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NICU Alert!

Labor & Birth
Practices Impacting
Neonatal Outcome

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Disclosure Statement

► **I, Do NOT** have any actual or potential conflict of interest in relation to this presentation.

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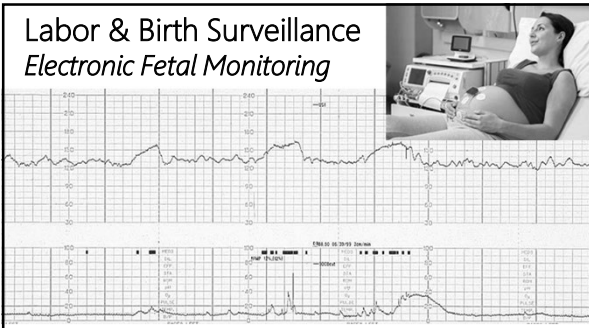
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NICU Surveillance



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Labor & Birth Surveillance
Electronic Fetal Monitoring



► EFM is an ongoing *indirect* assessment of fetal oxygenation. When interruptions in oxygenation occur, the fetus responds with detectable FHR changes.

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Electronic Fetal Monitoring Perinatal Litigation



- ▶ AWHONN, ACOG, ACNM agree on common FHR definitions and management of intrapartum FHR tracings
- ▶ With deteriorating FHR and/or clinical complications, timely interventions are imperative for optimal fetal outcome
- ▶ EFM is the most common method of fetal assessment for nearly 3.8 million in the US who give birth each year (however, periodic auscultation may be used with low-risk moms/fetuses)

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NICU Alert! Labor & Birth Practices Impacting Neonatal Outcome



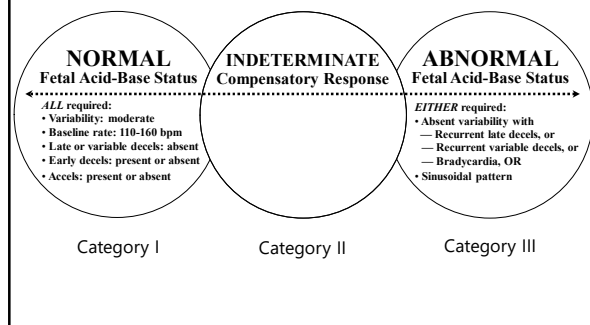
- ▶ Deteriorating fetal oxygenation and development of acidemia (category I, II, III)
- ▶ Labor & birth clinical scenarios
 - ↓ Maternal oxygenation
 - ↓ Uteroplacental exchange *
 - ↓ Umbilical blood flow *
 - ↓ Fetal circulation & FHR regulation



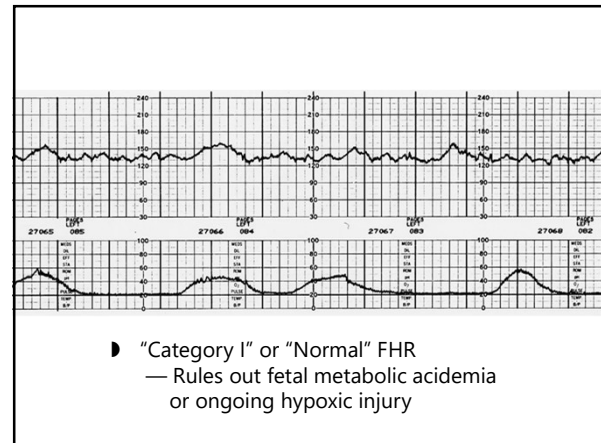
- ▶ Acute clinical scenarios (e.g., eclamptic seizure, uterine tachysystole, prolapsed umbilical cord, ruptured vasa previa, abruptio placenta, uterine rupture, 2nd stage fetal intolerance)

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FHR Characteristics and Acidemia Intrapartum EFM



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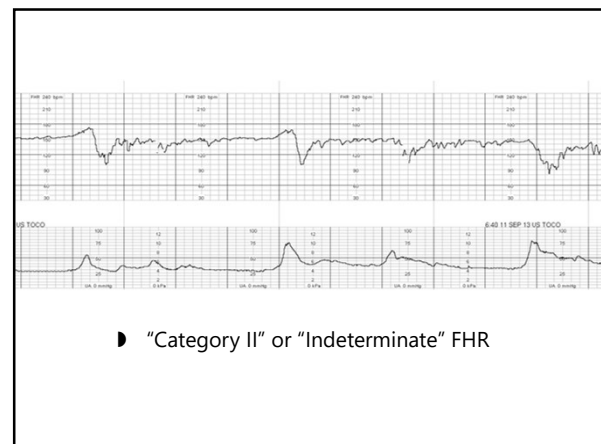
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Moderate Variability at Birth High Predictability

