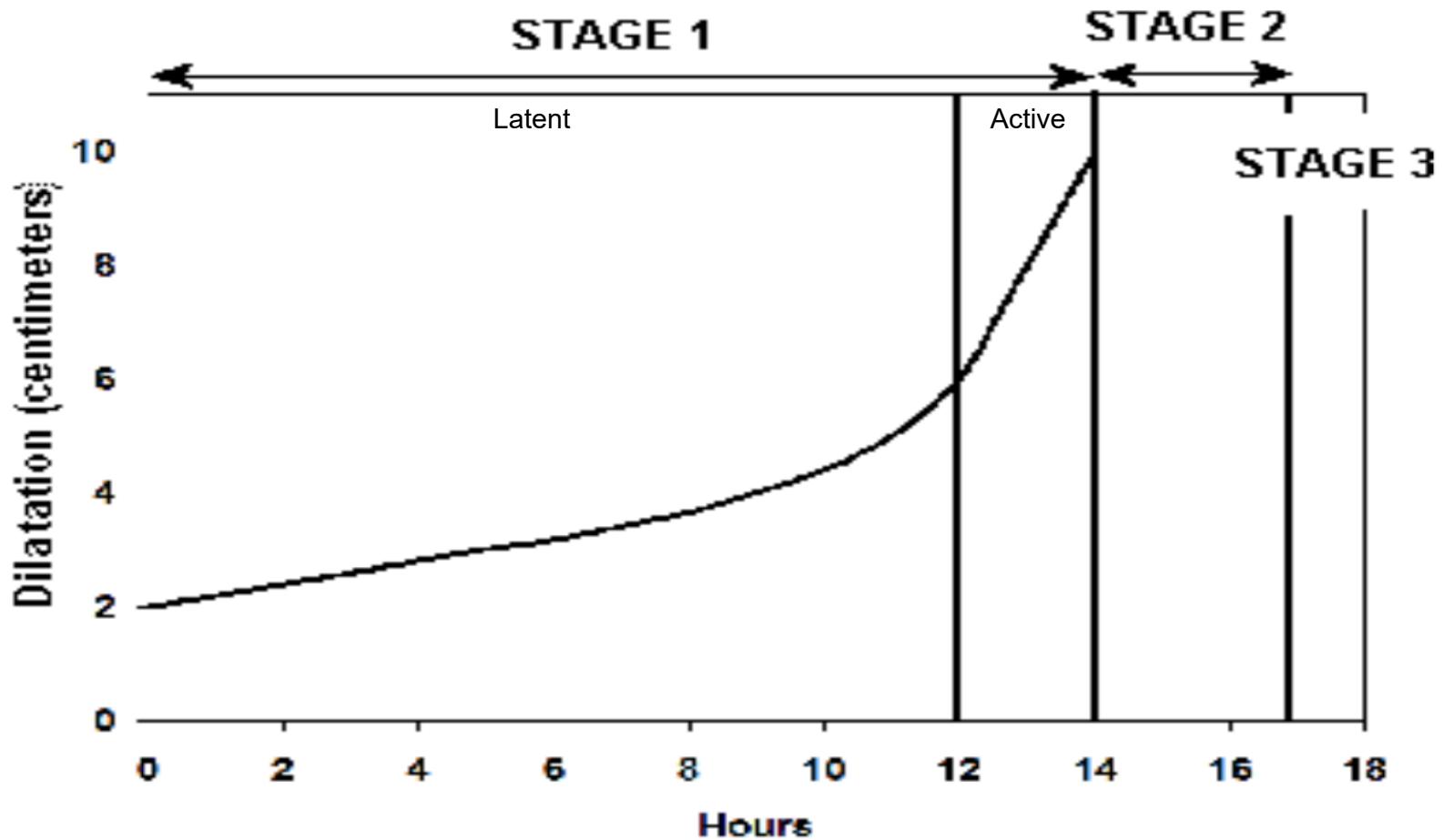
Definition:

Regular uterine contractions that demonstrate cervical effacement, dilation or both

Labor isn't perfect!
No one size fits all



Labor Curve



Timeline of Labor Curve

First stage:

