

INDUCTION AND AUGMENTATION OF LABOR

INSTRUCTOR: SUE FARON, RNC-OB, MN, CNS
 SYLLABUS: MEGGAN MCGRAW, MN, RNC-OB, CNS

INDUCTION OF LABOR TERMS

- **Cervical Ripening:** The process of effecting physical softening and distensibility of the cervix in preparation for labor and birth.
- **Induction:** The stimulation of uterine contractions **BEFORE** the onset of spontaneous labor for the purpose of accomplishing a vaginal birth.
- **Augmentation:** The stimulation of uterine contractions when spontaneous contractions have **FAILED** to result in the progressive dilation or descent of the fetus.

INCIDENCE

Induction /Augmentation all-time HIGH !!!

National Center for Health Statistics 2012:

- ~50% of women in labor had some kind of stimulation
- Rates peaked in 2010, now down slightly
- Likely Under-reported

**AMERICAN COLLEGE OF OBSTETRICS
AND GYNECOLOGY (ACOG)**

ACOG:

➤ Because **SPONTANEOUS LABOR** has **FEWER** complications, induction without a medical indication should be discouraged.

➤ **NO ELECTIVE** inductions **BEFORE 39weeks** (Nationwide Initiative- 2012)

Induction *should be used* when the benefits of delivery outweigh the risks of continuing the pregnancy

REASONS FOR INDUCTION

Maternal Issues:

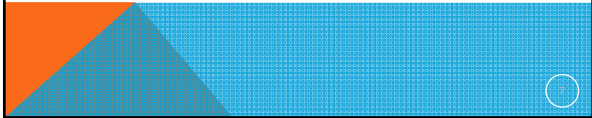
- ✓ Post-dates gestation 41 0/7
- ✓ Diabetes Mellitus (Type I, II, & gestational)
- ✓ Hypertensive disorders
- ✓ Premature rupture of membranes

Fetal Issues:

- ✓ Large infant (estimated fetal weight >4500gm) c/w macrosomia
- ✓ Non-reassuring antenatal testing
- ✓ IUGR

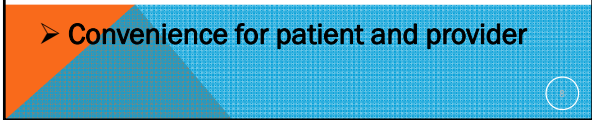
OTHER INDICATIONS:

- **Chorioamnionitis/ Prolonged Rupture of Membranes**
- **Maternal Illness (Cardiac)**
- **Rh Sensitization**
- **Intrauterine Fetal Demise**



OTHER REASONS FOR INDUCTION

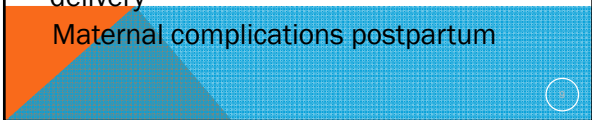
- History of rapid labors
- Women who live great distance from the hospital
- Convenience for patient and provider



REVIEW OF POSTDATES PREGNANCIES (>40 WEEKS)

Associated with increase in:

- Fetal compromise
- Fetal death
- Neonatal illness
- Maternal complications during labor and delivery
- Maternal complications postpartum



REASONS RESEARCHERS GIVE FOR INDUCING LABOR AT 40 WEEKS

Control of labor with an induction is safer

Continuing the pregnancy increases the risk of shoulder dystocia

Continuing the pregnancy increases the risk of cesarean section

Continuing the pregnancy increases the potential for maternal and fetal morbidity and mortality.



CULTURAL/ SOCIAL INFLUENCES

➤ Some patients request induction because of prior pregnancy experiences

➤ “Tired of being pregnant”

➤ Providers fear lawsuits for poor outcomes that may be prevented by earlier delivery.