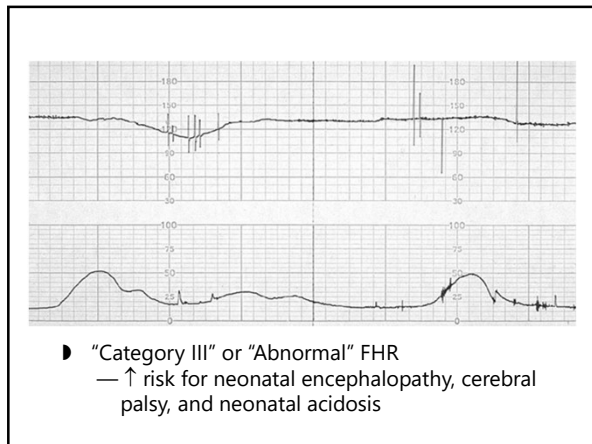


- Vigorous
- Well-oxygenated
- Normal pH

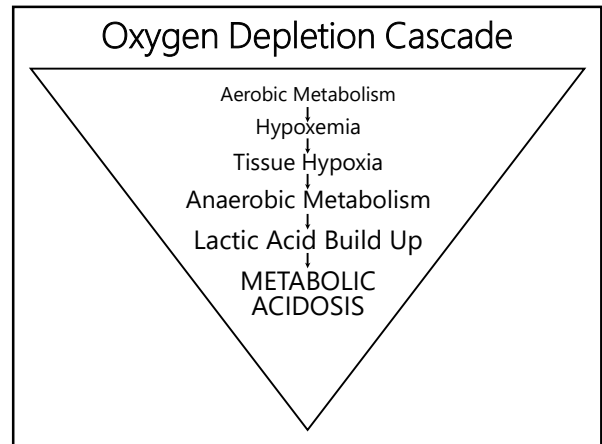
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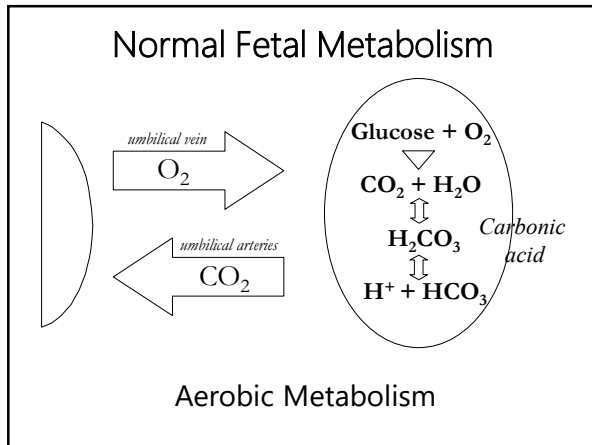
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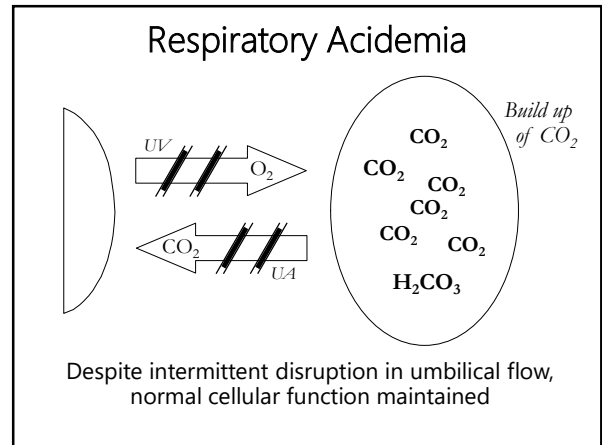
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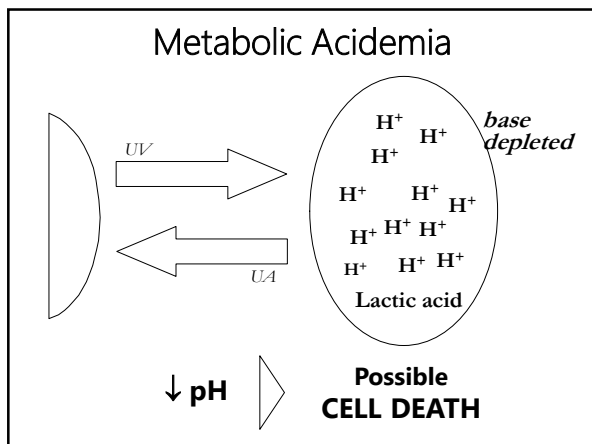
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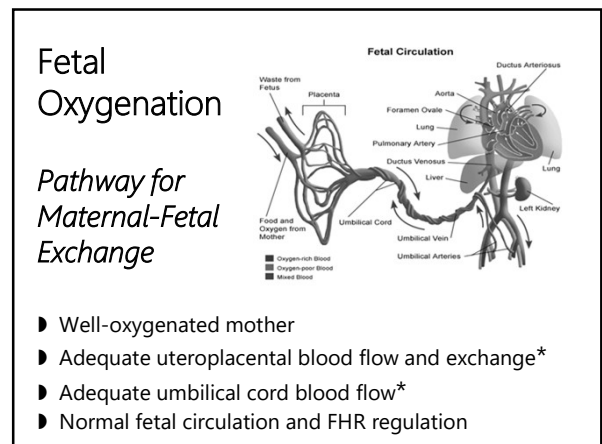
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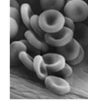
Well-Oxygenated Mother Supporting Fetal Oxygenation