- Latent: 4.5-16 hours; active: 0.5-0.7 cm/hr nulliparous, 0.5-1.3 cm/hr multiparous
- Protracted latent phase: ruptured, on Pitocin for 12-18(24) hours
- Active phase arrest if: no progression in 4 hours with effective, 6 hours with ineffective contractions

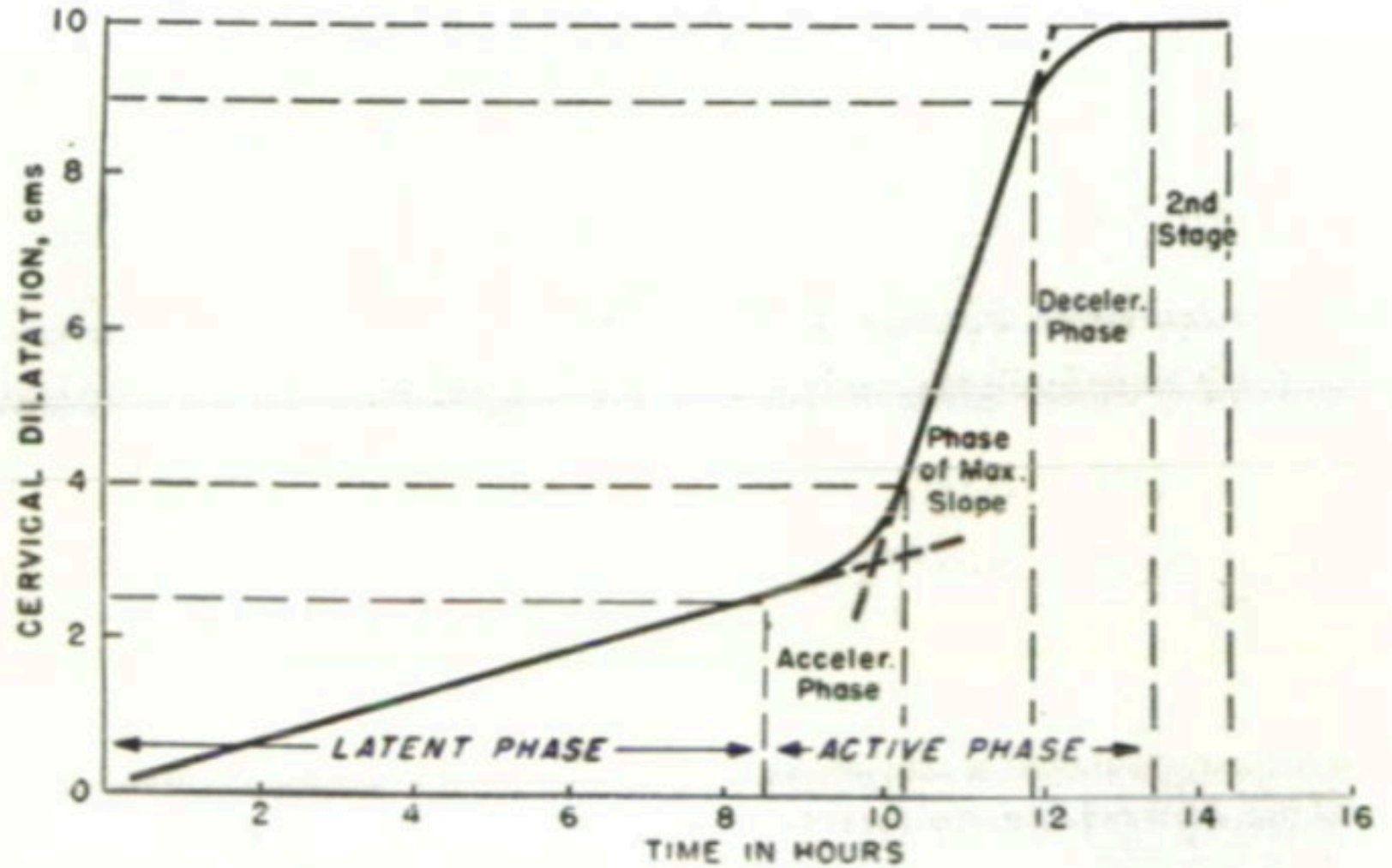
Second stage:

- Arrest if no cervical change in**:
- 3 hours or more in nulliparas
- 2 hours or more in multiparas