Study by Simpson, in 2010: In over 3,000 labor patients surveyed, 70% were offered “elective induction at 39 weeks”



CONTRAINDICATIONS:

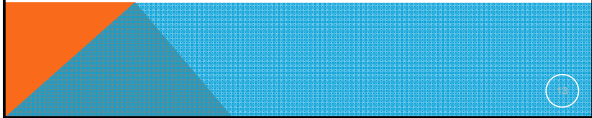
- Documented Cephalopelvic disproportion (CPD)
- Fetal distress: Category III tracings
- Complete placenta previa or vaso previa
- Prior uterine surgery (not including previous c/section)

Active genital herpes



**CONTRAINDICATIONS FOR INDUCTION
(RELATIVE)**

- Unfavorable cervix
- Presenting part not engaged
- Abnormal presentation
- Grand multiparity
- Multiple gestation
- Polyhydramnios
- Hypertonic uterus
- Maternal exhaustion



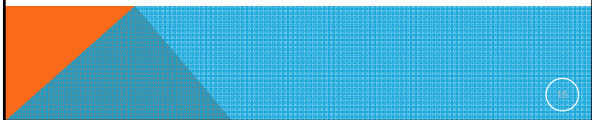
INDUCTION CONCERNS:

- Labors last longer than spontaneous labors
- Inpatient length of stay is longer
- More intense monitoring/ manpower costs to maintain ratios...
- Increased risk of Cesarean Section



**INDUCTION CONDITION
NEEDING SPECIAL ATTENTION**

**Trial of Labor After
C-Section (TOLAC)
Patient**



RISKS WITH INDUCTION

- ✓ Tachysystole
- ✓ Fetal Distress/ Neonatal Resuscitation
- ✓ Increased incidence of C-Section
- ✓ Uterine Rupture
- ✓ Postpartum Hemorrhage

Controversial Procedure

Must have documented Informed consent!!!

NURSING RESPONSIBILITIES WITH INDUCTION

- Assess and document fetal lie
- Assess and document cervical status

UTERINE TACHYSYSTOLE

ACOG definition: Five or MORE contractions in a 10 minute period over a 30 minute period.

- Tachysystole impairs uterine-placental blood flow...
- Can lead to a progressive deterioration of fetal status. Category II tracing; progressing to a Category III or Category III pattern.



INFORMED CONSENT SHOULD INCLUDE:

- ▣ A RISK-BENEFIT analysis which includes:
 - ▣ Review of induction plan: agents and methods to be used
 - ▣ Advantages and disadvantages of each
 - ▣ Alternative approaches, including increased risk for C-Section and repeat induction.

BISHOP SCORE

Method of evaluating cervical readiness and the likelihood of having a VAGINAL BIRTH..

- Exam findings are scored on a scale of 0-10
- Higher scores indicate the “PROBABILITY” of a VAGINAL DELIVERY OUTCOME following induction similar to that of a spontaneous labor...

BISHOP SCORE

Assigned Value

Factor	0	1	2	3
Cervical Dilation	0	1-2 cm	3-4 cm	>= 5 cm
Cervical Effacement	0 – 30%	40 – 50%	60 – 70%	>=80%
Fetal Station	-3	-2	-1, 0	+1, +2
Cervical Consistency	Firm	Moderate	Soft	
Cervical Position	Posterior	Midposition	Anterior	

PROBABILITY FOR A SUCCESSFUL VAGINAL DELIVERY

BISHOP SCORE	PERCENT (%) of SUCCESS
9 or HIGHER	100%
6-8	80-95%

SCORING

- Score of **LESS THAN 4** is indicative that a woman's body is NOT READY for labor and will result in a C-Section.
- **SHOULD** use cervical ripening regime to improve score or **DELAY** induction...
- Strongest **VALUE** in Bishop score associated with vaginal delivery is **"DILATION"**

CERVICAL RIPENING

Makes cervix more favorable for dilation and effacement (physically softer)

Can be accomplished by:

- Mechanical agents (catheters, laminaria)
- Chemical agents (Cervidil and Misoprostil)
- Stripping of membranes
- Amniotomy (must be dilated)

Must have accurate gestational age!

CERVICAL RIPENING- OPTIONS

- STRIP MEMBRANES (at or > 39 EGA)
- MECHANICAL AGENTS:
 - Transcervical Balloon Catheters
 - Osmotic Dilators/ Hygroscopic (Laminaria/ Seaweed)
- CHEMICAL AGENTS:
 - (Cervidil & Misoprostol)
- AMNIOTOMY

STRIPPING MEMBRANES

Digital separation of the chorioamniotic membrane from the wall of the cervix and lower uterine segment on vaginal exam.

