

## Obstetrics Guidelines

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**SUBJECT:            INDUCTION AND AUGMENTATION OF LABOR**  
**PART A: CERVICAL RIPENING**  
**PART B: OXYTOCIN ADMINISTRATION**  
**SPECIAL CONSIDERATIONS: SECOND TRIMESTER ABORTION**  
**HIGH DOSE OXYTOCIN**

### Overview

Induction of labor occurred in 20.6% of pregnancies or 206 inductions per 1000 live births in the United States in 2003. The goal of induction is to achieve vaginal delivery by stimulating contractions before the spontaneous onset of labor. The benefits of induction must be weighed against the potential maternal or fetal risks. Elective induction at term increases the risk two-fold for a cesarean delivery among nulliparous patients. Induction may utilize one or more of the following: cervical ripening, amniotomy, and/or oxytocin. Given that the state of the cervix is an important predictor of the success of induction, cervical ripening agents may be used to ripen an unfavorable cervix

### I.        **Indications for Induction of Labor**

Induction of labor is indicated when the benefits to either the mother or fetus outweigh the risk of continuing the pregnancy. Indications include but are not limited to:

Premature rupture of membranes  
Preeclampsia, eclampsia  
Chorioamnionitis  
Suspected fetal jeopardy (e.g., fetal growth retardation, isoimmunization)  
Maternal medical problems (e.g., diabetes mellitus, renal disease, hypertension)  
Fetal demise  
Post term pregnancy  
Abnormal antepartum testing results

### II.       **Contraindications to Induction of Labor**

Include, but are not limited to:

Placenta or vasa previa  
Transverse fetal lie  
Prior classical uterine incision  
Active genital herpes infection  
Invasive cervical carcinoma

## Obstetrics Guidelines

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### III. Requirements for Induction of Labor

Prior to induction, the following must be clearly documented in the medical record:

- Indication for delivery
- Review of pregnancy dating
- Document fetal lung maturity, if indicated
- The attending physician has been notified and concurs with the need for induction
- Patient has been counseled regarding the indications for induction, the expected results, and possible adverse effects, including the increased risk for cesarean delivery.

#### Cervical Assessment

The state of the cervix is clearly related to the success of labor induction. Induction of labor with a poor Bishop Score has been associated with failure of induction, prolonged labor, and high cesarean birth rate. Digital cervical exam is usually done, but is not required particularly in cases of ruptured membranes.

#### Bishop Scoring System

Score	Dilation (cm)	Effacement(%)	Station	Consistency	Position of Cervix
0	Closed	0 - 30	-3	Firm	Posterior
1	1-2	40-50	-2	Moderate	Mid
2	3-4	60-70	-1/0	Soft	Anterior
3	>5	>80	+1/+2		

#### PART A: Cervical Ripening

Patients with an indication for induction of labor may benefit from cervical ripening agents, particularly those with a low Bishop's score. Cervical ripening has been shown to decrease time in labor, though not necessarily the cesarean section rate. Methods or ripening agents available are listed below. Induction of the nulliparous woman with an unfavorable cervix increases the length of the early first stage of labor, and increases caesarean delivery risk.

#### I. The cervical ripening agents include:

- Misoprostol (PGE1) (Cytotec)
- Dinoprostone Vaginal Insert (Cervidil)
- Prostaglandin E2 Gel (Prepidil)\* not on UIMC formulary

## Obstetrics Guidelines

Laminaria  
Transcervical Extra Amniotic Foley Catheter Insertion  
Extra Amniotic Saline Induction (EASI)

### II. Agent/Method Specific Guidelines

AGENT	DOSE	METHOD	REDOSE	EFM	CHG/ DOSE	HYPERSTIM	COMMENTS
Misoprostol	25mcg	Post. Vag. Fornix <b>Limit lubricant</b>	Q 3-6 hrs Max. x Doses/24h	Cont. EFM	<b>\$8.05/200mcg tablet *8 doses (\$1 ea)</b>		Oxytocin 4 hours after last dose <b>*Not for use with VBAC</b>
Dinoprostone (Cervidil)	10 mg	Post. Vag. Fornix <b>Limit lubricant</b>	Remove after 12 hrs Or w/ active Labor	Cont. EFM	<b>\$534.70/10mg dose</b>	Remove; reverses in 15 minutes (consider Terbutaline)	Oxytocin 30 minutes after removal
Prostaglandin E2 (Prepidil) (Not on UIMC formulary)	0.5mg	Room temp Intracervical	Q 6 hrs Max 3/doses/24h	30 min then prn			Oxytocin 6 hrs after last dose