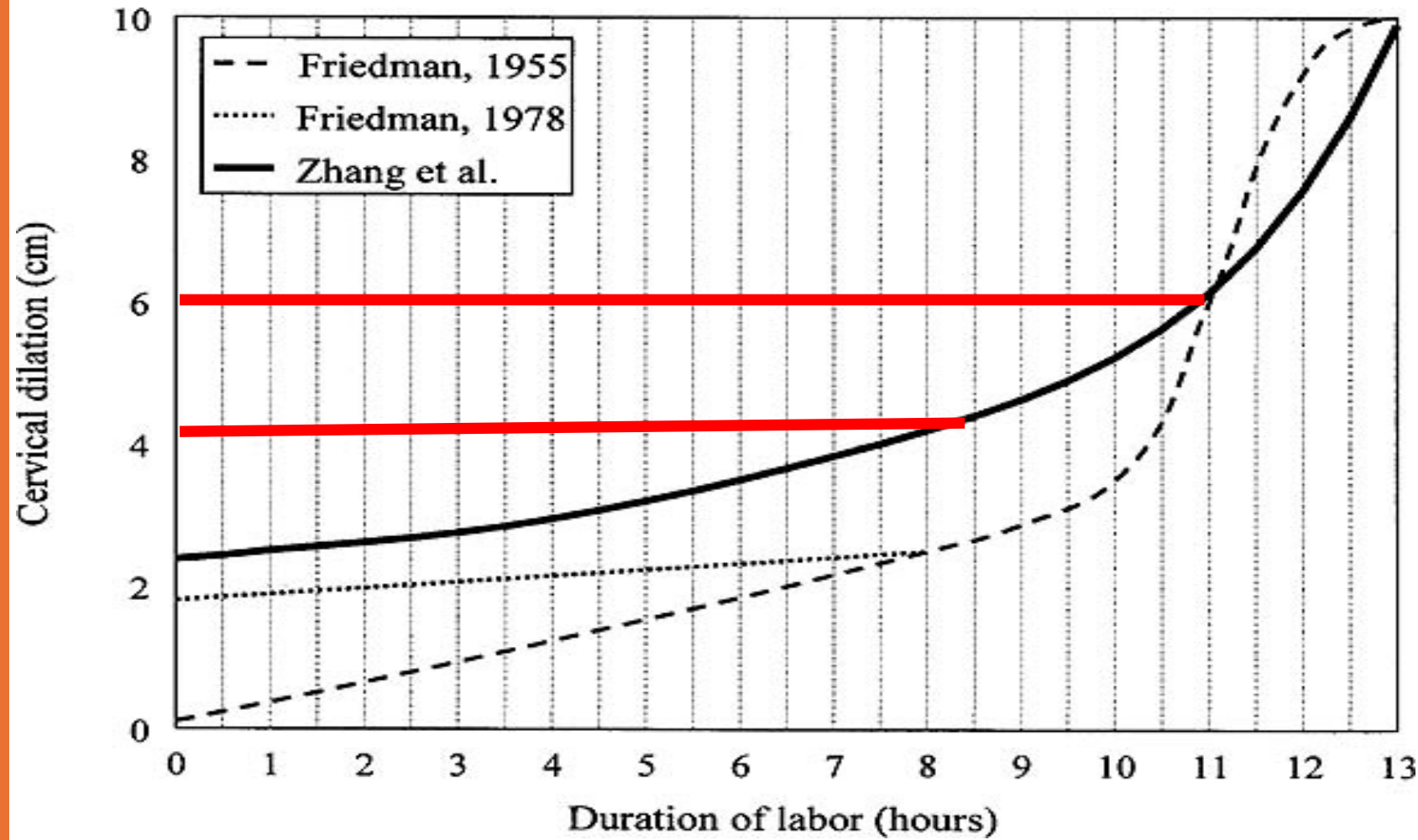
Third stage:

- 30 minutes

Labor Curve – Historical (Friedman)



Labor Curve – Contemporary (Zhang)



Labor Curve

- Labor can be slowed due to:
 - Maternal medical complications
 - Medical induction (especially if preterm delivery)
 - Obesity
 - Advanced maternal age
 - Nulliparity
 - Epidural use
 - Fetal:
 - Size, sex, anomalies, multifetal gestation



Induction Timing

Medically indicated late preterm and early term deliveries (ACOG CO 138)



Timing otherwise:

Full term: 39w0d to
40w6d

Late term: 41w0d to
41w6d

Post term: 42w0d
and beyond



Induction methods

Mechanical

- Foley balloon – single vs double
- Hygroscopic cervical dilators
- Amniotomy

Medical

- Dinoprostone (prostaglandin E2): gel, insert, suppository
- Misoprostol (Cytotec, prostaglandin E1): vaginal, oral
- Pitocin (oxytocin)

Other

- Membrane stripping
- Nipple stimulation
- Nitric oxide
- Exercise? Sexual intercourse? Homeopathy/ herbs? Castor oil? Food?