ACTIONS:
Rotate finger 360 degrees to increase prostaglandin release

BENEFITS:
Decreases Tachysystole
Minimal SE (Painful Exam, May have bloody show)
NO COST



TRANS-CERVICAL BALLOON

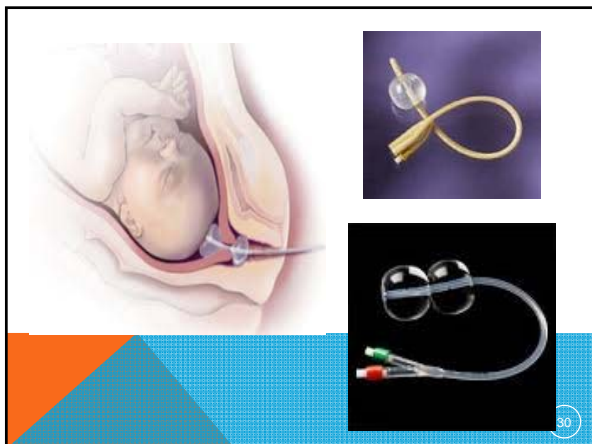
14-26 F catheter with 30 – 60 mL balloon is placed above the internal cervical os & inflated...

ACTIONS:
Pressure on cervix, increases prostaglandin release

BENEFITS:
Decreases Tachysystole
Reduces C-Section Risk

Minimal SE
Small Cost

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LAMINARIA/ OSMOTIC DILATORS

Small Diameter (2-3 mm or larger) "tampon-like" seaweed bundles are placed into cervical os eventually change dilation..

ACTIONS:

Absorbs fluid from cervical tissue and increases prostaglandin release. Mechanically dilates cervix

BENEFITS:

Decreases Tachysystole/ Reduces C-Section Risk

Minimal SE

Small Cost





AMNIOTOMY

Artificially breaking the amniotic sac
(MOST EFFECT in a MULTIP w/favorable cervix)

ACTIONS:

Releases prostaglandins/ Increases action of oxytocin

↑ pressure of fetal head against cervix, more prostaglandin release

RISKS of Amniotomy:

- Increased maternal/fetal infection
- Cord prolapse



CHEMICAL AGENTS:

CERVIDIL & MISOPROSTIL (CYTOTEC)
 Prostaglandin E2 and E1 Agents

ACTIONS:

- Designed to make cervix softer by relaxing cervical smooth muscles and may stimulate uterine muscles to contract

BENEFITS:

- Quick results

ADVERSE EFFECTS , BOTH AGENTS:

- Uterine Tachysystole
- Fetal Heart Rate Indeterminate and/or Abnormal patterns, CATEGORY II progressing to III.

CERVIDIL & MISOPROSTIL (CYTOTEC)

ADVERSE EFFECTS CONTINUED:

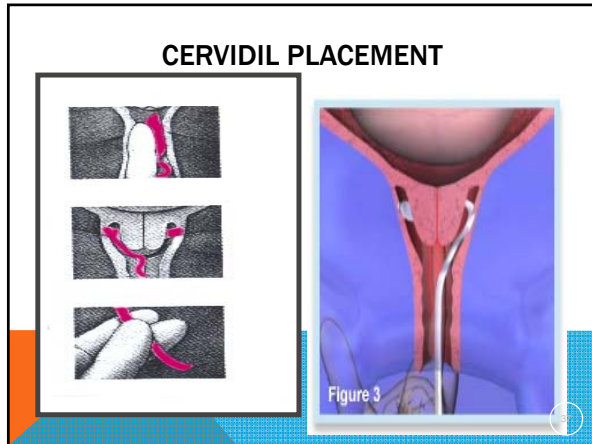
- Increased C-Section Rates
- UTERINE RUPTURE Risk (DO NOT USE FOR TOLAC PATIENTS)
- Fetal Distress, Low APGAR Scores

STAFFING when ripening cervix: 1:2 Ratio (Nurse to Patient)

TACHYSYSTOLE INTERVENTIONS:

- REMOVE agent if possible:
- Cervidil : YES (Pull String/ Insert out)
- Cytotec :NO
- For Fetal Distress (Indeterminate or abnormal Fetal Heart Rate Patterns)
 - Reposition Patient to LLD or RLD
 - Oxygen 8-10L/mask per order
 - Increase LR IV to bolus rate per order

GIVE Terbutaline 0.25 mg SubQ if Tachysystole NOT RESOLVED.....



