

# DSHS Grand Rounds

**Nov. 12**

**Preventing the First  
Cesarean Delivery:  
Practical Application of the  
Evidence**

Presenter: Christina Davidson, MD,  
Professor, Baylor College of Medicine  
and Chief of Service, Obstetrics and  
Gynecology, Ben Taub Hospital



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## Introductions



David Lakey, MD  
DSHS Commissioner  
is pleased to introduce our  
DSHS Grand Rounds speaker

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## Preventing the First Cesarean Delivery: Practical Application of the Evidence



Christina Davidson, MD  
Professor, Baylor College  
of Medicine and Chief of  
Obstetrics and Gynecology,  
Ben Taub Hospital

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# Preventing the First Cesarean Delivery: Why does it Matter and How Can We do It?

Christina Davidson, MD  
Baylor College of Medicine  
Assistant Professor  
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Division of Maternal Fetal Medicine  
  
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Chair, Obstetrics Standing Committee  
Texas Collaborative for Healthy Mothers and Babies

## Objectives

1. Describe the trends in cesarean delivery in Texas & the United States
2. Describe the short- & long-term consequences of cesarean delivery for mother & infant
3. Identify the most common indications for cesarean delivery
4. Illustrate the role of intrapartum oxytocin & how oxytocin protocols can help reduce the cesarean rate
5. Apply evidence-based practices to reduce the primary cesarean rate

## Background

- Cesarean delivery (CD)
  - Most commonly performed major surgery in United States
  - ~1 in 3 pregnancies delivered by cesarean, accounting for >1 million surgeries each year
  - 2007: 26.5% of low-risk women giving birth for first time had CD
    - Healthy People CD target for 2020 is 23.9% in low-risk full-term women with a singleton, vertex presentation

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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## Background

- Primary CD = the first CD
- Given its effect on subsequent pregnancies, an understanding of the drivers behind the increase in primary CD rates, & renewed effort to reduce them, may have a substantial effect on health care

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## Cesarean Delivery Rate

- CD rate in US increased from 5% to >31% between 1970 & 2007 as a result of changes in practice environment:
  - Introduction of electronic fetal heart rate monitoring
  - Decrease in vaginal breech deliveries
  - Decrease in use of forceps

ACOG Practice Bulletin No. 115, Aug 2010

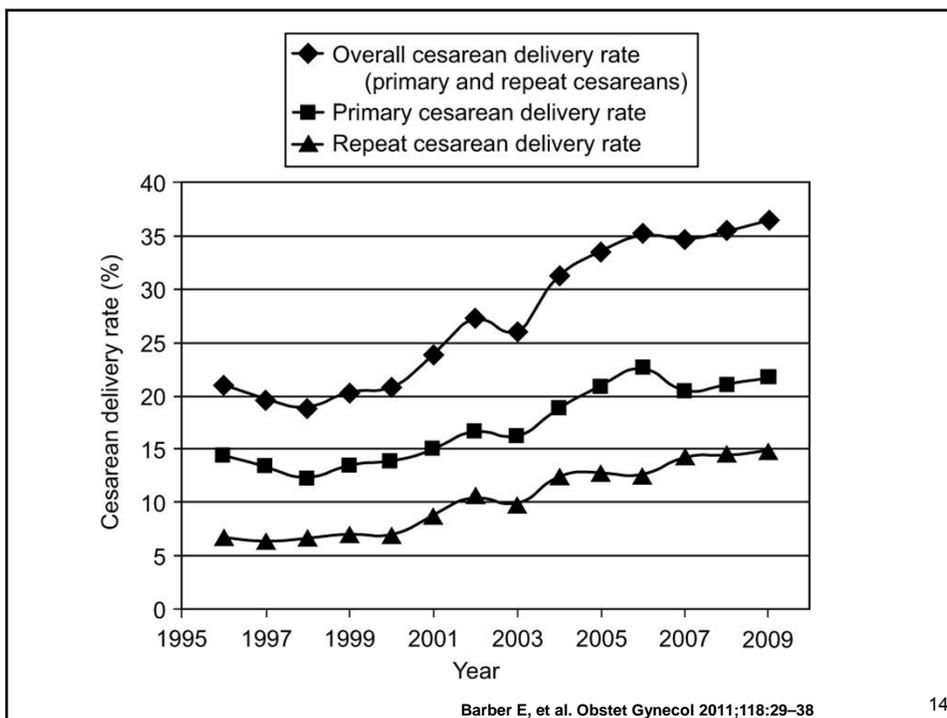
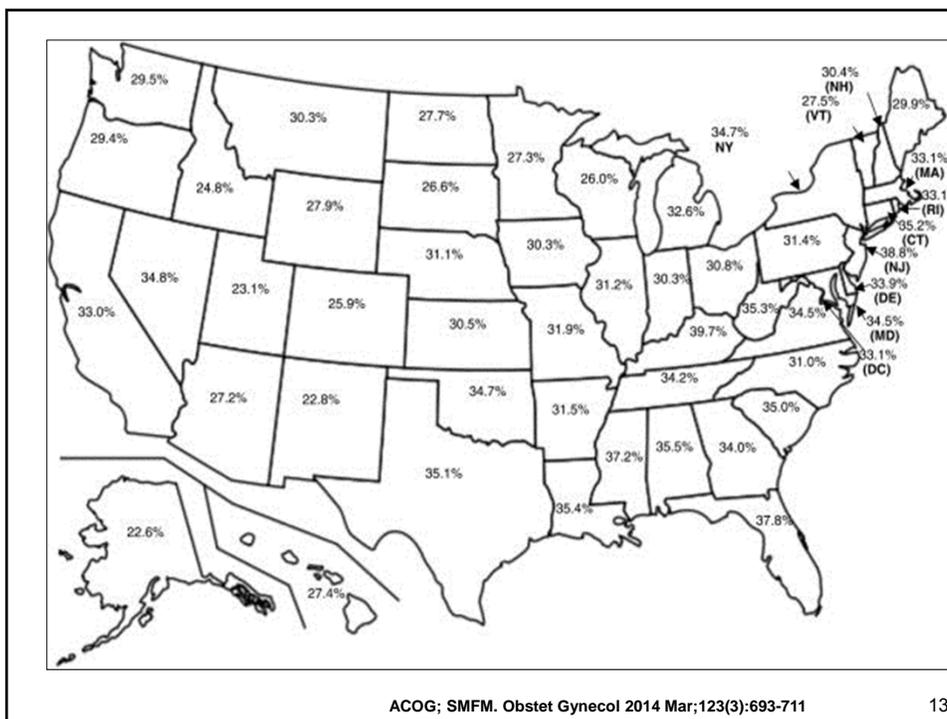
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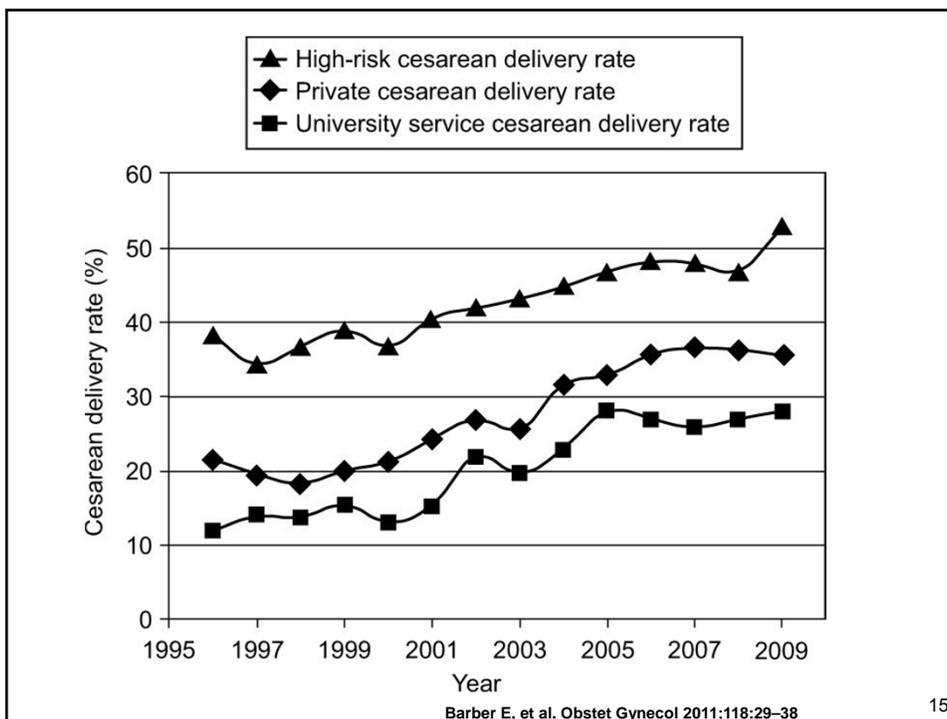
## Live Births Delivered by Forceps or Vacuum in the United States

Year	Forceps	Vacuum	Forceps or Vacuum
1990	5.11	3.90	9.01
1995	3.48	5.90	9.38
2000	2.07	4.85	6.92
2005	0.93	3.87	4.80
2007	0.76	3.47	4.23
2008	0.71	3.22	3.94
2009	0.67	3.04	3.71
2010	0.66	2.96	3.62
2011	0.65	2.85	3.50

National Vital Statistics Reports, Vol. 62, No. 1, June 28, 2013

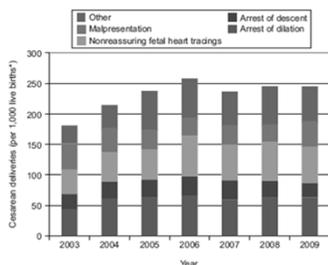
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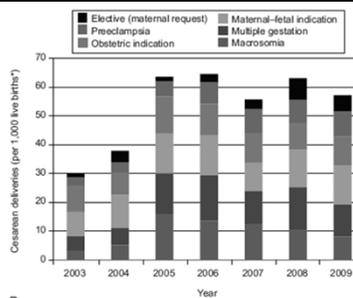