Main message

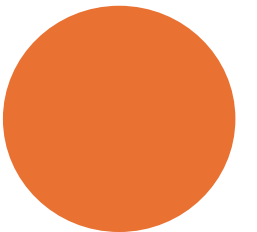


- *If maternal/fetal status stable, be patient and give it (some) time...*
- But active management of first stage reduces risks and need steady progress

- Vaginal delivery
- Prevention: infection, venous thromboembolism, foley catheter, hospital stay, surgical complications, placenta accreta

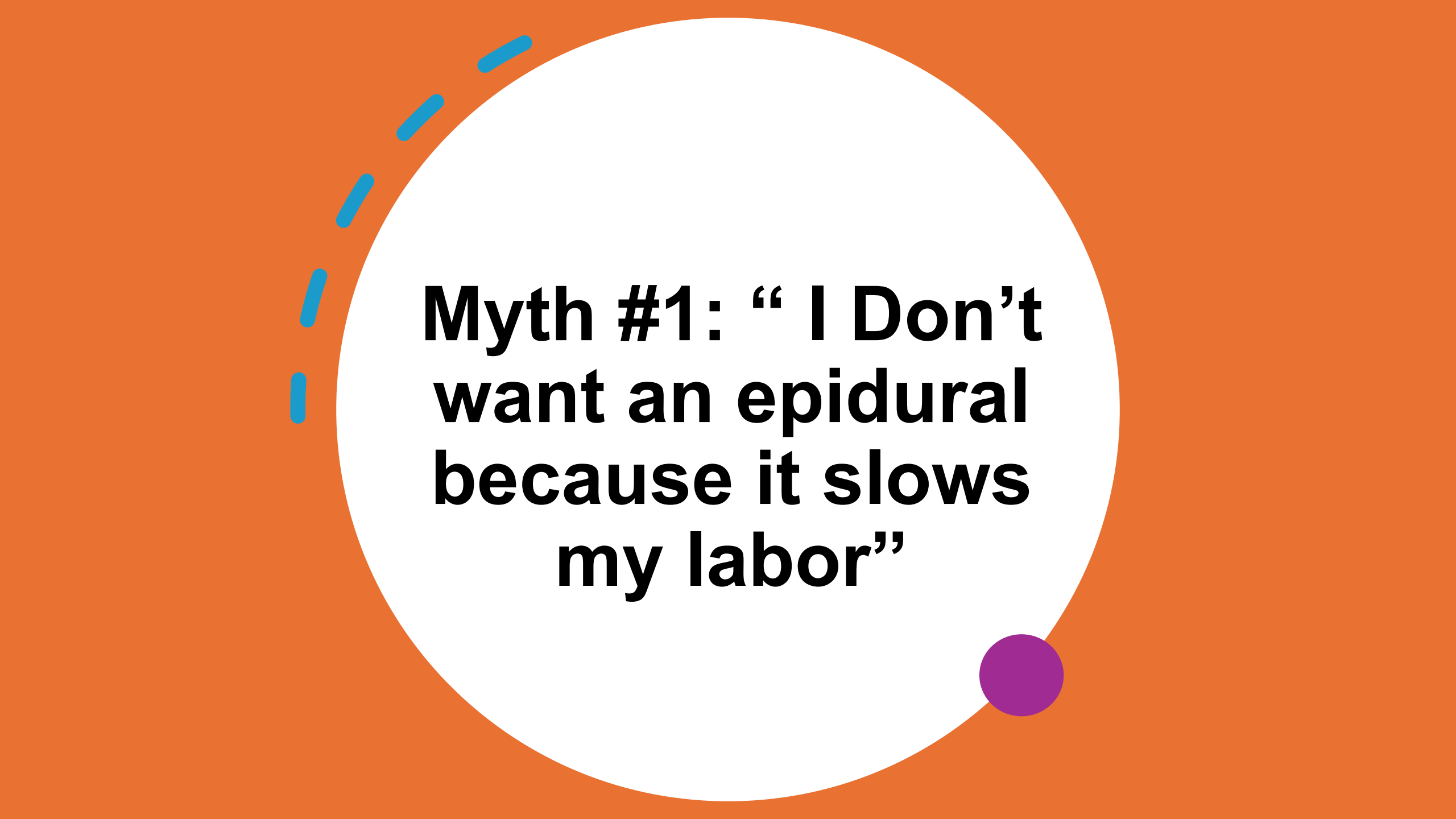


- Cesarean section
- Chorioamnionitis
- Postpartum hemorrhage
- Fetal acidemia
- NICU admission
- Placenta accreta



5 Top Myths...Debunked





**Myth #1: “ I Don’t
want an epidural
because it slows
my labor”**

Neuraxial anesthesia

- Includes: epidural, combined spinal epidural
- Safe and effective method for relieving labor pain and should be offered in any stage
- Anim-Somuah et al (2018)
 - Outcome: less pain, more satisfaction, less likely to need additional pain control
 - No clear difference in CS rates, neonatal outcomes (low APGARs, NICU admission)
 - Increased rates of VAVD however, no difference if studies before 2005 excluded