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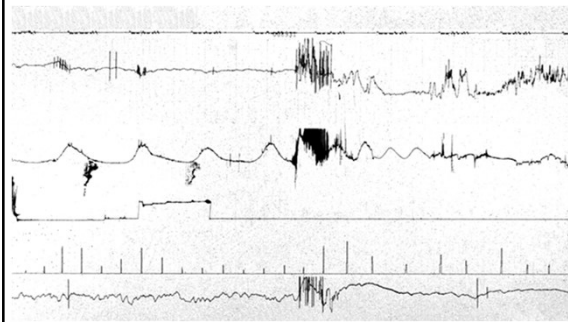
Oxygen Transport Physiology Supporting Fetal Oxygenation

- ▶ Adequate maternal hemoglobin concentrations
- ▶ Adequate maternal O₂ saturation (SaO₂) (*oxygen carrying capacity*)
- ▶ Adequate maternal arterial O₂ tension (PaO₂) (*immediately available O₂ for exchange*)
 - Adequate maternal ventilation and pulmonary function



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Decreased Maternal-Fetal O₂ Eclamptic Seizure



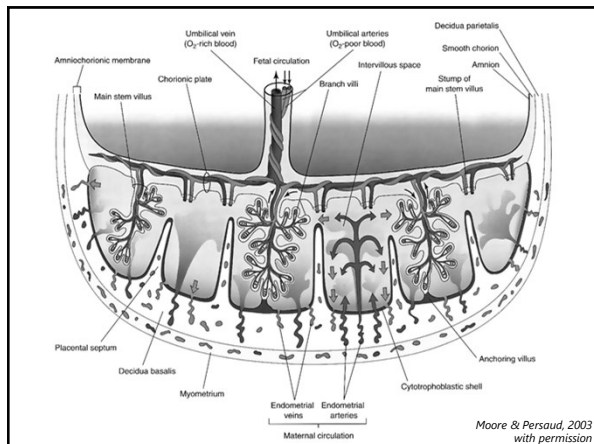
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Adequate Uterine Blood Flow

- ▶ ↑ From 50 ml/min → approx. 700 ml/min at term
- ▶ 10–15% of maternal CO
- ▶ 70–90% passes through intervillous space

Intervillous space perfusion dependent upon adequate uterine blood flow

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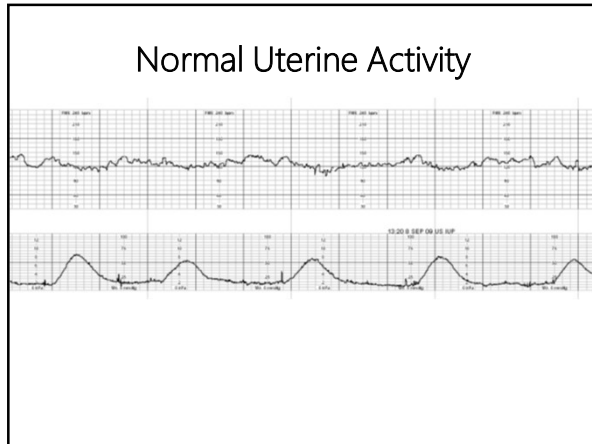


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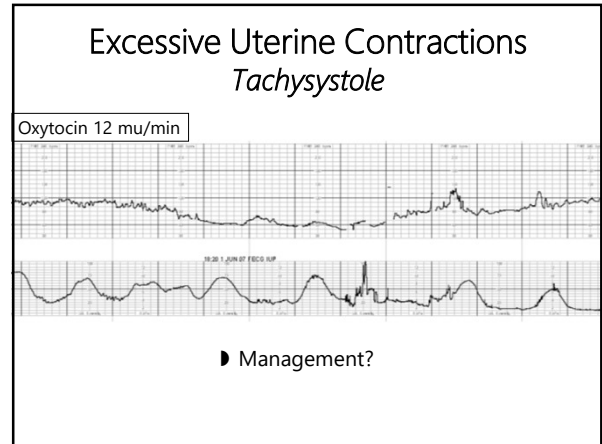
Uteroplacental Blood Flow and Maternal-Fetal Exchange *Clinical Factors that May Decrease*