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## Cesarean Delivery Increase by Indication



A



B

- Indications that increased over time: NRFHR, arrest of dilation, multiple gestation, preeclampsia, macrosomia, maternal request
- Indications that remained stable: arrest of descent, malpresentation, maternal-fetal indications, other (cord prolapse, placenta previa)
- NRFHR contributed the most
- Arrest of dilation increased 3.9% per year

Barber E, et al. *Obstet Gynecol* 2011;118:29-38

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## Cesarean Rates by Payment Source

- Total CD rate:
  - 11% higher for privately insured mothers (35.2 per 100 total births) vs. Medicaid (31.6)
  - Lowest rate for uninsured mothers (24.3)
- Higher CD rates for privately insured vs. Medicaid-insured mothers evident for all racial & ethnic groups, as was lower uninsured rate
- Variation in CD rates mostly due to primary CD rate (26.1 vs. 22.0 first cesareans per 100 births)
  - Age adjustment reduced, but did not eliminate, difference in primary CD rate between privately insured & Medicaid-insured births
  - Both primary & repeat CD rates lowest for uninsured mothers
    - Primary rate >25% lower, repeat rate 10% lower

National Vital Statistics Reports, Vol. 62, No. 5, December 19, 2013

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Current Commentary

### Preventing the First Cesarean Delivery

*Summary of a Joint Eunice Kennedy Shriver National Institute of Child Health and Human Development, Society for Maternal-Fetal Medicine, and American College of Obstetricians and Gynecologists Workshop*

*Catherine Y. Spong, MD, Vincenzo Berghella, MD, Katharine D. Wenstrom, MD, Brian M. Mercer, MD, and George R. Saade, MD*

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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## Potentially Modifiable Obstetric Indications for First Cesarean Delivery

- |   |  |
|---|--|
| 1. Failed induction   | 9. Malpresentation   |
| 2. Arrest of labor  | 10. Nonreassuring antepartum or intrapartum fetal surveillance |
| 3. Multiple gestation   | 11. Macrosomia   |
| 4. Preeclampsia   | 12. Fetal malformations  |
| 5. Prior shoulder dystocia  | 13. Obesity  |
| 6. Prior myomectomy   | 14. Infection  |
| 7. Prior 3 <sup>rd</sup> /4 <sup>th</sup> degree laceration, prior breakdown of repair, fistula | 15. Cardiovascular disease                                     |
| 8. Marginal & low-lying placentation  | 16. Inadequate pelvis  |
|   | 17. Request  |

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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## Background

- Dramatic rise in rate of CD since 1995 is attributable to increase in primary CD as well as decline in attempted trials of labor after cesarean delivery (TOLAC)
- >90% of U.S. women who require primary CD will have a subsequent repeat CD
- The primary CD increases risk of maternal complications in index pregnancy as well as future gestations
- The most effective approach to reducing overall morbidities related to CD is to avoid the first CD

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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## OBSTETRIC CARE CONSENSUS

Number 1 • March 2014    **Safe Prevention of the Primary  
Cesarean Delivery**

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ACOG/SMFM OBSTETRIC CARE CONSENSUS  
**Safe prevention of the primary  
cesarean delivery**




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Maternal-Fetal  
Medicine

This document was developed jointly by the American College of Obstetricians and Gynecologists (the College) and the Society for Maternal-Fetal Medicine with the assistance of Aaron B. Caughey, MD, PhD; Alison G. Cahill, MD, MSCI; Jeanne-Marie Guise, MD, MPH; and Dwight J. Rouse, MD, MSPH

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ACOG; SMFM. *Obstet Gynecol* 2014 Mar;123(3):693-711  
Caughey AB, et al. *Am J Obstet Gynecol*. 2014 Mar;210(3):179-93

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## Recommendations for Safe Prevention of the Primary Cesarean Delivery

1. First stage labor
2. Second stage labor
3. Fetal heart rate monitoring
4. Induction of labor
5. Fetal malpresentation
6. Suspected fetal macrosomia
7. Excessive maternal weight gain
8. Twin gestations

## Background

- Rapid increase in rate of cesarean births without evidence of concomitant decrease in maternal/neonatal morbidity or mortality raises significant concern that CD is overused
- Health care providers must understand short- & long-term tradeoffs between CD & vaginal delivery as well as safe & appropriate opportunities to prevent overuse of CD, particularly primary CD

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Risk of Adverse Maternal Outcomes by Mode of Delivery

Outcome	Risk	
	Vaginal Delivery	Cesarean Delivery
Overall severe morbidity & mortality	8.6% 0.9%	9.2% 2.7%
Maternal Mortality	3.6:100,000	13.3:100,000
Amniotic fluid embolism	3.3-7.7:100,000	15.8:100,000
3 <sup>rd</sup> or 4 <sup>th</sup> degree perineal laceration	1-3%	NA (scheduled delivery)
Placental abnormalities	Increased with prior cesarean delivery vs. vaginal delivery, & risk continues to increase with each subsequent cesarean delivery	
Urinary incontinence	No difference between cesarean delivery & vaginal delivery at 2 years	
Postpartum depression	No difference between cesarean delivery & vaginal delivery	

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Risk of Adverse Neonatal Outcomes by Mode of Delivery

Outcome	Risk	
	Vaginal Delivery	Cesarean Delivery
Neonatal		
Laceration	NA	1-2%
Respiratory morbidity	<1%	1-4% (without labor)
Shoulder dystocia	1-2%	0%

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## Major Indications for Primary Cesarean Delivery

Stage	Indication	%
Prelabor	Malpresentation	10-15
	Multiple gestation	3
	Hypertensive disorders	3
	Macrosomia	3
	Maternal Request	2-8
In labor	First-stage arrest	15-30
	Second-stage arrest	10-25
	Failed induction	10
	Nonreassuring fetal heart rate	10

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Indications for Primary Cesarean Delivery

- Very few absolute indications:
  - Complete placenta previa
  - Vasa previa
  - Umbilical cord prolapse
- Most indications depend on caregiver's interpretation, recommendation, or action in response to the developing situation, therefore making them modifiable & likely target to lower the CD rate

Spong C, et al. *Obstet Gynecol* 2012;120:1181-93

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## Labor Management Practices and Primary Cesarean Delivery

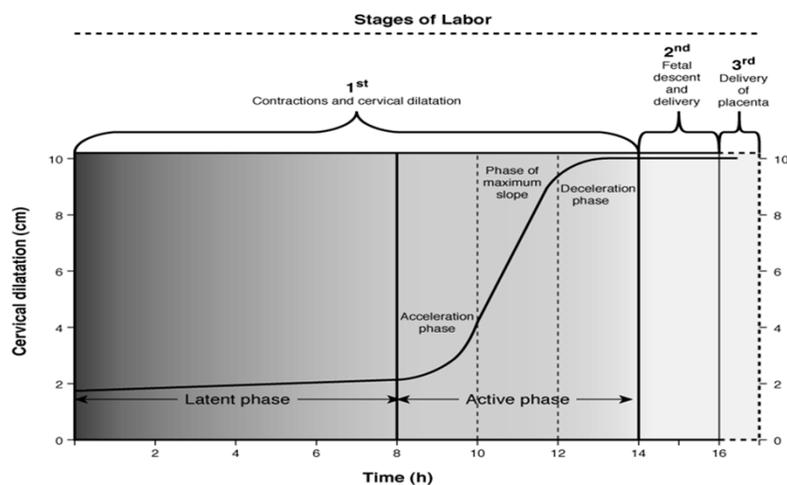
# Contemporary Recommendations

# Stages of Labor

- Stage 1: onset of regular contractions to complete dilation of the cervix (stage of cervical effacement and dilation)
- Stage 2: complete dilation to delivery of the fetus (stage of fetal expulsion)
- Stage 3: delivery of the fetus to delivery of the placenta (stage of placental separation and expulsion)

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# Friedman Labor Curve

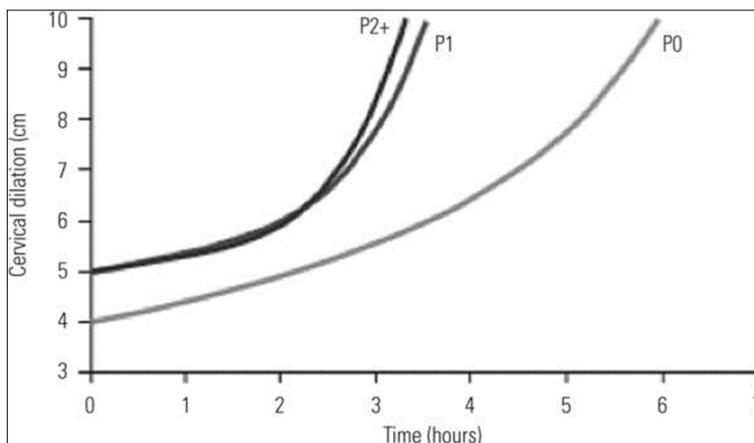


Source: Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Rouse DJ, Spong CY: Williams Obstetrics, 23rd Edition. <http://www.accessmedicine.com>. Copyright © The McGraw-Hill Companies, Inc. All rights reserved.

Williams Obstetrics 23<sup>rd</sup> ed

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## Contemporary Labor Patterns: First Stage



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## Contemporary Labor Patterns: First Stage

Cervical Dilatation (cm)	Median Elapsed Time (h)		
	Parity 0 (95th percentile)	Parity 1 (95th percentile)	Parity 2 or Greater (95th percentile)
3-4	1.8 (8.1)	—	—
4-5	1.3 (6.4)	1.4 (7.3)	1.4 (7.0)
5-6	0.8 (3.2)	0.8 (3.4)	0.8 (3.4)
6-7	0.6 (2.2)	0.5 (1.9)	0.5 (1.8)
7-8	0.5 (1.6)	0.4 (1.3)	0.4 (1.2)
8-9	0.5 (1.4)	0.3 (1.0)	0.3 (0.9)
9-10	0.5 (1.8)	0.3 (0.9)	0.3 (0.8)

Modified from Zhang J, Landy HJ, Branch DW, Burkman R, Haberman S, Gregory KD, et al. Contemporary patterns of spontaneous labor with normal neonatal outcomes. Consortium on Safe Labor. Obstet Gynecol 2010;116:1281-7.