NURSING CONSIDERATIONS WITH CERVIDIL

- Insert /Shoelace stays in place for 12 hours
- Can STOP Prostaglandin E2 release by pulling string and removing insert
- Pitocin can be Started **NO SOONER than 30 minutes** after removal

NURSING CONSIDERATIONS WITH MISOPROSTIL USE:

- ✓ Inserted buccal or into posterior vaginal vault by RN or MD
- ✓ Can be reinserted every 4 hours (either 25 or 50 µg dose)
- ✓ Patient remains supine for 1 hour following vaginal insertion

MISOPROSTOL CONSIDERATIONS:

- Can be given via : ORAL / BUCCAL dose (Less tachysystole/ indeterminate FHR patterns seen w/this dosing)
- Pitocin can be started **NO SOONER than 4 hours after last dose.**
- Not controlled release OR RETRIEVABLE , may have to use TERBUTALINE to STOP tachysystole pattern.



NURSING CONSIDERATIONS WITH MISOPROSTIL

- Higher cesarean section rate
- Can cause labor or SAB in pregnant healthcare workers



WHY USE MISOPROSTIL/ CYTOTEC???

Cervidil

Misoprostol

\$165

\$0.50



**PITOCIN IS AN "INDUCTION AGENT"/
NOT REALLY A CERVICAL RIPENER**

- Only pharmacologic agent approved by the FDA for "Induction of labor"
- Normally used AFTER cervical ripening agents...

ACTION -

- Posterior pituitary gland releases oxytocin which causes the uterus to contract.
- Stimulates the alveoli of the breast to contract, promoting milk letdown postpartum.

PITOCIN BASICS

Synthetic oxytocin-

- Posterior pituitary gland releases oxytocin which causes the uterus to contract.
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Only pharmacologic agent approved by the FDA for induction of labor

Stimulates uterine contractions by increasing myometrial cell membrane permeability to the sodium ion (increases the number of contracting myofibrils)

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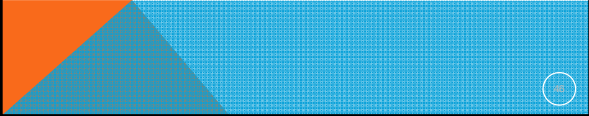
OVERALL EFFECTS OF PITOCIN

Has an **Intrinsic antidiuretic effect** and changes both maternal and fetal osmotic pressure to sodium ion concentration

Pitocin also increases water reabsorption at the glomerular filtrate

Maternal water intoxication and fetal hyperbilirubinemia have been associated with prolonged pitocin infusions

Administer in a balanced-salt solution, typically mixed in LR or NS

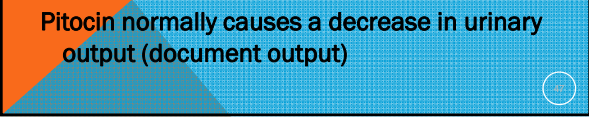


EFFECTS OF PITOCIN ON KIDNEYS

Pitocin is cleared from the body by the kidney and liver

Pitocin should be used with caution in women with hepatic or renal disease.

Pitocin normally causes a decrease in urinary output (document output)



MATERNAL HYPONATREMIA

Definition

- Plasma sodium < 135 mEq/L (norm 135-145)

Cause

- Large volumes of sodium free fluids in labor

Signs and symptoms


- Apathy, weakness, N/V, H/A, urinary incontinence, seizures, respiratory arrest, brain damage, death

Effect on newborn

- Hyperbilirubinemia, respiratory distress, feeding difficulties

Prevention

- ACOG recommends oxytocin be delivered in an isotonic electrolyte solution (1995)
- Some hospitals continue to administer pitocin in D5W



WHY PREGNANT WOMEN ARE AT RISK FOR HYPONATREMIA

Increased ADH production during childbirth leads to water retention.
Estrogen and progesterone inhibit the brain's sodium pump, compromising adaptation to hyponatremia
Oxytocin also has an antidiuretic effect
Excessive nonsaline IV solutions administered during childbirth dilute the serum sodium concentration

Antidiuresis and fluid excess leads to maternal hyponatremia/water intoxication.