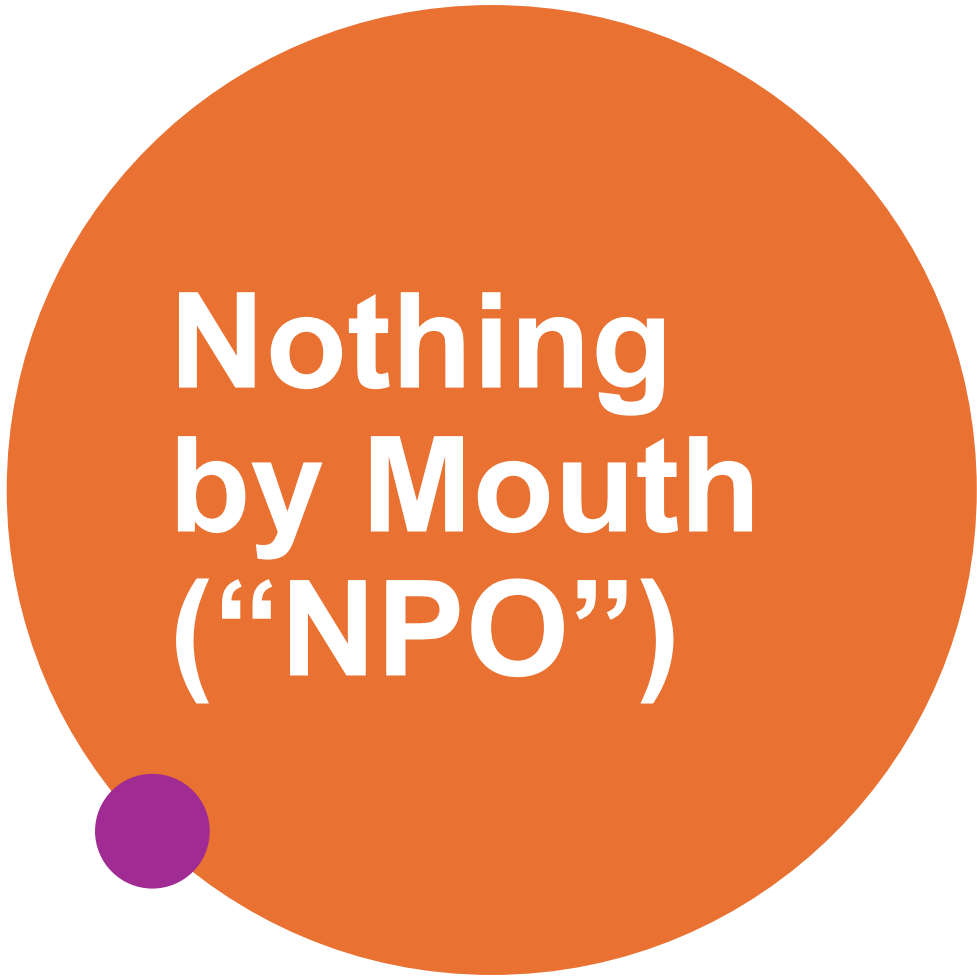


Neuraxial anesthesia

- Affect on labor course:
 - 1. Timing: Lewkowitz et al.(2018)
 - Early epidural (≤ 6 cm) had no effect on fetal station in active labor, decreased risk of prolonged second stage
 - 2. Length of second stage and risk CS:
 - Agency for Healthcare Research and Quality (AHRQ) (Meyers, et al 2020):