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Labor Patterns: First Stage

### HISTORIC

- Prolonged latent phase
  - >20 hrs in nullipara
  - >14 hrs in multipara
- Active phase dilation
  - 1.2 cm/hr in nullips
  - 1.5 cm/hr in multips
- **Active labor = 4 cm**

### CONTEMPORARY

- Prolonged latent phase
  - >20 hrs in nullipara
  - >14 hrs in multipara
- Active phase dilation
  - 0.5-0.7 cm/hr in nullips
  - 0.5-1.3 cm/hr in multips
  - From 4-6 cm, nullips & multips dilate at same rate & slower than historically described
  - Beyond 6 cm, multips dilate more rapidly
- **Active labor = 6 cm**

Williams Obstetrics, 23<sup>rd</sup> ed  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Management of Latent Phase Disorders

- Most women with prolonged latent phase ultimately enter active phase with expectant management
  - Remainder will cease contracting or achieve active phase with oxytocin or amniotomy (or both)
  - Prolonged latent phase should not be an indication for CD

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Criteria for Active Phase Arrest that Justify Cesarean Delivery

### HISTORICAL CRITERIA

- Before an arrest disorder can be diagnosed in the 1<sup>st</sup> stage of labor, the following 2 criteria should be met:
  1. The latent phase is completed
  2. A uterine contraction pattern exceeds 200 MVU for 4 hours without cervical change

### CONTEMPORARY CRITERIA

- 6 cm or greater dilation with ruptured membranes & no cervical change for
  1.  $\geq 4$  hrs of adequate ctx (eg,  $>200$  MVU) or
  2.  $\geq 6$  hrs if ctx inadequate

ACOG Practice Bulletin #49, Dec 2003  
 Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93  
 ACOG; SMFM. *Obstet Gynecol* 2014 Mar;123(3):693-711

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## Algorithm for Spontaneous Labor

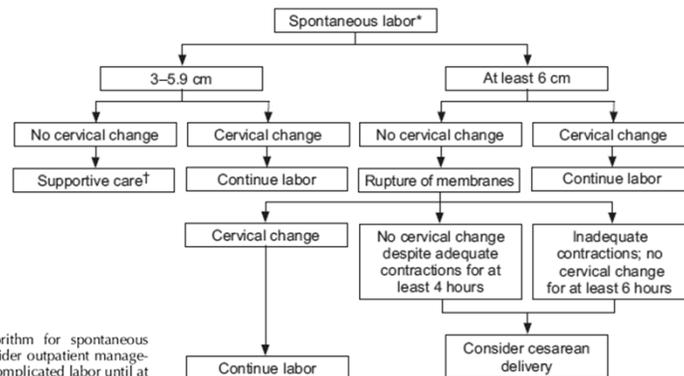


Fig. 3. Algorithm for spontaneous labor. \*Consider outpatient management of uncomplicated labor until at least 3 cm dilated or fetal membrane rupture occurs. †Continued observation in latent phase, with augmentation as indicated. Discharge may be appropriate if labor subsides, membranes remain intact, and maternal and fetal status remain stable.

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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## Recommendations for the Safe Prevention of the Primary Cesarean Delivery

First stage of labor	
A prolonged latent phase (eg, >20 h in nulliparous women and >14 h in multiparous women) should not be indication for cesarean delivery.	1B Strong recommendation, moderate-quality evidence
Slow but progressive labor in first stage of labor should not be indication for cesarean delivery.	1B Strong recommendation, moderate-quality evidence
Cervical dilation of 6 cm should be considered threshold for active phase of most women in labor. Thus, before 6 cm of dilation is achieved, standards of active-phase progress should not be applied.	1B Strong recommendation, moderate-quality evidence
Cesarean delivery for active-phase arrest in first stage of labor should be reserved for women $\geq$ 6 cm of dilation with ruptured membranes who fail to progress despite 4 h of adequate uterine activity, or at least 6 h of oxytocin administration with inadequate uterine activity and no cervical change.	1B Strong recommendation, moderate-quality evidence

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## Second Stage Labor

- Factors that affect length of 2nd stage include:
  - Parity
  - Delayed pushing
  - Use of epidural analgesia
  - Maternal BMI
  - Birth weight
  - Occiput posterior position
  - Fetal station at complete dilation

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### Clinical Outcomes in Relation to Duration of Second Stage Labor

Clinical Outcome	Duration of 2 <sup>nd</sup> Stage		
	<2 hr n= 6259 (%)	2-4 hr n=384 (%)	>4 hr n=148 (%)
Cesarean delivery	1.2	9.2	34.5
Instrumented delivery	3.4	16	35.1
Perineal trauma	3.6	13.4	26.7
Postpartum hemorrhage	2.3	5	9.1
Chorioamnionitis	2.3	8.9	14.2

Adapted from Myles TD, et al. Obstet Gynecol 2003;102:52-8 39

### Definition of Second Stage Arrest Disorder

HISTORICAL	CONTEMPORARY
<ul style="list-style-type: none"> <li>▪ Nulliparous women                             <ul style="list-style-type: none"> <li>▪ &gt;3 hrs with regional anesthesia or &gt;2 hrs without</li> </ul> </li> <li>▪ Multiparous                             <ul style="list-style-type: none"> <li>▪ &gt;2 hrs with regional anesthesia or &gt;1 hr without</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Nulliparous women (no descent or rotation)                             <ul style="list-style-type: none"> <li>▪ ≥ 4 hrs with regional anesthesia or ≥ 3 hrs without</li> </ul> </li> <li>▪ Multiparous (no descent or rotation)                             <ul style="list-style-type: none"> <li>▪ ≥ 3 hrs with regional anesthesia or ≥ 2 hr without</li> </ul> </li> <li>▪ Longer durations appropriate as long as progress is documented</li> </ul>

Spong CY, et al. Obstet Gynecol 2012;120:1181-93  
Williams Obstetrics 23<sup>rd</sup> ed  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711 40

## Second Stage Labor

- Once 2<sup>nd</sup> stage arrest disorder diagnosed, options include:
  1. Continued observation
  2. Operative vaginal delivery
  3. Cesarean delivery

ACOG PB #49, Dec 2003  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Management Approaches to Reduce Second Stage Cesarean Deliveries

- Expectant management: no absolute max length of time beyond which all women should undergo operative delivery
- Operative vaginal delivery
- Manual rotation of the fetal occiput

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## Operative Vaginal Delivery

- Rate of intracranial hemorrhage associated with vacuum does not differ significantly from either forceps delivery (OR 1.2; 95% CI 0.7-2.2) or CD (OR 0.9, 95% CI 0.6-1.4)
- Forceps associated with reduced risk of combined outcome of seizure, IVH, or subdural hemorrhage as compared with vacuum (OR 0.60; 95% CI 0.40-0.90) or CD (OR 0.68; 95% CI 0.48-0.97), with no significant difference between vacuum or CD
- <3% of women in whom OVD is attempted require CD



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## Manual Rotation of Fetal Occiput

- Occiput posterior & occiput transverse associated with increase in CD & neonatal complications
- Historically, forceps rotation performed
  - Still considered reasonable but rarely taught
- Manual rotation associated with safe reduction in risk of CD
  - Prospective trial of 61 women offered trial of manual rotation: 0% CD for those offered trial vs. 23% without manual rotation (p=.001)
  - Large retrospective cohort: 9% rate of CD with manual rotation vs. 41% without (p<.001)
- Must be able to properly assess fetal position
  - Intrapartum ultrasonography increases accurate diagnosis

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Mar;123(3):693-711

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## Intrapartum Ultrasound Assessment of Fetal Occiput Position: Occiput Posterior



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## Primary Cesarean Delivery in the United States

- Among women with primary CD for failure to progress, 42.6% of nullips & 33.5% of multips never progressed beyond 5 cm before delivery

Cervical Dilation (cm)	Total (n=13,635)	Primiparous Women (n=11,616)	Multiparous Women (n=2,554)
Less than 6	5,629 (41.3)	4,953 (42.6)	676 (33.5)
6-9	4,142 (30.4)	3,363 (29.0)	779 (38.6)
10 (2nd stage)	2,919 (21.4)	2,546 (21.9)	373 (18.5)
No dilation recorded	945 (6.9)	754 (6.5)	191 (9.5)

Data are n (%).

OBSTETRICS & GYNECOLOGY

Boyle A. Obstet Gynecol 2013;122:33-40

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## Primary Cesarean Delivery in the United States

- Among women with primary CD who reached 2<sup>nd</sup> stage labor, 17.3% underwent CD for arrest of descent before 2 hours and only 1.1% were given trial of operative vaginal delivery

Duration (h)	Total (n=2,919)	Primiparous Women (n=2,546)	Multiparous Women (n=373)
Less than 2	505 (17.3)	390 (15.3)	115 (30.8)
2–2.9	614 (21.0)	521 (20.5)	93 (24.9)
3–3.9	587 (20.1)	535 (21.0)	52 (13.9)
4 or more	884 (30.3)	817 (32.1)	67 (18.0)
Not recorded	329 (11.3)	283 (11.1)	46 (12.3)
Failed operative delivery	33 (1.1)	30 (1.2)	3 (0.8)

Data are n (%).

OBSTETRICS & GYNECOLOGY

Boyle A. Obstet Gynecol 2013;122:33–40

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## Primary Cesarean Delivery in the United States

- “Using 6 cm as the cut-off for active labor, allowing adequate time for 2<sup>nd</sup> stage of labor, & encouraging operative vaginal delivery, when appropriate, may be important strategies to reduce the primary CD rate. These actions may be particularly important in the primiparous woman at term with a singleton fetus in cephalic presentation.”