#### A. Misoprostol: PGE1 (Cytotec)

Misoprostol is more stable and easier to store than dinoprostone, however use for induction of labor represents an off-label use. **It is 500+ times less expensive.** Misoprostol has been found to be an effective agent in randomized controlled clinical trials for the induction of labor [ACOG, July 2004]. Use of misoprostol decreased oxytocin requirements and achieved higher rates of vaginal delivery when compared with placebo, and it has been found to be as effective as dinoprostone in achieving vaginal deliveries. There have been reports of misoprostol being associated with higher incidence of uterine tachysystole. There have been reports of uterine rupture following misoprostol use in patients with prior C-Section or other uterine surgery therefore it is contraindicated in these patients. When deciding which cervical ripening agent to use consider the following:

- misoprostol cannot be reversed easily
- misoprostol may be stored at room temperature
- misoprostol is very inexpensive

Dosage/Procedure: 25 mcg (1/4 of 100 mcg tablet) placed in posterior vaginal fornix

## Obstetrics Guidelines

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- Doses should not be administered more frequently than every 4 hours
- Oxytocin should not be administered sooner than 4 hours after last dose of misoprostol
- Misoprostol should not be used if a woman is having contractions every 5 min. or more frequently
- Avoid use of lubricant with insertion
- Monitor continuously
- Repeat dose every 4 hours, to a maximum of 3 doses. After three doses consider another approach
- Oxytocin administration may be initiated 4 hours after the last dose of misoprostol, if uterine activity is not adequate.

### **B. Cervidil: Dinoprostone 10 mg. Vaginal Insert (PGE2)**

Dosage: 10 mg releases 0/3 mg/hr over 12 hours

#### Cautions/contraindications

- Contraindications for induction
- Multipara with 6 or more previous term pregnancies
- Patients already receiving oxytocin. Cervidil may augment the activity of oxytocin.
- “Patients in whom oxytocic drugs are contraindicated or when prolonged contraction of the uterus may be detrimental to fetal safety or uterine integrity (previous cesarean section or major uterine surgery)” – (manufacturer insert)
- Caution with ruptured membranes.
- Caution with patients with history of previous uterine hypertony, glaucoma, or childhood asthma. (manufacturer insert)

#### Procedure:

- One cervidil is placed transversely in the posterior fornix immediately after removal from foil package. Insertion does not require sterile conditions. The ribbon end of the Cervidil may extrude distally or may be tucked into the vagina.
- Minimal amount of lubricant may be used. Excess lubricant can prevent optimal swelling and release of dinoprostone.

#### Management

- Patients should be monitored for the initial 2 hours after insertion. “Fetal heart rate and uterine activity should be continuously monitored from the time the PGE2 vaginal insert is placed until at least 15 minutes after it is removed.” [ACOG, 2004]

## Obstetrics Guidelines

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- In the event of hyperstimulation, reversal of the dinoprostone-induced contractions is complete within 15 minutes. If needed, terbutaline may be administered.

### Removal

- Cervidil should be removed after 12 hours (**existing data is based on one time use...if ineffective other method(s) should be explored**), or with onset of active labor.
- Oxytocin, if needed, may be started after 30 minutes post removal.

### C. Prostaglandin E2 Gel (Prepidil)

#### Procedure:

- Initiate continuous fetal monitoring per EFM guidelines.
- Administer PGE2 gel 0.5 mg intracervically at room temperature.
- Patients should remain in supine position for 30 minutes (left lateral tilt).
- Patient should be monitored 30 minutes post insertion; if no increase in uterine activity and FHR is reassuring, may be intermittently monitored.
- Evaluate tracing one hour following administration. If the FHR tracing is reassuring, then the patient can ambulate.
- Check FHR every 30 minutes per protocol. If a non-reassuring pattern is present, continue to monitor.

#### Dosing:

- PGE2 can be repeated every 6 hrs with a maximum recommended cumulative dose of 1.5 mg (3 doses) in 24 hrs.

#### Management

- Oxytocin may be started a minimum of 6 hours after administration of the last dose of PGE2 gel.
- Patients with no cervical change despite the use of PGE2 gel can be managed with alternative agents for cervical ripening such as laminaria, Foley bulb or Extra-Amniotic Saline Induction (EASI).

### D. Laminaria Tent (Dilateria):

Laminaria have been used for more than a century. They appear to act primarily by extracting water from cervical tissues, gradually swelling and causing the cervix to expand. They are effective agents for cervical ripening, however there is no consistent evidence that use of

## Obstetrics Guidelines

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laminaria is associated with a reduced cesarean section rate, nor with increased maternal or fetal risk. They can be used with or without oxytocin during the ripening process. The use of laminaria should be limited to patients who have an indication for induction, but little or no cervical effacement.