GOALS FOR PITOCIN USE:

- Administered via IV and "TITRATED" to keep blood levels at a value that stimulates contractions and causes cervical change...
- Produce effective contractions/ "MIMIC" ACTIVE LABOR
 - Frequency—2-3 minutes apart
 - Duration—lasting 60-90 seconds
 - Intensity—55-75 mmHg



UTERINE RESPONSE TO PITOCIN

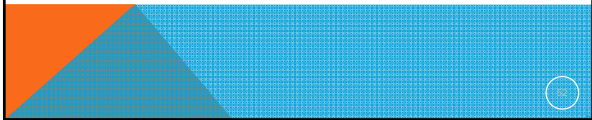
- **Incremental Phase**
 - Begins when uterine activity increases as pitocin is increased
 - Presence of pitocin causes maturation of new receptor sites in uterus
 - Requires 30-40 minutes to mature gap junctions



UTERINE RESPONSE TO PITOCIN

Stable Phase:

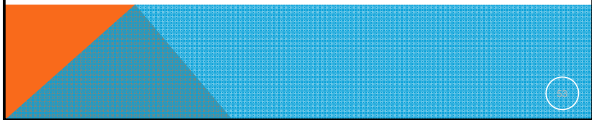
- Point at which uterine contractions are constant in spite of increased pitocin doses.
- increased increments with no increase in uterine activity



UTERINE RESPONSE TO PITOCIN

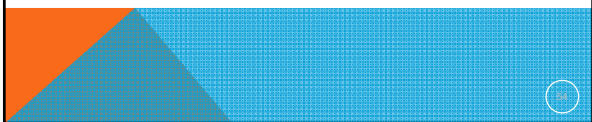
• **Tachysystole Phase:**

- Pitocin is advanced through stable phase, and uterine contractions continue to increase in frequency
- Contractions may be weaker in quality
- Can cause hypertonus or tetanic contractions



PITOCIN CONSIDERATIONS:

- ✓ Considered "High Risk Medication. Should have special protocols
- ✓ In the SPONTANEOUS LABOR PATIENT: Usual maternal blood values of Pitocin measure a of 5/7 mU/min..



PITOCIN CONSIDERATIONS:

- ✓ 90% of women at term have successful induction rates, Vaginal Delivery, with Pitocin values titrated at 6 mU/min or LESS.
- ✓ Usually takes about 40 minutes to reach a steady state blood plasma concentration
- ✓ Multiparous women respond more quickly than nulliparous women to Pitocin infusion



CONSIDERATIONS:

- ✓ The more preterm the patient, the more Pitocin is required for the same effect due to fewer mature receptor sites
- ✓ Maternal size effects amount of Pitocin needed to cause labor
- ✓ Prolonged increase/level of Pitocin can result in oxytocin receptor desensitization (LESS EFFECTIVE)
- ✓ Once active labor is established, Pitocin should be discontinued...



PITOCIN ADMINISTRATION SAFETY PRACTICES

- Inform patient about sensation of contractions
- ALWAYS given IV piggyback via an infusion pump (with guardrails if possible)...
- Should be inserted into the port closest to the IV insertion site
- Concentration is hospital specific; usually given mu/min, not mL/hr. (KNOW PROTOCOLS)



PITOCIN INFUSION SAFETY

- Association for Women's Health, Obstetrical and Neonatal Nursing (AWHONN) recommends the initial Pitocin dose to start at 0.5-1.0 mu/min.
- Serum half-life of Pitocin is 10-12minutes, however, uterine efficacy lasts 20-30 minutes
- Increase the dose at regular intervals (15-60 minutes) to attain a desired contraction frequency of 3-4 minutes

SAFETY CONT'D

- Assure that patient is positioned to increase uterine blood flow
- Uterine relaxation should be palpated and documented regularly
- Maintain continuous fetal monitoring while administering Pitocin
- Assess Maternal vital signs and fetal status every 30 minutes and whenever the dose of Pitocin is altered

TREATMENT FOR ADVERSE REACTIONS

TACHYSYSTOLE:

- Reposition patient to left side
- Increase IV fluid rate (bolus of 200-500cc)
- Decrease Pitocin rate
- Notify Provider if tachysystole is unresolved
- Consider OXYGEN for abnormal FHR changes

ADVERSE EFFECTS OF PITOCIN

Maternal:

- Water intoxication--leading to seizure and coma (s/s: headache, nausea, vomiting, ↓ urinary output, confusion, hypotension, arrhythmias)
- Uterine tachysystole--abruption, rupture, amniotic fluid embolus
- Soft tissue damage--cervical laceration, perineal hematomas, rectal tears

Increased incidence of cesarean sections

Increased incidence of postpartum hemorrhage



ADVERSE RESPONSE TO PITOCIN

• Fetal:

- Iatrogenic prematurity
- Impaired fetal oxygenation
- Fetal injury due to precipitous labor and delivery
- Fetal injury due to shoulder dystocia



STOP PITOCIN

1. UNRESOLVED Tachysystole AND Category II FHR tracing progressing to a Category III
2. Category III FHR tracing
3. Suspected uterine rupture
4. If nurse is unable to continuously monitor the fetus



RESTART PITOCIN

- Pitocin is usually restarted at HALF the dose prior to STOP, if under 30 minutes..
- If Pitocin has been OFF for greater than 30 minutes, start at 1-2 mu/min. (Like at the beginning.)