Boyle A. Obstet Gynecol 2013;122:33–40

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## Recommendations for the Safe Prevention of the Primary Cesarean Delivery

Second stage of labor	ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711
A specific absolute maximum length of time spent in second stage of labor beyond which all women should undergo operative delivery has not been identified.	1C Strong recommendation, low-quality evidence
Before diagnosing arrest of labor in second stage, if maternal and fetal conditions permit, allow for following: <ul style="list-style-type: none"> <li>• At least 2 h of pushing in multiparous women (1B)</li> <li>• At least 3 h of pushing in nulliparous women (1B)</li> </ul> Longer durations may be appropriate on individualized basis (eg, with use of epidural analgesia or with fetal malposition) as long as progress is being documented. (1B)	1B Strong recommendation, moderate-quality evidence
Operative vaginal delivery in second stage of labor by experienced and well-trained physicians should be considered safe, acceptable alternative to cesarean delivery. Training in, and ongoing maintenance of, practical skills related to operative vaginal delivery should be encouraged.	1B Strong recommendation, moderate-quality evidence
Manual rotation of fetal occiput in setting of fetal malposition in second stage of labor is reasonable intervention to consider before moving to operative vaginal delivery or cesarean delivery. To safely prevent cesarean deliveries in setting of malposition, it is important to assess fetal position in second stage of labor, particularly in setting of abnormal fetal descent.	1B Strong recommendation, moderate-quality evidence

## Intrapartum Fetal Heart Rate Monitoring

## Classification of FHR Tracings

- Category I FHR tracings are strongly predictive of **normal fetal acid-base status** at time of observation
- Category I FHR tracings include **all** of the following:
  - Baseline rate: 110-160 BPM
  - Baseline FHR variability: moderate
  - Late or variable decelerations: absent
  - Early decelerations: present or absent
  - Accelerations: present or absent

ACOG PB#116, Nov 2010

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## Classification of FHR Tracings

- Category III FHR tracings are abnormal & associated with **abnormal fetal acid-base status** at time of observation
- Category III FHR tracings include **either**:
  - Absent baseline FHR variability **and** any of the following:
    - Recurrent late decelerations
    - Recurrent variable decelerations
    - Bradycardia
  - Sinusoidal pattern

ACOG PB#116, Nov 2010

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## Classification of FHR Tracings

- Category II FHR tracings:
  - Indeterminate
  - Not categorized as Category I or Category III
  - Accounts for most FHR tracings

ACOG PB#116, Nov 2010

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## Management Protocol of Category II FHR

- When a pattern suggests early development of hypoxia:
  - Attempt to identify cause
  - Correct cause
  - Give measures to maximize placental O<sub>2</sub> delivery/exchange (intrauterine resuscitation)
    - Place patient on side
    - Administer O<sub>2</sub>
    - Discontinue oxytocin
    - Correct any hypotension
  - Amnioinfusion with NS
    - Resolves variable decels
    - Reduces incidence of CD for nonreassuring FHR

ACOG PB#116, Nov 2010  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## Management Protocol of Category II FHR

- If pattern remains non-reassuring, attempt to provide other measure of reassurance to rule out metabolic acidosis
  - Moderate FHR variability strongly associated with arterial UC pH >7.15
  - Presence of accelerations, spontaneous or elicited (vibroacoustic or digital scalp stimulation), ensures fetus not acidemic
  - Absence of accels for >30 min usually requires operative delivery

ACOG PB#116, Nov 2010

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## Fetal Scalp & Vibroacoustic Stimulation

- Methods
  - Gentle digital stroking of vertex for 15 sec during SVE
  - Closing of Allis clamp on scalp x 15 sec during SVE
  - Electronic artificial larynx applied to maternal abdominal skin over fetal head for 3-5 sec
- Interpretation
  - If FHR acceleration elicited (15 x 15) just prior to fetal scalp sampling, scalp blood pH uniformly  $\geq 7.19$
  - When accelerations are induced by scalp stimulation, acidosis is present in <10% of fetuses
  - When no accelerations occur, acidosis is present in ~50% of fetuses

Clark SL, et al. Am J Obstet Gynecol 1984;148(3):274-7  
Skupski DW, et al. Obstet Gynecol 2002;99:129-34

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## Prolonged Decelerations: Causes

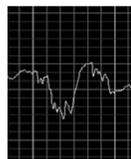
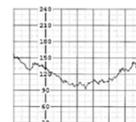
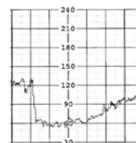
- Rapid cervical change
- Hypotension (regional analgesia)
- Tachysystole
  - Reduce/discontinue oxytocin
  - Administer uterine relaxing agent (terbutaline)
- Uterine rupture
- Placental abruption
- Umbilical cord prolapse

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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## “Atypical” Decelerations

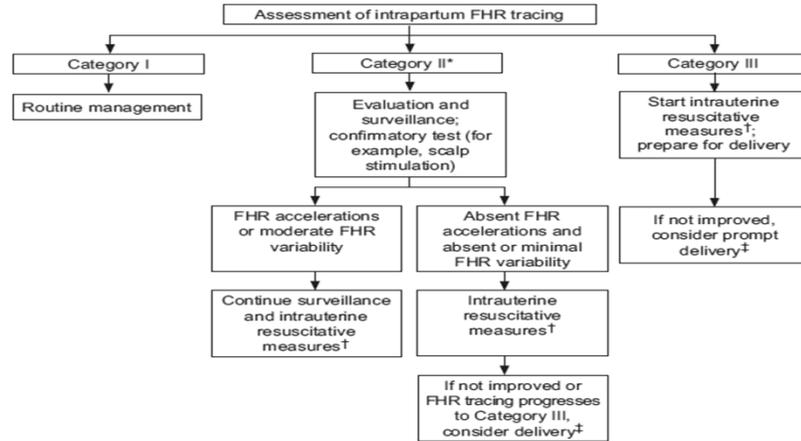
- No data to support interventions for decels with “atypical features”
  - No association with fetal acidemia
- Slow return to baseline
- Variability only within decel
- Shoulders



Cahill A, et al. Obstet Gynecol 2012;120:1387-93  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711

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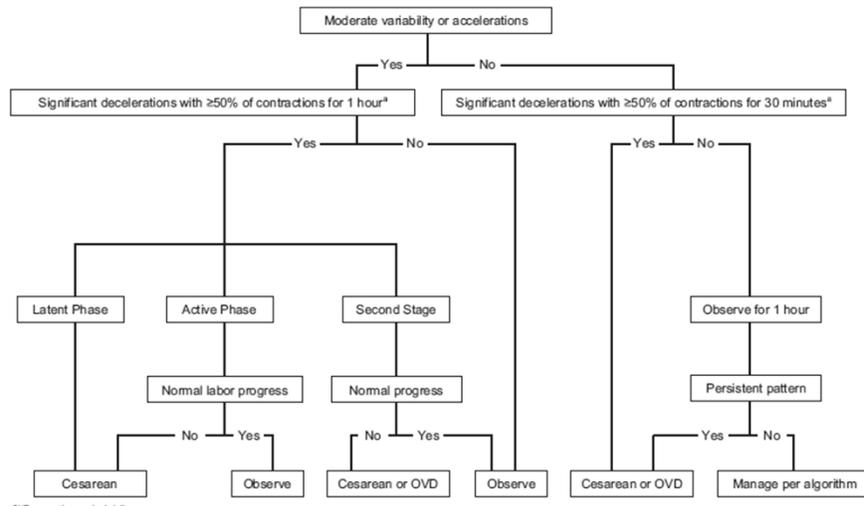
# Fetal Heart Rate Monitoring



Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93

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FIGURE 1  
Algorithm for management of category II fetal heart rate tracings



Clark S, et al. *Am J Obstet Gynecol*. 2013 Aug;209(2):89-97

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**TABLE**  
**Management of category II fetal heart rate patterns: clarifications for use in algorithm**

1. Variability refers to predominant baseline FHR pattern (marked, moderate, minimal, absent) during a 30-minute evaluation period, as defined by NICHD.
2. Marked variability is considered same as moderate variability for purposes of this algorithm.
3. Significant decelerations are defined as any of the following:
  - Variable decelerations lasting longer than 60 seconds and reaching a nadir more than 60 bpm below baseline.
  - Variable decelerations lasting longer than 60 seconds and reaching a nadir less than 60 bpm regardless of the baseline.
  - Any late decelerations of any depth.
  - Any prolonged deceleration, as defined by the NICHD. Due to the broad heterogeneity inherent in this definition, identification of a prolonged deceleration should prompt discontinuation of the algorithm until the deceleration is resolved.
4. Application of algorithm may be initially delayed for up to 30 minutes while attempts are made to alleviate category II pattern with conservative therapeutic interventions (eg, correction of hypotension, position change, amnioinfusion, tocolysis, reduction or discontinuation of oxytocin).
5. Once a category II FHR pattern is identified, FHR is evaluated and algorithm applied every 30 minutes.
6. Any significant change in FHR parameters should result in reapplication of algorithm.
7. For category II FHR patterns in which algorithm suggests delivery is indicated, such delivery should ideally be initiated within 30 minutes of decision for cesarean.
8. If at any time tracing reverts to category I status, or deteriorates for even a short time to category III status, the algorithm no longer applies. However, algorithm should be reinstated if category I pattern again reverts to category II.
9. In fetus with extreme prematurity, neither significance of certain FHR patterns of concern in more mature fetus (eg, minimal variability) or ability of such fetuses to tolerate intrapartum events leading to certain types of category II patterns are well defined. This algorithm is not intended as guide to management of fetus with extreme prematurity.
10. Algorithm may be overridden at any time if, after evaluation of patient, physician believes it is in best interest of the fetus to intervene sooner.

FHR, fetal heart rate; NICHD, Eunice Kennedy Shriver National Institute of Child Health and Human Development.  
 Clark, Category II FHR. *Am J Obstet Gynecol* 2013.