 - No difference in first or second stage, CS rates
 - Shen et al (2017): duration second stage similar
 - SVD rates similar
 - No different maternal or fetal outcomes
- **Summary: Effective pain relief with no effect on length of labor, relatively safe for baby**

**Myth #2: You are
“starving me”
during my
induction**





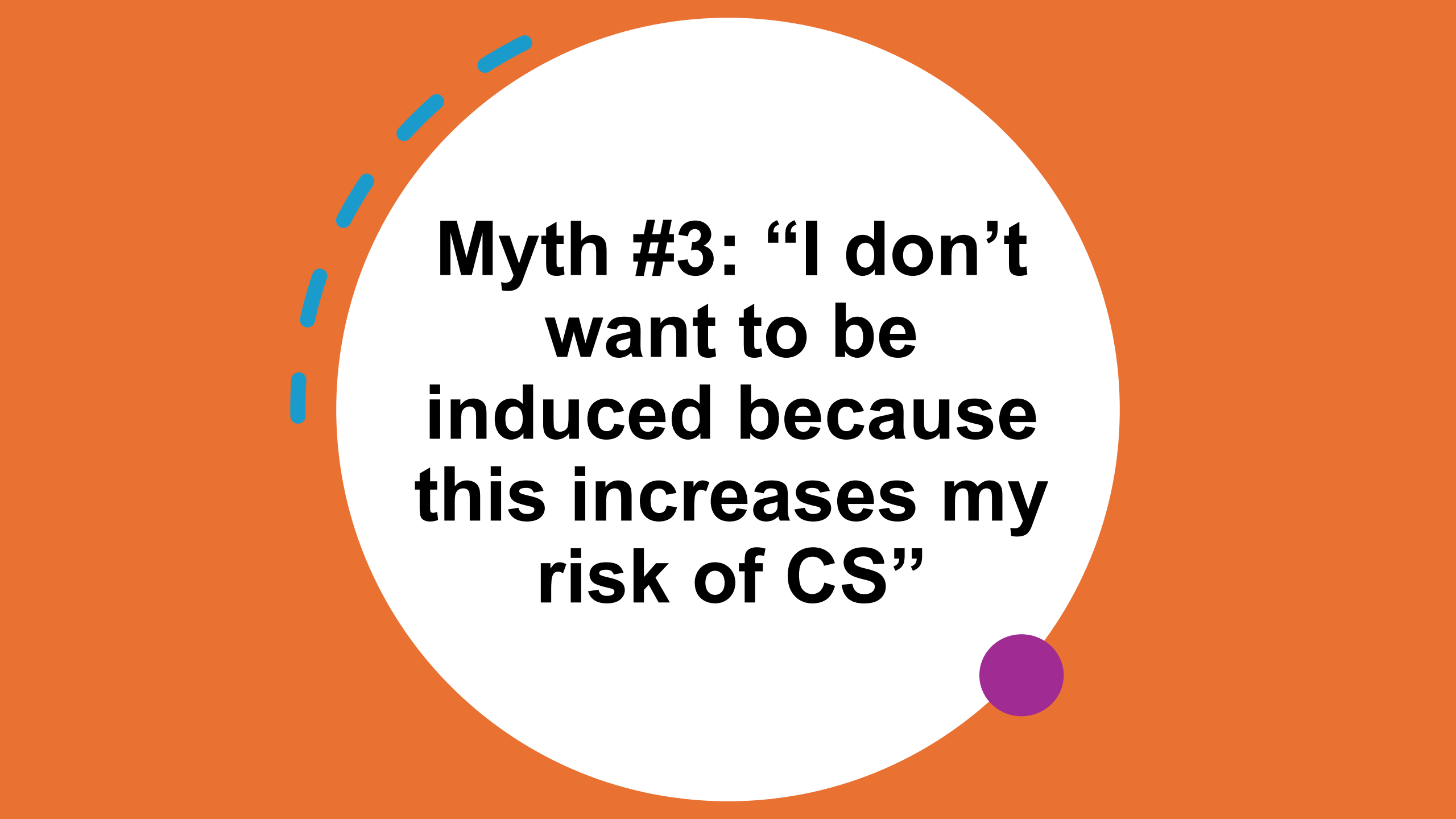
Nothing by Mouth (“NPO”)