AUGMENTATION INDICATIONS:

- Hypotonic contractions
- Irregular contractions
- Prolonged labor

COMPARISON INDUCTION VS. AUGMENTATION

- Labor principles are the same!
- In the augmentation of a spontaneous labor, the uterus may be more sensitive to exogenous Pitocin so less quantity may be necessary.

**HOW is a FAILED
LABOR/INDUCTION/
AUGMENTATION
DETERMINED??**



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LATENT PHASE OF LABOR- STAGE I

FREIDMAN CURVE, 1955

“When woman perceives “ Regular Contractions” & gets to 4 cm dilation


PRIMIP: >20 hours

MULTIP: > 14 hours

RECOMMENDATIONS: “ Expectant Management” until the woman gets to 6 cm or the “ Active Phase “ of labor where cervical changes occur faster...

CURRENT EVIDENCE: Suggests that LATENT labor does not end until 6 cm, so cervical changes are **SLOWER than initially thought...**


CMQCC Toolkit to Support Vaginal Birth and Reduce Primary Cesareans, 2016



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**WITH ADEQUATE CONTRACTIONS & CERVICAL EXAM
OF 4 CM FREIDMAN CURVE, 1955:**

<u>First Time/ PRIMIP</u>	<u>MULTIP</u>
Should have cervical change of more than 1.2 cm/hr.	Should have cervical change of more than 1.5 cm/hr.



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“REEVALUATION OF FRIEDMAN'S LABOR CURVE IN 2010:

Consortium on Safe Labor found:

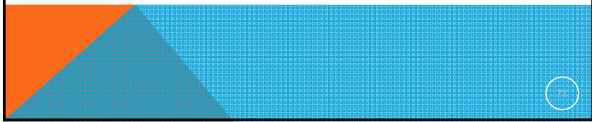
- In OVER 62,415 vaginal deliveries studied, Primigravida's rate of dilation was much slower (0.5 -0.7cm/hr.) and ACTIVE PHASE (rapid dilation) did not really begin until **6 cm...**
- MULTIP dilation was between (0.5-1.3 cm/hr.)



ACTIVE PHASE LABOR ABNORMALITIES:

Failure to progress:

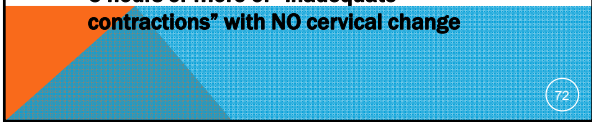
“A Protraction disorder/ “slower than normal progress”



NEW DEFINITION FOR ARREST OF LABOR CONSIDERATION:

MORE than or EQUAL to 6 cm DILATION with membrane rupture and ONE of the following:

- ✓ 4 hours or more of adequate contractions with NO cervical change
- ✓ 6 hours or more of “inadequate contractions” with NO cervical change



NURSING RESPONSIBILITIES RELATED TO PITOCIN INFUSION

Vaginal exam prior to beginning infusion.

- Document cervical status and presentation of fetus.

Prepare IV solution according to hospital protocol.

Perform ongoing maternal and fetal assessments and document clearly.

Keep account of patient's intake and output

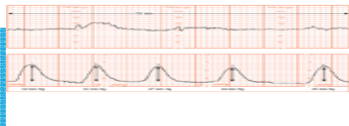
Administer Pitocin infusion per procedure

Intrauterine resuscitation



ADEQUATE CONTRACTIONS

- "Adequate labor" is expected to cause cervical change.
- Adequate LABOR measurement = Contraction intensity totaling 180 -250 Montevideo units in a 10 minute period. (MUST have INTERNAL monitor)
ADD contraction intensity values.