- ▶ Excessive uterine activity (*tachysystole, hypertonus, oxytocin, abruptio placenta, cocaine*)
- ▶ Maternal hypotension (*supine, regional analgesia, hemorrhage*)
- ▶ Maternal conditions (*hypertension, cardiac disease*)
- ▶ Placental changes (*degenerative, ↓ surface area, edema*)

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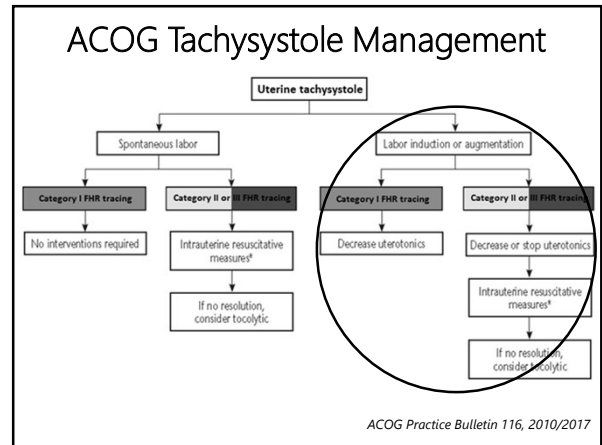


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Oxytocin *Induction Agent*

- Most commonly used induction agent in US and worldwide
Smith & Merrill, 2006
- High-alert medication
Institute for Safe Medication Practices, 2012

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Prevention Strategies *Oxytocin Safety*

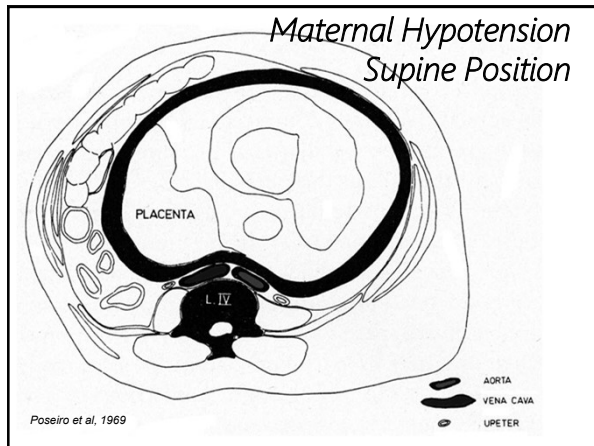
- Standard order sets and protocols based on current pharmacologic and physiologic evidence:
Start at 1-2 mU/min., ↑ by 1-2 mU/min no more frequently than every 30 min. based on maternal-fetal response
- Oxytocin checklists