**Clark S, et al. Am J Obstet Gynecol. 2013 Aug;209(2):89-97**

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## Recommendations for the Safe Prevention of the Primary Cesarean Delivery

### Fetal heart rate monitoring

Amnioinfusion for repetitive variable fetal heart rate decelerations may safely reduce rate of cesarean delivery.	1A Strong recommendation, high-quality evidence
Scalp stimulation can be used as means of assessing fetal acid-base status when abnormal or indeterminate (formerly, nonreassuring) fetal heart patterns (eg, minimal variability) are present and is safe alternative to cesarean delivery in this setting.	1C Strong recommendation, low-quality evidence

ACOG; SMFM. *Obstet Gynecol* 2014 Mar;123(3):693-711

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## Effect on Cesarean Delivery

# Induction of labor

## Background

- 23% of pregnant women undergo induction of labor (IOL)
- Failed IOL=lack of progression into active labor (CD in latent phase for lack of cervical dilation)

# Background

- Likelihood of vaginal delivery with IOL
  - Nulliparous women with unfavorable cervix (Bishop score <6) have 2-fold increased risk of CD
  - If Bishop score >8, probability of vaginal delivery similar to that after spontaneous labor
  - Avoid IOL with unfavorable cervix unless indicated for maternal/fetal benefit
- Quality improvement initiative to reduce frequency of inappropriate IOL (elective IOL before 39 wks or before ripe cervix) resulted in lower CD rate for electively induced nullips
  - Elective IOL, including logistical inductions:
    - ≥39 wks
    - Accurate GA dating
    - Bishop score ≥8 for nullips, ≥6 for multips before scheduling elective IOL
    - Cervical ripening agents not allowed for elective IOL

Spong CY, et al. *Obstet Gynecol* 2012;120:1181-93  
 ACOG; SMFM. *Obstet Gynecol* 2014 Mar;123(3):693-711  
 Fisch J, et al. *Obstet Gynecol* 2009;113:797-803

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## Patient Safety Checklist

The American College of  
 Obstetricians and Gynecologists  
 Women's Health Care Physicians  
 Number 5 • December 2011  
 (Replaces Patient Safety Checklist No. 1, November 2011)

### SCHEDULING INDUCTION OF LABOR

Date \_\_\_\_\_ Patient \_\_\_\_\_ Date of birth \_\_\_\_\_ MR # \_\_\_\_\_  
 Physician or certified nurse-midwife \_\_\_\_\_ Last menstrual period \_\_\_\_\_  
 Gravidity/Parity \_\_\_\_\_  
 Estimated date of delivery \_\_\_\_\_ Best estimated gestational age at delivery \_\_\_\_\_  
 Proposed induction date \_\_\_\_\_ Proposed admission time \_\_\_\_\_  
 Gestational age of 39 0/7 weeks or older confirmed by either of the following criteria (1):  
 Ultrasound measurement at less than 20 weeks of gestation supports gestational age of 39 weeks or greater  
 Fetal heart tones have been documented as present for 30 weeks of gestation by Doppler ultrasonography

#### Indication for induction: (choose one)

Medical complication or condition (1): Diagnosis: \_\_\_\_\_  
 Nonmedically indicated (1-3): Circumstances: \_\_\_\_\_

Patient counseled about risks, benefits, and alternatives to induction of labor (1)

Consent form signed as required by institution

Bishop Score (see below) (1): \_\_\_\_\_

#### Bishop Scoring System

Score	Factor			
	Dilation (cm)	Position of Cervix	Effacement (%)	Station* Cervical Consistency
0	Closed	Posterior	0-30	-3 Firm
1	1-2	Midposition	40-50	-2 Medium
2	3-4	Anterior	60-70	-1, 0 Soft
3	5-6	—	80	+1, +2 —

\*Station reflects a -3 to +3 scale.  
 Modified from Bishop EH. *Public scoring for elective induction.* *Obstet Gynecol* 1964;24:266-8.

Pertinent prenatal laboratory test results (eg, group B streptococci or hematocrit) available (4, 5)  
 Special concerns (eg, allergies, medical problems, and special needs): \_\_\_\_\_

#### To be completed by reviewer:

Approved induction after 39 0/7 weeks of gestation by aforementioned dating criteria  
 Approved induction before 39 0/7 weeks of gestation (medical indication)  
 **HARD STOP** – gestational age, indication, consent, or other issues prevent initiating induction without further information or consultation with department chair

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**Table 1: Recommendations for the Timing of Delivery When Conditions Complicate Pregnancy at or After 34 Weeks of Gestation** <->

Condition	General Timing	Suggested Specific Timing
<b>Placental/uterine issues</b>		
Placenta previa*	Late preterm/early term	36 0/7–37 6/7 weeks of gestation
Placenta previa with suspected accreta, increta, or percreta*	Late preterm	34 0/7–35 6/7 weeks of gestation
Prior classical cesarean	Late preterm/early term	36 0/7–37 6/7 weeks of gestation
Prior myomectomy	Early term/term (individualize)	37 0/7–38 6/7 weeks of gestation
<b>Fetal issues</b>		
Growth restriction (singleton) Otherwise uncomplicated, no concurrent findings	Early term/term	38 0/7–39 6/7 weeks of gestation
Concurrent conditions (oligohydramnios, abnormal Doppler studies, maternal co-morbidity [eg, preeclampsia, chronic hypertension])	Late preterm/early term	34 0/7–37 6/7 weeks of gestation
Growth restriction (twins)		
Di–Di twins with isolated fetal growth restriction	Late preterm/early term	36 0/7–37 6/7 weeks of gestation
Di–Di twins with concurrent condition abnormal Doppler studies, maternal co-morbidity (eg, preeclampsia, chronic hypertension)	Late preterm	32 0/7–34 6/7 weeks of gestation
Mo–Di twins with isolated fetal growth restriction	Late preterm	32 0/7–34 6/7 weeks of gestation
Multiple gestations		
Di–Di twins	Early term	38 0/7–38 6/7 weeks of gestation
Mo–Di twins	Late preterm/early term	34 0/7–37 6/7 weeks of gestation
Oligohydramnios	Late preterm/early term	36 0/7–37 6/7 weeks of gestation
<b>Maternal issues</b>		
Chronic hypertension		
Controlled on no medications	Early term/term	38 0/7–39 6/7 weeks of gestation
Controlled on medications	Early term/term	37 0/7–39 6/7 weeks of gestation
Difficult to control	Late preterm/early term	36 0/7–37 6/7 weeks of gestation
Gestational hypertension	Early term	37 0/7–38 6/7 weeks of gestation
Preeclampsia—severe	Late preterm	At diagnosis after 34 0/7 weeks of gestation
Preeclampsia—mild	Early term	At diagnosis after 37 0/7 weeks of gestation
Diabetes		
Pregestational well-controlled*	Late preterm, early term birth not indicated	
Pregestational with vascular complications	Early term/term	37 0/7–39 6/7 weeks of gestation
Pregestational, poorly controlled	Late preterm or early term	Individualized
Gestational—well controlled on diet or medications	Late preterm, early term birth not indicated	
Gestational—poorly controlled	Late preterm or early term	Individualized
<b>Obstetric issues</b>		
PPROM	Late preterm	34 0/7 weeks of gestation

Abbreviations: Di–Di, dichorionic–diamniotic; Mo–Di, monochorionic–diamniotic; PPROM, preterm premature rupture of membranes.  
\*Uncomplicated, thus no fetal growth restriction, superimposed preeclampsia, or other complication. If these are present, then the complicating conditions take precedence and earlier delivery may be indicated.  
Modified from Spong CY, Mercer BM, D'Alton M, Kilpatrick S, Blackwell S, Saade G. Timing of indicated late-preterm and early-term birth. *Obstet Gynecol* 2011;118:323–33. [PubMed] [Obstetrics & Gynecology]

ACOG CO#560, 2013 67

The American College of  
Obstetricians and Gynecologists  
Women's Health Care Physicians



## Patient Safety Checklist

Number 2 • November 2011

### INPATIENT INDUCTION OF LABOR

Date \_\_\_\_\_ Patient \_\_\_\_\_ Date of birth \_\_\_\_\_ MR # \_\_\_\_\_  
 Physician or certified nurse–midwife \_\_\_\_\_ Last menstrual period \_\_\_\_\_  
 Gravidity/Parity \_\_\_\_\_  
 Estimated date of delivery \_\_\_\_\_ Best estimated gestational age at delivery \_\_\_\_\_  
 Indication for induction \_\_\_\_\_

Fetal Presentation (1)

Vertex

Other \_\_\_\_\_

If other, physician or certified nurse–midwife notified

Estimated fetal weight \_\_\_\_\_

Patient has a completed medical history and physical examination

Known allergies identified \_\_\_\_\_

Medical factors that could effect anesthetic choices identified \_\_\_\_\_

Pertinent prenatal laboratory test results (eg, group B streptococci or hematocrit) available (2, 3)

Other special concerns identified (eg, medical problems and special needs): \_\_\_\_\_

Patient counseled about risks and benefits of induction of labor (1)

Consent form signed as required by institution

Bishop Score (see below) (1): \_\_\_\_\_

**Bishop Scoring System**

Score	Factor			
	Dilation (cm)	Position of Cervix	Effacement (%)	Station* Cervical Consistency
0	Closed	Posterior	0–30	-3 Firm
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2	3–4	Anterior	60–70	-1, 0 Soft
3	5–6	—	80	+1, +2 —

\*Station reflects a -3 to +3 scale.  
Modified from Bishop EH. Pelvic scoring for elective induction. *Obstet Gynecol* 1964;24:266–8.