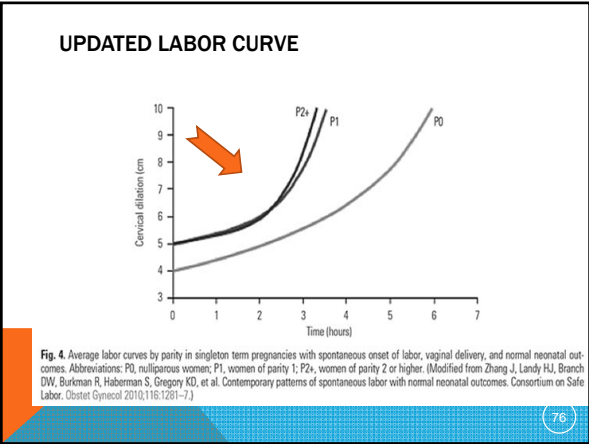


DIAGNOSIS OF FAILED INDUCTION

CMOCC guidelines specify:

- Bishop score >6 when undergoing elective induction
- Oxytocin administration for a minimum of 12 hours after membrane rupture


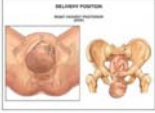





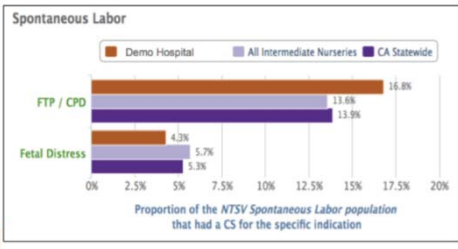
- ### SECOND STAGE FAILURE/ VERY COMPLEX:
- Parity
 - Delayed pushing
 - Epidural analgesia (ADD 1 hr. duration for pushing attempts)
 - Body mass Index (OBESITY)
 - Birth weight
 - Fetal Position (Occiput Posterior Position)
 - Fetal Station

ARREST OF DESCENT/ FAILURE TO DESCEND:

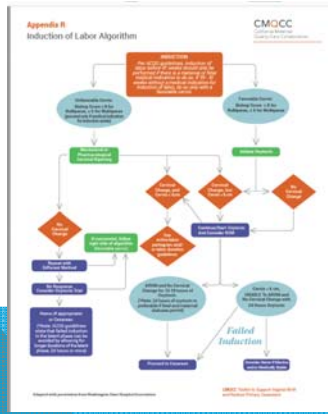
- ✓ Women should be ALLOWED to PUSH 2-3 hours (add an hour with EPIDURAL) as long as progress is being demonstrated.
- ✓ An absolute maximum length of time for the 2nd stage has not been identified

CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE (CMQCC)



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- Appendix K**
CMQCC Labor Dystocia Checklist (ACOG/SMFM Criteria)
- CMQCC Labor Dystocia Checklist (ACOG/SMFM Criteria)**
- 1. Diagnosis of Dystocia/Arrest Disorder (all 3 should be present)**
 - Cervix 6 cm or greater
 - Membranes ruptured, then
 - No cervical change after at least 4 hours of adequate uterine activity (e.g. strong to regular or MVU > 200), or at least 6 hours of oxytocin administration with inadequate uterine activity
 - 2. Diagnosis of Second Stage Arrest (only one needed)**

No descent or retention flat:

 - At least 4 hours of pushing in nulliparous women with epidural
 - At least 3 hours of pushing in nulliparous women without epidural
 - At least 3 hours of pushing in multiparous women with epidural
 - At least 2 hour of pushing in multiparous women without epidural
 - 3. Diagnosis of Failed Induction (both needed)**
 - Bishop score ≤ 6 for nulliparous women and ≤ 8 for multiparous women, before the start of induction (for non-medically indicated/selective induction of labor only)
 - Oxytocin administered for at least 12-18 hours after membrane rupture, without achieving cervical change and regular contractions. *Note: At least 24 hours of oxytocin administration after membrane rupture is preferable if maternal and fetal status permit.

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NURSING RESPONSIBILITIES REGARDING LABOR PROGRESS

- Know Procedures/ protocols
- Active participation in positioning and managing induction agents
- Tachysystole should be avoided!
- Adequate contractions should provide normal labor progress
- Labor abnormalities should be detected and reported to provider in a timely fashion
- Documentation of communication and interventions

LEGAL / ETHICAL CONSIDERATIONS

- Induction of labor is one of the more controversial issues in obstetrics due to the possible risks
- Informed Consent
- It is imperative that sound clinical judgement prevail
- The use of Pitocin is the highest single cause of perinatal lawsuits! FOLLOW PROTOCOLS and INTERVENTIONS...

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