- Idea of NPO in labor began in 1940s
 - Mendelson (1946): aspiration risk 0.15%
- Mhyre et al (2007)
 - 855 deaths during 20 year period
 - 8 anesthesia related; none due to aspiration
- United Kingdom data: Cantwell et al (2011)
 - 1 aspiration death in 6 million patients
- Ciardulli (2017): Meta analysis
 - Less restrictive eating: labor shortened by 16 min
 - No other differences in health outcomes



Current recommendations

- ACOG and American Society of Anesthesiologists (ASA):
 - **Avoid solid food but low risk patients may have clear liquids**
 - *“Insufficient evidence to draw conclusions about relationship between fasting times for clear liquids and solids and the risk of aspiration during delivery”*



**Myth #3: “I don’t
want to be
induced because
this increases my
risk of CS”**

ARRIVE

Trial

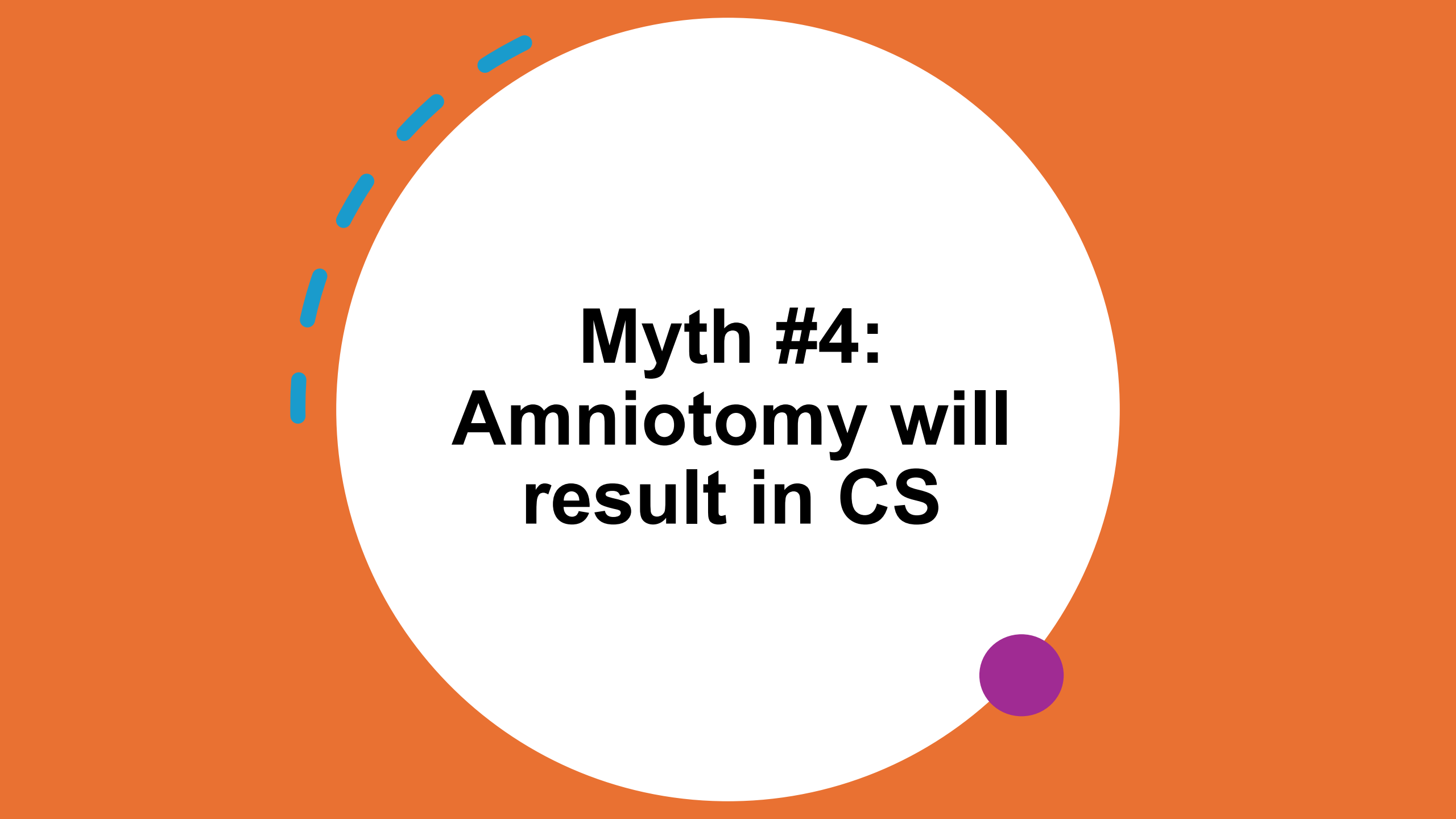
(A Randomized
Trial of Induction
vs Expectant
Management
Trial)