Orders received (1)

Oxytocin

Cervical ripening

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## Management of Induction of Labor

### HISTORICAL

- No uniform management of latent phase of induced labor
- No uniform definition of failed induction
  - 12-18 hours of latent labor before diagnosis of failed IOL

### CONTEMPORARY

- Accept longer durations of latent phase (up to  $\geq 24$  hours)
- Administer oxytocin for at least 12-18 hours after membrane rupture before diagnosis of failed IOL
- Failed IOL:
  - Failure to achieve regular ctx (Q 3 min) & cervical change after  $\geq 24$  hours of oxytocin with AROM (after completion of cervical ripening)
  - Oxytocin administered for at least 12-18 hours after ROM

Spong CY, et al. Obstet Gynecol 2012;120:1181-93  
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711  
ACOG PB#107, Aug 2009

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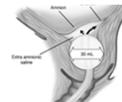
## Cervical Ripening

- If induction *indicated* & cervix unfavorable, agents for cervical ripening may be used
- Cervical ripening agents not consistently associated with reduced likelihood of CD, but do effect duration of labor

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## Cervical Ripening Techniques: Mechanical

- Transcervical Foley catheter or Cook balloon
  - Foley catheter placement before oxytocin induction significantly reduces duration of labor & risk of CD
  - Addition of oxytocin doesn't shorten time to delivery
  - Primiparous cervix with 80 ml balloon vs. 30 ml balloon:
    - Advanced cervical dilation
    - Higher rates of deliveries within 24 hours of induction
    - Less oxytocin requirement
    - Lower rate of CD resulting from dysfunctional labor
- Comparison of Cook Cervical Ripener Balloon (balloons on either side of cervix inflated with 80 ml of saline) vs. 60 ml Foley catheter filled:
  - Both equally efficacious for inducing labor
  - No statistical difference in CD between the 2 groups

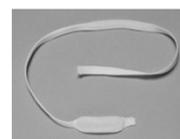


Williams Obstetrics 23<sup>rd</sup> ed  
 Levy R, et al. Am J Obstet Gynecol 2004;191:1632-6  
 Pettker CM, et al. Obstet Gynecol 2008;111:1320-6  
 ACOG PB#107, Aug 2009

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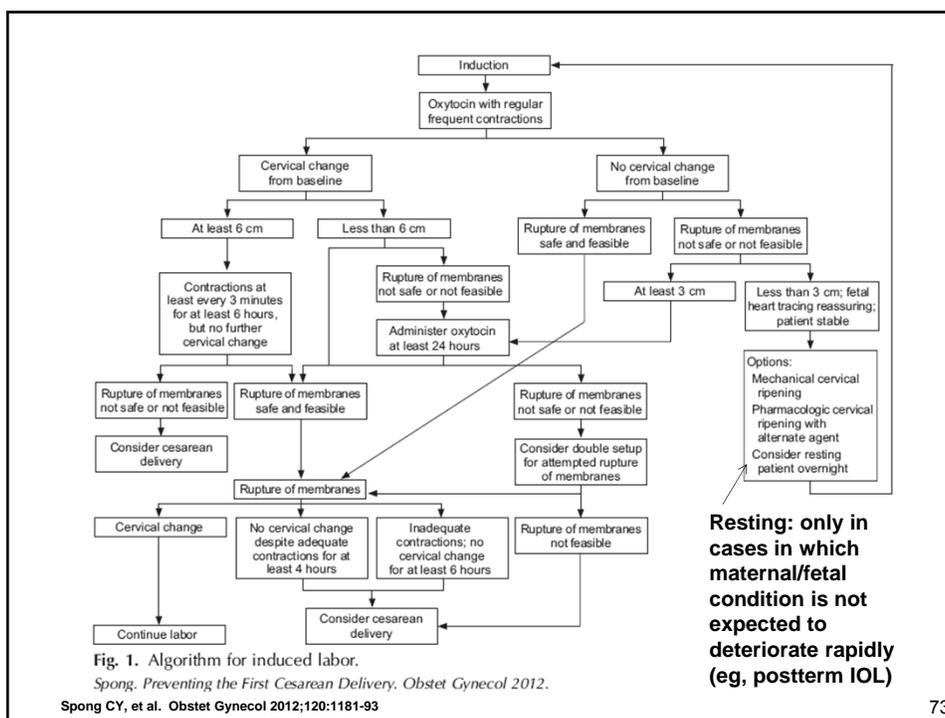
## Cervical Ripening Techniques: Pharmacologic

- Prostaglandin E<sub>2</sub> (dinoprostone)
  - Delay oxytocin for 6-12 hours after administration
- Prostaglandin E<sub>1</sub> (misoprostol)
  - Uterine tachysystole with FHR changes (↑ with 50 µg dose)
  - Delay oxytocin for 4 hours after last dose
  - Contraindicated in women with prior CD or major uterine surgery (↑ risk uterine rupture)
- Combination
  - Foley + misoprostol
    - Induction-to-delivery time shorter with combination compared to vaginal misoprostol alone (difference -3.1 hours, 95% CI -5.9 to -0.30)



Williams Obstetrics 23<sup>rd</sup> ed  
 ACOG PB#107, Aug 2009  
 Carbone JF, et al. Obstet Gynecol 2013;121:247-52

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## Standardized Latent Labor Management

- Amniotomy within 24 hours of starting induction
- IUPC after membrane rupture
- Titration of oxytocin to achieve >200 MVUs
- At least 12 hrs of oxytocin after membrane rupture before cesarean for failed induction
  - Cervix not 4 cm/90% or 5 cm
- 4% nullips & no multiples in latent labor after 12 hrs

## Standardized Protocol vs. Provider Preference

- Retrospective analysis of women who underwent IOL with unfavorable cervix to determine if adherence to standardized IOL protocol decreased rate of failed IOL
  - Included preterm GA & TOLAC
  - Use & type of cervical ripening at discretion of provider
- Protocol adherent IOL:
  - Amniotomy within 24 hrs of oxytocin induction
  - IUPC at amniotomy or within 6 hours & still latent labor
  - Titration of oxytocin to MVUs 200-300 or cervical change
  - Oxytocin for at least 12 hours (up to 18 hours) after membrane rupture before diagnosis of failed IOL
- Rate of failed IOL:
  - Significantly lower in protocol-adherent group among nullips (3.8% vs. 9.8%; p=.043) & multips (0% vs. 6%; p=.0004)
  - Protocol-adherent nullips spent 3.5 fewer hours in labor
  - Protocol-adherent multips spent 1.5 fewer hours in labor
  - Lower among protocol-adherent women who underwent TOLAC (0 vs. 22%; p=.008)
  - Lowest rate when ALL elements of protocol followed

Rhinehart-Ventura, et al; Am J Obstet Gynecol 2014;211:301.e1-7 75

## Recommendations for the Safe Prevention of the Primary Cesarean Delivery

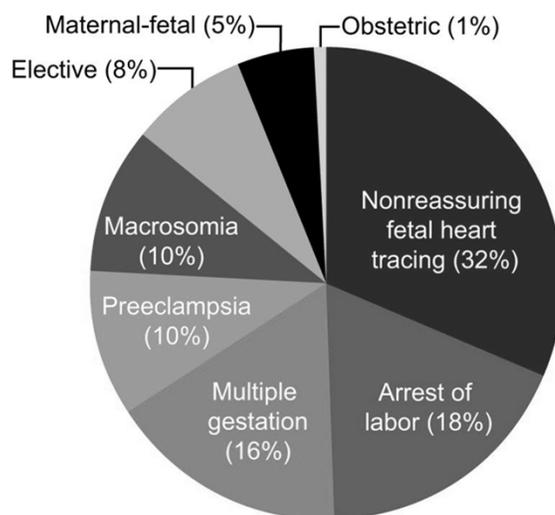
Induction of labor	
Before 41 0/7 wks of gestation, induction of labor generally should be performed based on maternal and fetal medical indications. Inductions at ≥41 0/7 wks of gestation should be performed to reduce risk of cesarean delivery and risk of perinatal morbidity and mortality.	1A Strong recommendation, high-quality evidence
Cervical ripening methods should be used when labor is induced in women with unfavorable cervix.	1B Strong recommendation, moderate-quality evidence
If maternal and fetal status allow, cesarean deliveries for failed induction of labor in latent phase can be avoided by allowing longer durations of latent phase (up to ≥24 h) and requiring that oxytocin be administered for at least 12-18 h after membrane rupture before deeming induction failure.	1B Strong recommendation, moderate-quality evidence

ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711 76

General Principles and Safe Approach

# Intrapartum Use of oxytocin

## Indications for Primary Cesarean Delivery



Barber E, et al. *Obstet Gynecol* 2011;118:29-38

## Management of Active Phase Disorders

- When 1<sup>st</sup> stage labor is protracted or arrested, oxytocin is commonly recommended
- 80% of women with active phase arrest have inadequate uterine contractions (<180 MVU)
- Oxytocin augmentation
  - 90% achieve 200-225 MVU
  - 40% achieve at least 300 MVU
- Criteria for labor augmentation
  - Active labor arrest of dilation >2 hrs & inadequate uterine activity
  - Arrest of descent with inadequate uterine activity

Hauth JC, et al. *Obstet Gynecol* 1986;68:305  
 Hauth JC, et al. *Obstet Gynecol* 1991;78:344  
 Clark SL, et al. *Am J Obstet Gynecol* 2009;200:35.e1-35.e6  
 Williams Obstetrics 23<sup>rd</sup> ed

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## Oxytocin Regimens

Regimen	Starting Dose (mU/min)	Incremental Increase (mU/min)	Interval (min)
Low dose	0.5-2	1-2	15-40
High dose	6	3-6	15-40

ACOG PB #107, Aug 2009

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## Oxytocin Regimens

- Initial infusion rates vary by more than an order of magnitude; dosing intervals vary by 200-300%
- No evidence for improved perinatal outcomes with aggressive active management protocols vs. low-dose techniques
- Patient safety approach favors use of a low-dose regimen

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-e6

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## Oxytocin Regimens

### LOW-DOSE, LESS FREQUENT INCREASE

- Less tachysystole with FHR changes
- Less postpartum maternal infection
- Less postpartum hemorrhage
- More spontaneous vaginal birth