Sundin et al, MCN, 2018

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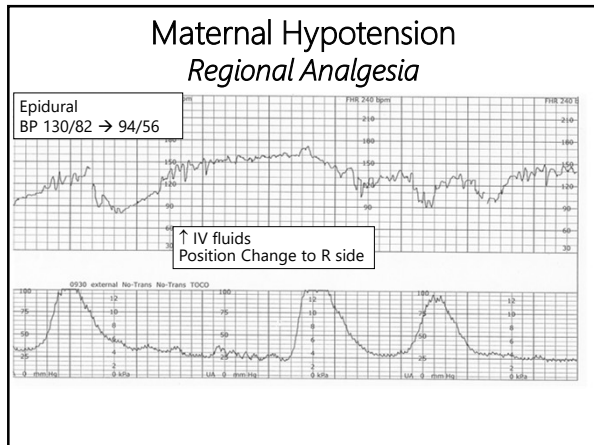
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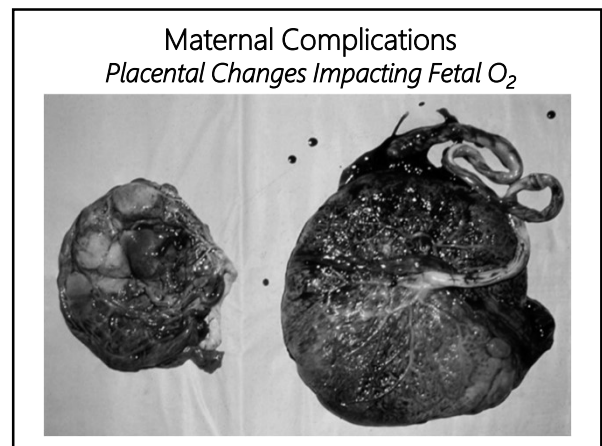
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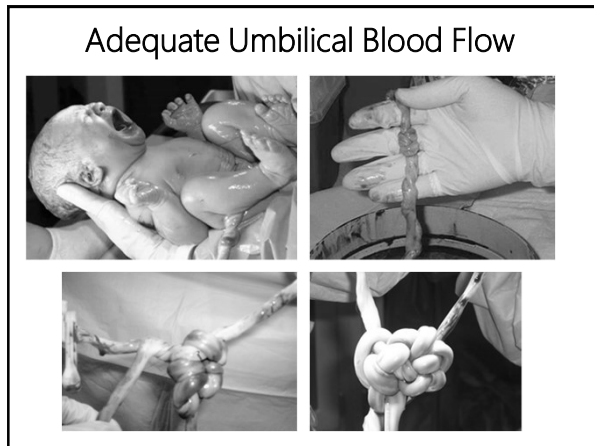
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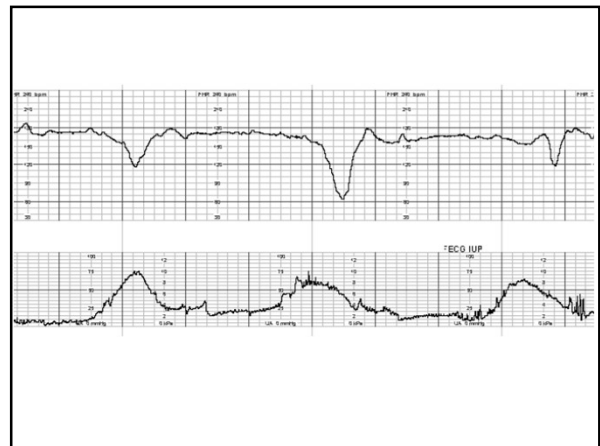
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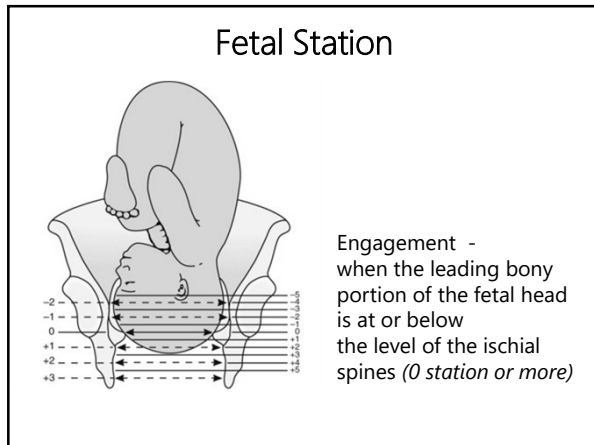
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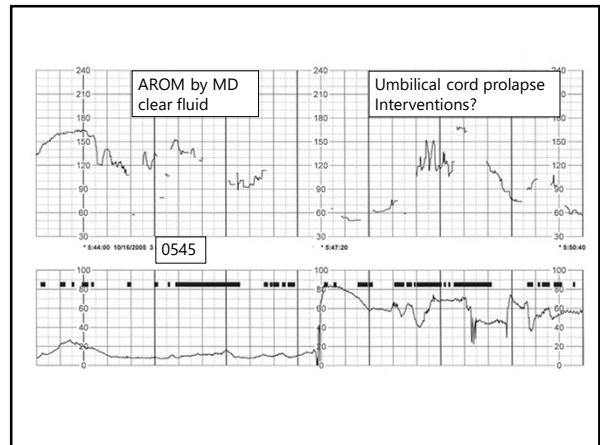
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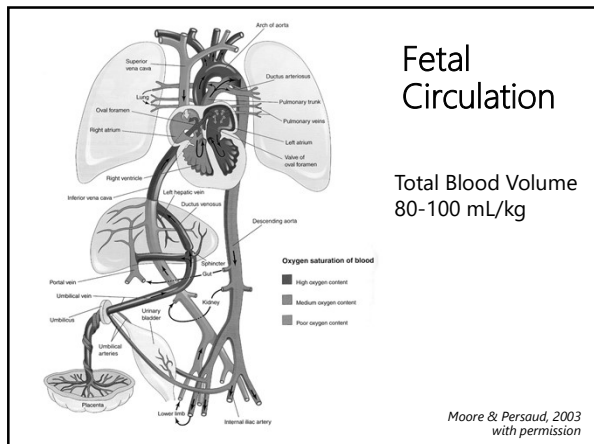
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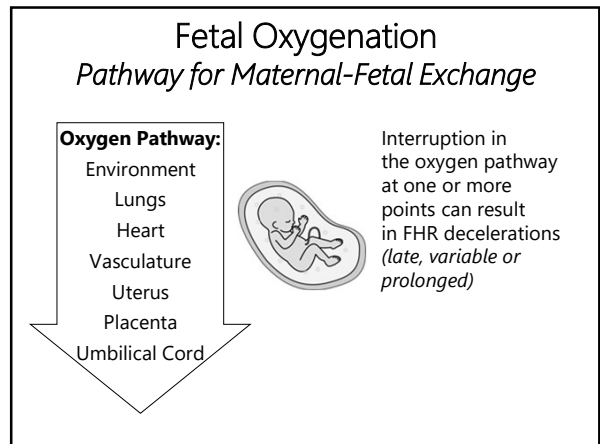
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Development of Metabolic Acidemia *Evolution Over Time*

When **initially normal** tracing develops abnormal FHR patterns in absence of a catastrophic event...