- Multicenter randomized trial
 - Low risk women between 34w0d-38w6d
 - Randomized to induction vs expectant management
- Outcomes:
 - Primary: perinatal death or severe neonatal complication
 - Secondary: multiple neonatal and maternal outcomes including mode of delivery
- N= 6,000 total (approx. 3,000 in each group)

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ARRIVE Trial

- Outcomes:
 - No difference in perinatal outcomes
 - Reduced frequency of CS (19 vs 22%)
 - Decreased risk hypertensive disorders
 - 1 CS can be avoided for every 28 deliveries if undergo elective induction
- Current recommendations/summary:
 - ACOG and SMFM: **reasonable to offer elective induction in low risk patient**
 - Caveats:
 - Appropriate gestational age
 - Need to meet eligibility criteria
 - Shared decision making
 - Dependent on hospital resources



**Myth #4:
Amniotomy will
result in CS**



Amniotomy

- Spontaneous labor
 - Meyers et al (AHRQ, 2020 review)
 - Amniotomy in spontaneous labor decreased total time in labor for nulliparous patients
 - No increases risks
- Induction
 - Early vs late amniotomy
 - Gagnon-Geravis (2012):
 - Shorter labor time in nulliparous (12 vs 15 hours)
 - No increased risk CS
 - Kim et al (2019): early
 - Shorter time to delivery (5 hours in nulliparous)
 - Post foley removal:
 - Battarbee et al (2020): no increased risk CS with amniotomy in nulliparous women
 - No increased chorioamnionitis, hemorrhage, NICU admission
 - Berry et al (2024): early amniotomy shortens time to active labor
 - No increased risk complications
 - Delayed amniotomy could increase risk postpartum hemorrhage

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ACOG Recommendation

- Recommends amniotomy for patients undergoing augmentation or induction of labor to reduce duration of labor
- *Strong recommendation, high quality evidence*



**Myth #5: Pitocin
increases risk of
CS**

Pitocin

- Synthetic form of oxytocin
 - Greek: oxys, tokos = quick birth
- Meyers et al (AHRQ, 2020 review):
 - Shorter duration labor with early initiation
 - No affect on overall CS rate
 - High dose protocol with lower CS rates, no difference in maternal hemorrhage
- Similar outcomes:
 - Wei et al (2009, 2013)





Other medical agents

- Difficult to compare methods
- Oral misoprostol vs other (Kerr et al, 2021)
 - Less or no increased risk of CS compared to following methods:
 - Dinoprostone
 - Vaginal misoprostol
 - Mechanical methods
 - Pitocin
 - Hyperstimulation rates vary per method
- Sanchez-Ramos et al (2024)
 - Ripening agents helpful prior to oxytocin administration if unfavorable cervix
 - Combination methods (mechanical and medical) likely best



Summary

- Labor curve does not fit every single person in the same way
- Should be patient but needs to make progress
- Neuraxial anesthesia, amniotomy and medication interventions do not reliably increase CS rates
- Little evidence to withhold PO intake (solid or liquid) in labor
- Elective induction can be considered at 39 weeks



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Thank you!