### HIGH-DOSE, MORE FREQUENT INCREASE

- More tachysystole with FHR changes
- Less chorioamnionitis
- Shorter labor
- Less CD for dystocia
- No data in previous CD

ACOG PB #107, Aug 2009  
Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-e6

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## Oxytocin: Safety Considerations

- ~50% of all paid obstetric litigation claims involve allegations of oxytocin misuse
- Recently added to list of high-alert meds designated by Institute for Safe Medication Practices
  - Only 11 other drugs on this list
    - "bearing a heightened risk of harm when used in error"
    - "require special safeguards to reduce risk of error"
  - Administration of other high alert meds (eg, insulin, methotrexate, nitroprusside) generally involves use of well-defined protocols that eliminate dangerous variation & minimize risk of inadvertent human error

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-e6

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## Oxytocin: Pharmacologic Considerations

- Unpredictable therapeutic index
  - Most women requiring oxytocin deliver with infusion at no more than 11-13 m/U per minute
  - Effects of any given dose may range from sustained tachysystole & fetal asphyxia to no discernible effect on uterine contractility
- Oxytocin should be started at a relatively low dose
- Dosage increase based upon determination that lower dose is insufficient in achieving normal, physiologic rates of labor progress

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-35.e6

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## Oxytocin: Pharmacologic Considerations

- No established max dose
- Uterine response ↑ from 20-30 wks & ↑ rapidly at term
- $t_{1/2} = 5 \text{ min}$
- Uterus contracts within 3-5 min of starting oxytocin
- Steady-state reached in 40 min
  - Dosing regimens that increase infusion rate significantly faster than this will result in additional drug being given before full effects of previous dose known

Williams Obstetrics 23<sup>rd</sup> ed  
ACOG PB #107, Aug 2009  
Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-35.e6

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## Oxytocin: Pharmacologic Considerations

- Detrimental effects exclusively mediated through its dose-related effects on uterine activity
  - Inverse relationship between ctx number & fetal pH
  - Incomplete recovery of fetal SaO<sub>2</sub> to previous baseline levels when ctx occur  $\geq 2 \text{ min}$
- Progressive decline in fetal SaO<sub>2</sub> with persistent ctx frequencies of  $\geq 5/10 \text{ min}$ 
  - Not seen with frequencies  $< 5/10 \text{ min}$

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-35.e6

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## Oxytocin: Physiologic Considerations

- Acceptable uterine ctx in patients receiving oxytocin:
  - Consistent achievement of 200-220 MVU
  - Consistent pattern of 1 ctx every 2-3 min, lasting 80-90 sec, & palpating strong by an experienced labor nurse
- Once these levels achieved, more time, not more oxytocin!
- If no labor progress, CD is indicated rather than supraphysiologic uterine activity levels!

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-35.e6

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## Oxytocin: Team Approach

- The professional at the bedside administering & monitoring the oxytocin infusion should have authority & responsibility for assuring this is done safely. It is inappropriate to override the recommendation of a labor nurse at the bedside regarding oxytocin infusion without actual examination of the tracing.
- Use of uniform, unambiguous, & preestablished criteria for oxytocin initiation, administration, & monitoring, agreed on in advance by both nursing & medical staff, can largely eliminate such.

Clark SL, et al. Am J Obstet Gynecol 2009;200:35.e1-e6

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## Oxytocin: Checklist-Based Protocol

- Study objective: examine effects of conservative, specific checklist-based protocol for oxytocin on maternal & newborn outcomes
- Focused on uterine & fetal response to oxytocin rather than on any specific dosing regimen
- Premise
  - Lack of outcomes based data on regimen superiority
  - Fundamental principle of quality improvement: greater practice variation is associated with poorer outcomes than more uniform practice patterns

Clark S, et al. Am J Obstet Gynecol 2007;197:480.e1-480.e5

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TABLE 2  
Pre-oxytocin checklist



### HCA Perinatal Safety Initiative Pre-Oxytocin Checklist For Women with Term-Singleton Babies

"This Pre-Oxytocin checklist represents a guideline for care; however, individualized medical care is directed by the physician."

If the following checklist cannot be completed, Oxytocin should not be initiated

Date and time completed \_\_\_\_\_

1.  Physician or Midwife Order on chart
2.  Current history and physical on the chart\*
3.  Prenatal Record on chart\*
4.  Indication for induction is documented
5.  Pelvis is documented by physician to be clinically adequate (should be on prenatal record)\*
6.  Estimated fetal weight within past week (clinical or ultrasound) less than 4500gms in a non-diabetic woman or less than 4250 grams in a diabetic woman\*
7.  Gestational age documented
8.  Consent signed (General I&D consent)
9.  Physician with C-section privileges is aware of the induction and readily available and this is documented in the medical record
10.  Status of the cervix is assessed and documented
11.  Presentation is assessed and documented (physician required to come in if nurse unable to determine)
12.  Fetal Assessment completed and indicates: (complete all below)
  - A minimum of 30 minutes of fetal monitoring is required prior to starting Oxytocin
  - At least 2 accelerations (15 bpm x 15 sec) in 30 minutes are present, or a biophysical profile of 8 or 10 is present within the past 4 hours or adequate variability.\*\*
  - No late decelerations in the last 30 minutes
  - No more than 2 Variable deceleration exceeding 60 seconds and decreasing greater than 60 bpm from baseline within the previous 30 minutes prior to starting Oxytocin infusion.

\*May be delayed for non-elective admissions.

\*\* This document does not apply to a formal Oxytocin challenge test without the intent to induce or augment labor.

\*\*\*There will be some situations in which alterations in management from that described in the protocol are clinically appropriate. If, after reviewing the fetal heart rate strip and course of labor the responsible physician feels that in his or her judgment, continued use of Oxytocin is in the best interest of the mother and baby, the physician should write or dictate a note to that effect and order the Oxytocin to continue. The RN will continue to provide safe, high quality nursing care.

FINAL: September 8, 2005

Clark S, et al. Am J Obstet Gynecol 2007;197:480.e1-480.e5

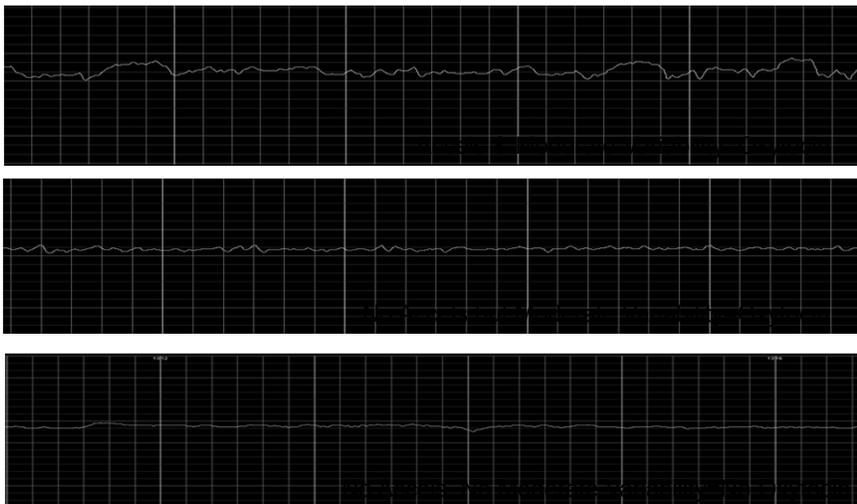
90

## Pre-Oxytocin Checklist

- Fetal Assessment completed & indicates (complete all below):
  - Minimum of 30 min of fetal monitoring required prior to starting oxytocin
  - At least 2 accels (15 bpm x 15 sec) in 30 min are present, or a BPP of 8/10 is present within past 4 hours, or adequate variability
  - No late decels in the last 30 min
  - No more than 2 variable decels exceeding 60 sec & decreasing >60 bpm from baseline within the previous 30 min

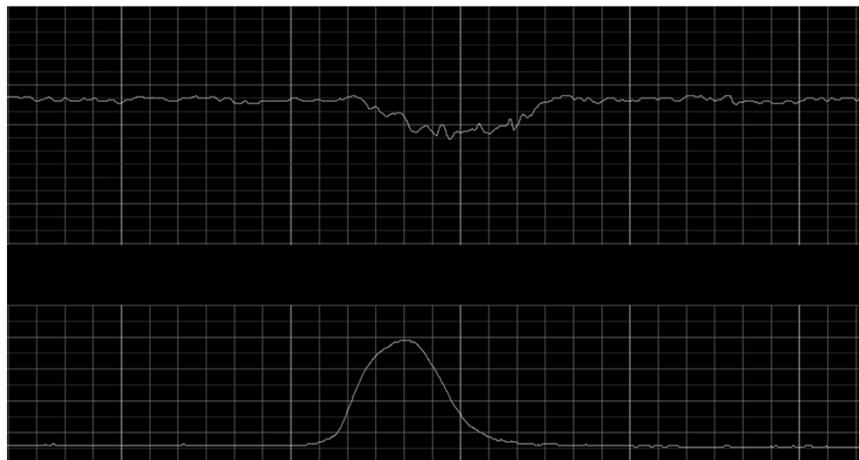
91

## Pre-Oxytocin Checklist: Accelerations and/or Moderate Variability



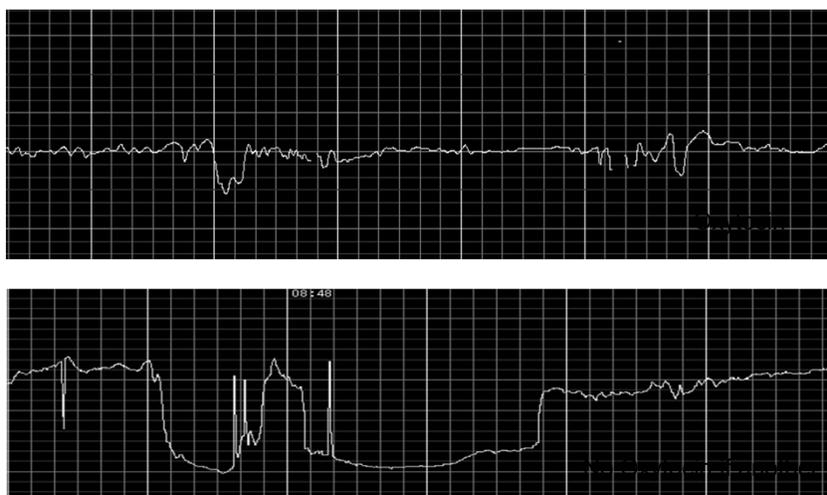
92

### Pre-Oxytocin Checklist: Late Deceleration=No Oxytocin



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### Pre-Oxytocin Checklist: Variable Decelerations