60-90 min

→


Significant Acidemia

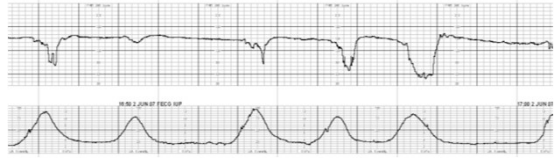
- Identify cause of change
- Intervene
- Decide to deliver?

Parer et al, 2006

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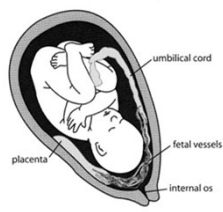
Additional Clinical Scenarios *Impact on Neonatal Outcome*





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Vasa Previa



- ▶ Fetal blood vessels present in membranes covering internal cervical os
- ▶ Velamentous umbilical cord, bilobed or succenturiate placentas; placenta previas
- ▶ Risk of fetal exsanguination, death, with ROM
- ▶ Routine screening not recommended
- ▶ However, antenatal diagnosis improves fetal outcome

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Velamentous Insertion of Umbilical Cord



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Ruptured Vasa Previa

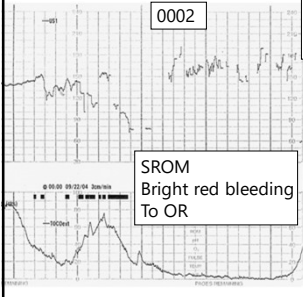
6 cm/+1; spont. labor
Prior category I FHR
Epidural injected; position chg



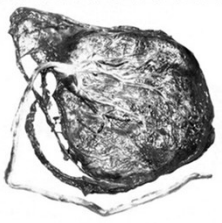
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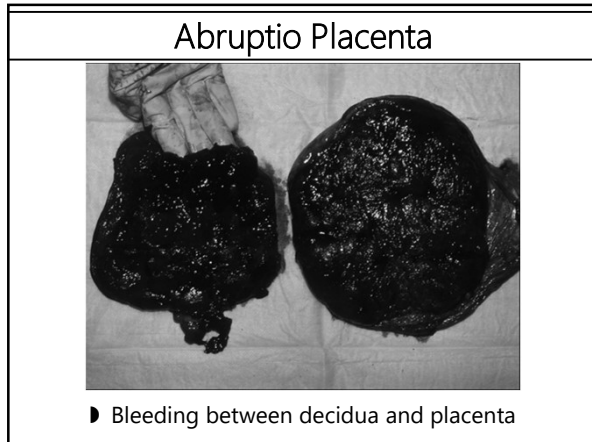
C-Birth @0017
15 min. post SROM/bleeding
APGARS 1/3
Unable to draw cord gases
Initial Hct 38%



SROM
Bright red bleeding
To OR



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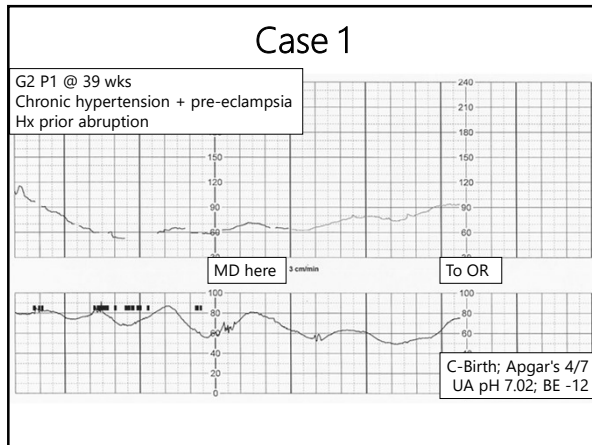
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Abruptio Placenta

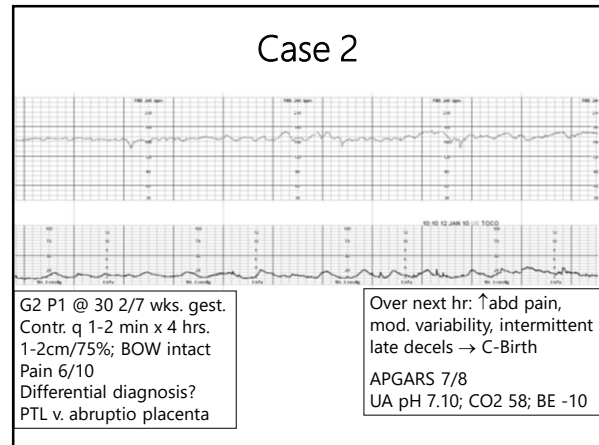
Risk Factors and Management

- ▶ Major Risk Factors
 - Prior history
 - Hypertension
 - Cigarette smoking; cocaine use
 - Blunt abdominal trauma
- ▶ Diagnosis based on clinical findings
- ▶ ↑ Uterine activity and FHR changes
- ▶ Management depends upon severity and GA
- ▶ K-B poor correlation; US poor sensitivity

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Uterine Rupture

- ▶ Unscarred uterus
 - Risk rupture 0.02%
Gregory et al., 1999
- ▶ 1 prior low-transverse ut. incision
 - Rupture rate after TOLAC 0.5-0.9%
ACOG, 2019
- ▶ VBAC is associated with fewer complications than elective repeat cesarean; whereas a failed TOLAC is associated with more complications
ACOG, 2019

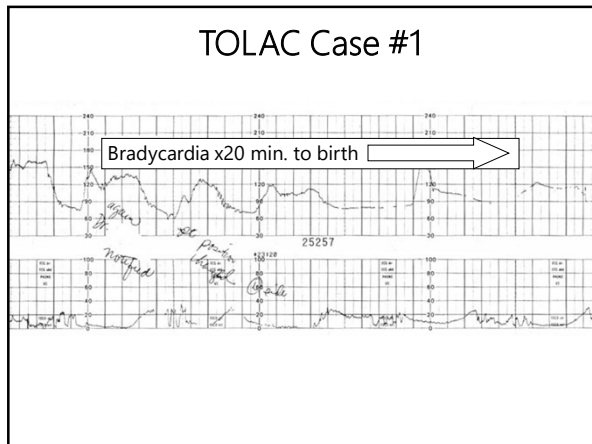
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Intrapartum Uterine Rupture

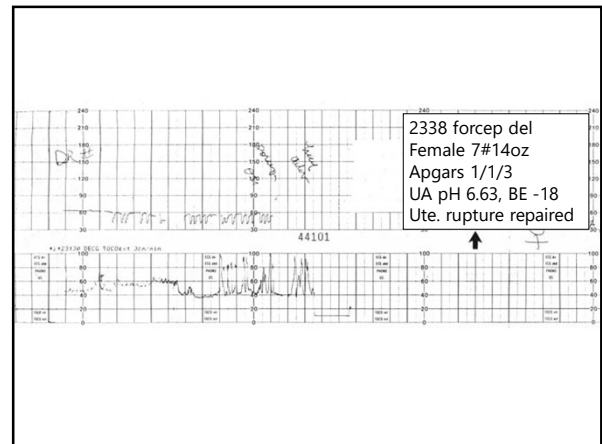
Considerations

- ▶ FHR Abnormality
 - Most common sign of uterine rupture
 - Recurrent variables, late, prolonged decels
 - Think beginning uterine rupture, not amnioinfusion!
- ▶ Continuous EFM (*no data IUPC/FSE superior*)
- ▶ Loss of Fetal Station
- ▶ New Intense Maternal Pain (*often masked with epidural*)
- ▶ Vaginal Bleeding (*not consistent finding*)

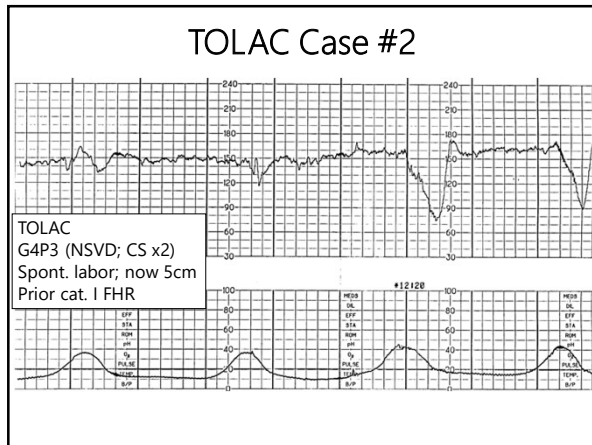
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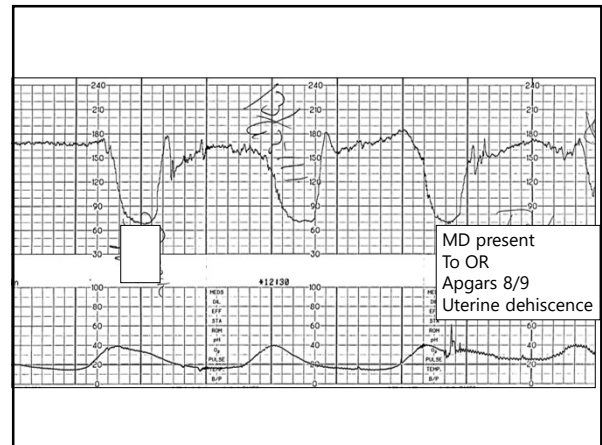
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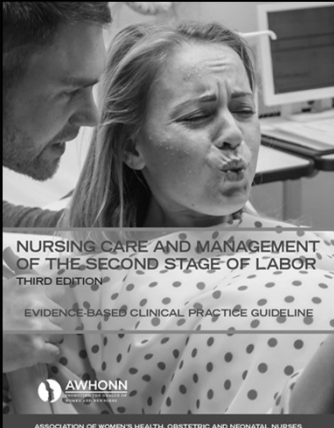
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2019