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TABLE 3 "In use" oxytocin checklist

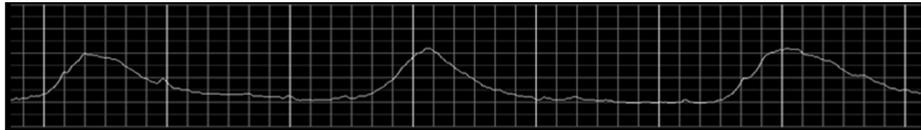
HCA Perinatal Safety Initiative
Recommended Oxytocin "In Use" Checklist for Women with Term Singleton- Babies
<small>"This Oxytocin "In Use" Checklist represents a guideline for care; however, individualized medical care is directed by the physician."</small>
Checklist will be completed every 30 minutes. Oxytocin should be stopped or decreased if the following checklist cannot be completed.
Date and time completed _____
<input type="checkbox"/> <b>Fetal Assessment indicates:</b>
<input type="checkbox"/> At least 1 acceleration of 15 bpm x 15 seconds in 30 minutes or adequate variability for 10 of the previous 30 minutes.
<input type="checkbox"/> No more than 1 late deceleration occurred.
<input type="checkbox"/> No more than 2 Variable decelerations exceeding 60 seconds in duration and decreasing greater than 60 bpm from the baseline within the previous 30 minutes.
<input type="checkbox"/> <b>Uterine Contractions</b>
<input type="checkbox"/> No more than 5 uterine contractions in 10 minutes for any 20minute interval
<input type="checkbox"/> No two contractions greater than 120 seconds duration
<input type="checkbox"/> Uterus palpates soft between contractions
<input type="checkbox"/> If IUPC is in place, MVU** must calculate less than 300 mm Hg and the baseline resting tone must be less than 25 mm Hg.
<b>*If Oxytocin is stopped the Pre-Oxytocin Checklist will be reviewed before Oxytocin is reinitiated.</b>
<b>** MVU = Montevideo Units</b>

Clark S, et al. Am J Obstet Gynecol 2007;197:480.e1-480.e5 95

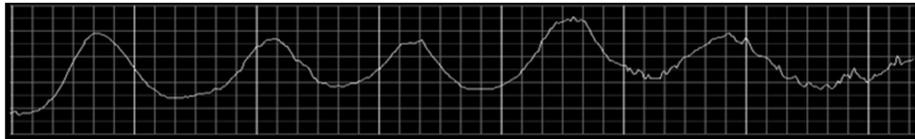
## "In Use" Oxytocin Checklist

- **Fetal Assessment indicates:**
  - At least 1 accel of 15 bpm x 15 sec in 30 min or adequate variability for 10 of the previous 30 min
  - No more than 1 late decel occurred
  - No more than 2 variable decels exceeding 60 sec in duration & decreasing >60 bpm from baseline within the previous 30 min
- **Uterine Contractions**
  - No more than 5 ctx in 10 min for any 20 min interval
  - No two ctx >120 sec duration
  - Uterus palpates soft between ctx
  - If IUPC is in place, MVU must calculate <300 mm Hg & the baseline resting tone must be <25 mm Hg

## "In Use" Oxytocin Checklist: Uterine Contractions



Oxytocin



No Oxytocin

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## Outcomes

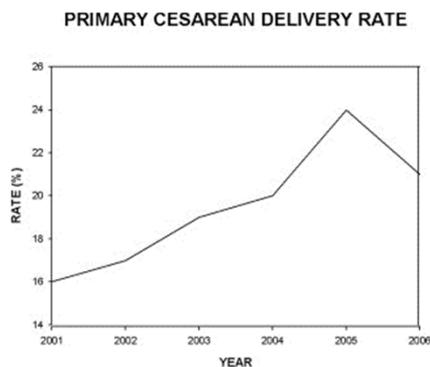
- Max dose used to achieve delivery significantly lower in checklist-managed group
- No difference in length of any stage or phase of labor, total time of oxytocin administration, or rate of operative vaginal or abdominal delivery
- CD rate declined & newborn outcome improved

Clark S, et al. Am J Obstet Gynecol 2007;197:480.e1-480.e5

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## Outcomes

- Primary CD rate in 220,000 deliveries fell from 23.6% to 21.0% in contrast to annual increase of 1-4% in previous years



Clark S, et al. Am J Obstet Gynecol 2007;197:480.e1-480.e5

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## Alternate Management Strategies

### Other Indications for Primary Cesarean Delivery

## Recommendations for the Safe Prevention of the Primary Cesarean Delivery

<b>Fetal malpresentation</b>	
Fetal presentation should be assessed and documented beginning at 36 0/7 wks of gestation to allow for external cephalic version to be offered.	1C Strong recommendation, low-quality evidence
<b>Suspected fetal macrosomia</b>	
Cesarean delivery to avoid potential birth trauma should be limited to estimated fetal weights of at least 5000 g in women without diabetes and at least 4500 g in women with diabetes. Prevalence of birth weight of ≥5000 g is rare, and patients should be counseled that estimates of fetal weight, particularly late in gestation, are imprecise.	2C Weak recommendation, low-quality evidence
<b>Excessive maternal weight gain</b>	
Women should be counseled about IOM maternal weight guidelines in attempt to avoid excessive weight gain.	1B Strong recommendation, moderate-quality evidence
<b>Twin gestations</b>	
Perinatal outcomes for twin gestations in which first twin is in cephalic presentation are not improved by cesarean delivery. Thus, women with either cephalic/cephalic-presenting twins or cephalic/noncephalic presenting twins should be counseled to attempt vaginal delivery.	1B Strong recommendation, moderate-quality evidence
ACOG; SMFM. Obstet Gynecol 2014 Mar;123(3):693-711	
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# Beyond Labor and Delivery

## Reducing Elective Deliveries Prior to 39 Weeks in Medicaid & CHIP

- ACOG discouraged elective deliveries <39 wks without medical or obstetrical need for >30 years
- Practices among physicians & hospitals continued to vary significantly
- CMS launched initiatives in 2012 to improve perinatal health outcomes
  - Partnered with ACOG & March of Dimes

<http://www.medicaid.gov/medicaid-chip-program>

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## Reducing Elective Deliveries Prior to 39 Weeks in Medicaid & CHIP

- Pilot project interventions achieved reductions through collaborative models
- Other strategies recognized:
  - Educational efforts aimed at physicians & patients
  - Prior authorization policies
    - Hospital prior authorization or peer review prior to scheduling early elective deliveries
    - Hospital monthly reporting
    - Retrospective reviews or audits
  - Reimbursement policies
    - Payment disincentives for early elective CD (equalize payment for low-risk vaginal & cesarean births)
    - Financial bonus payment for hospitals that achieve a threshold reduction in early elective deliveries

<http://www.medicaid.gov/medicaid-chip-program>

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## State Medicaid & Public Health Efforts to Reduce Early Elective Deliveries

- Texas:
  - Medicaid will deny payment for claims non-medically necessary early elective deliveries, but allow retrospective reviews for reconsideration

<http://www.medicaid.gov/medicaid-chip-program>

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## Center for Healthcare Quality & Payment Reform

- "One of the biggest opportunities for reducing healthcare costs is improving the quality of maternity care."
- "The place to start is with the most common hospital procedure in America - the Cesarean section."
- "A major contributor to all of these problems is the way health plans & Medicaid typically pay for maternity care. Hospitals are paid more for C-Sections than for vaginal deliveries, creating an incentive to do more C-Sections, & doctors are often paid similar amounts for both types of delivery, even though vaginal deliveries typically take longer & occur at inconvenient times."

<http://www.chqpr.org/maternitycare.html>

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## Reimbursement Considerations

- Compared to spontaneous vaginal delivery of singleton, higher reimbursement for:
  - Operative vaginal delivery (OVD)
  - Multiple gestation
  - Breech vaginal delivery
- Documentation that supports failure of evidence-based measures to avoid CD
  - NRFHR: Category II with negative response to scalp stim or minimal variability
  - Failed IOL: CD not performed before 24 hrs of ROM & oxytocin
  - Arrest of active phase: at least 6 cm with ROM & adequate MVU x 4 hrs, inadequate x 6 hrs
  - Arrest of descent: exceeded normal time & poor candidate for OVD

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## Summary

- The primary CD rate has increased without a concomitant decrease in maternal/neonatal morbidity or mortality
- ACOG & SMFM have instituted guidelines for the safe prevention of the primary CD that focuses on contemporary labor patterns
  - Longer times should be allowed for induction of labor
  - Active phase arrest disorders should not be diagnosed before 6 cm
  - Longer times should be allowed for 2<sup>nd</sup> stage progress
- A standardized & conservative checklist-based approach to oxytocin administration may also assist in safely lowering the CD rate

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**Thank you!**

## Questions and Answers



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Services Section, DSHS

Remote sites can send in questions by typing in the *GoToWebinar* chat box or email [GrandRounds@dshs.state.tx.us](mailto:GrandRounds@dshs.state.tx.us).

For those in the auditorium, please come to the microphone to ask your question.

**DSHS Grand Rounds  
Spring Semester 2015**

**Wednesday, April 8, 2015**

**Wednesday, April 15, 2015**

**Wednesday, April 22, 2015**

**Wednesday, April 29, 2015**

**Wednesday, May 6, 2015**

**Wednesday, May 13, 2015**



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