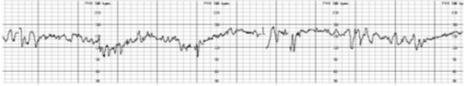
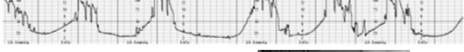
AWHONN's
Nursing Care
and Management
of the Second Stage
of Labor



*Evidence-Based
Clinical Practice
Guideline*

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Second Stage Labor

- ▶ Active pushing is the most physiologically stressful time of labor for the fetus

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Frequency of Category I, II, and III During Labor

	Over Course of Labor	2 Hours Before Birth
Category I	78%	↓ 61%
Category II	22%	↑ 39%
Category III	0.004%	↑ 0.006%

Jackson et al., *Obstet Gynecol*, 2011

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Second Stage Pushing Considerations for Fetal Oxygenation

- ▶ Decrease in fetal reserve (category II/III)
- ▶ Uterine tachysystole
- ▶ Maternal positioning
- ▶ Regional analgesia
- ▶ Length of time holding breath (*closed v. open glottis pushing*)
- ▶ Modified pushing



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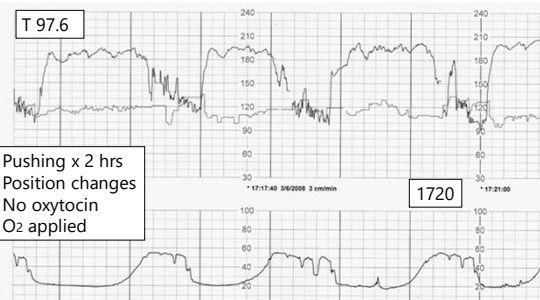
2nd Stage Pushing Techniques Open (Spont.) vs. Closed Glottis (Valsalva)

- ▶ Active Pushing Phase: characterized by ↑ intensity of UC and strong urge to bear down with activation of Ferguson's reflex
- ▶ When not coached, women push with open glottis (approx. 6-8 seconds, repeat x4)
- ▶ Each woman should be encouraged to use her preferred technique

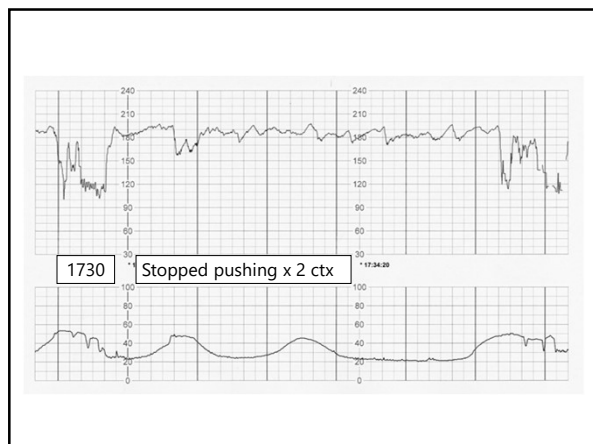
ACOG 2019; Adams et al, AWHONN, 2019, 2016; Aldrich et al., 1995; Barnett & Humenick, 1982; Bassell et al., 1980; Caldeyro-Barcia et al., 1981; Langer et al., 1997; Lemos et al, Cochrane Database, 2015; Prins et al, BJOG, 2011; Rossi et al, JOGNN, 1886; Schaffer et al, AJOG; Simpson & James, 2005

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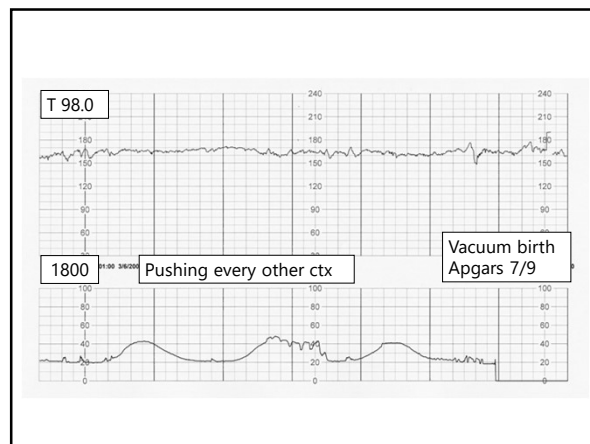
Modified Maternal Pushing



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