Contraindications, as noted above, and in addition:

- Acute mucopurulent cervicitis
- Ruptured membranes

Procedure:

- Insert speculum
- Swab external os with betadine solution.
- Cervix is lubricated with bacteriostatic cream or jelly.
- Place 1-5 large laminaria using long forceps.
- May place a pack of 4x4 gauze sponges saturated with Betadine or bacteriostatic cream or jelly in the vagina.
- Document the number of laminaria inserted in the medical record.
- Remove laminaria 12-24 hours after placement, document the number of laminaria removed in the medical record.

Management

- If there is minimal or no cervical change despite the use of laminaria, the laminaria procedure can be repeated or other cervical ripening agents can be utilized.

### **E. Transcervical Foley Catheter Insertion**

An effective method for cervical ripening that can be used with or without oxytocin during the ripening process.

Contraindications as for any induction, and also:

- Acute mucopurulent cervicitis

Procedure:

- Insert speculum.
- Swab the external os with betadine.
- Under direct visualization, insert an 18-26 gauge Foley catheter with a 30 cc balloon beyond the internal cervical os [L&D currently stocks 24 gauge catheters]
- Insufflate the balloon with 30 cc of sterile saline.

## Obstetrics Guidelines

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- Tape the Foley to the patient's medial thigh on minimal traction.
- If the balloon is not expelled spontaneously, it should be removed 12 hours after insertion.

**F. EASI (Extra-Amniotic Saline Induction):** above method with addition of saline infusion

- Contraindication: Ruptured Membranes
- Infuse 30 cc per hour of sterile saline through the Foley catheter.

Management:

- The patient may be started concurrently on oxytocin.

### **PART B: Induction Procedures: Oxytocin for Augmentation or Induction of Labor**

#### **Essential Requirements for Administration of Oxytocin:**

Provider must document indication for administration of oxytocin in the medical record and enter order for induction or augmentation in the computer.

Skilled nursing personnel will administer and document the use of oxytocin according to AWHONN and UIMC Obstetric guidelines.

Intrapartum oxytocin will be administered intravenously utilizing a controlled infusion device.

Continuous electronic monitoring will be performed on all women receiving intrapartum oxytocin.

#### **Detailed Oxytocin Infusion Procedure:**

Obtain a baseline FHR-uterine activity (UA) recording per EFM policy.

Obtain baseline vital signs.

Confirm order specifying which oxytocin protocol is to be utilized: induction or augmentation.

Obtain 500 cc bag of diluted oxytocin (30 units oxytocin/ 500 cc of 0.9 NS 60 mU/ml) from pharmacy.

Check patency of mainline IV and infusion system.

Piggyback oxytocin solution **next to needle insertion site (key patient safety action)**.

## Obstetrics Guidelines

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Begin oxytocin infusion according to guidelines.

Titrate dose of oxytocin to achieve  $\geq 3$  and  $\leq 5$  uterine contractions of 60-90 second duration in a 10 minute window.

The dose of oxytocin is to be increased every 15-30 minutes to achieve this contraction frequency.

Prior to increasing the dose of oxytocin, assess and document the FHR and UC pattern.

If abnormalities are present in either the FHR/UC pattern or the maternal status, notify the provider immediately.

Document input and output after each void.

### Contraction Terminology

- A. Tachysystole:  $> 5$  uterine contractions in 10 minutes over two consecutive 10 minute periods without elevation of uterine tone or associated fetal heart rate abnormalities.
- B. Hypertonus: elevation of uterine resting tone. If internal monitoring is utilized, elevation of more than 15 mm H<sub>2</sub>O from baseline.
- C. Hyperstimulation: tachysystole, hypertonus or tetany associated with worrisome fetal heart rate changes (fetal tachycardia, repetitive late decelerations or loss of FHR variability).

### Management of Contraction Pattern Abnormalities:

- A. Tachysystole: reduce oxytocin infusion by 2 milliunits per minute every 15 minutes until desired contraction frequency obtained
- B. Hypertonus: reduce oxytocin infusion by 2 milliunits per minute every 15 minutes until desired contraction frequency obtained with normalization of uterine tonus.
- C. Hyperstimulation or non reassuring fetal heart rate patterns:
  - 1. Turn off oxytocin for 15-20 minutes.

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### Obstetrics Guidelines

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2. Initiate supportive measures:
  - a. Position patient on her side (change position)
  - b. Fluid bolus with 250-500 cc (maximum of 500 cc; avoid bolus with glucose)
  - c. O<sub>2</sub> therapy at 10L/min through rebreather mask
  - d. Consider terbutaline 0.25 mg subcutaneous injection
3. Notify the provider, if not present
4. If the FHR pattern normalizes, restart oxytocin at one-half of the previous dose
5. If this is tolerated and uterine contractions are inadequate, increase oxytocin per guidelines.

#### Labor Induction Titration Procedure:

Oxytocin is to be increased using the following algorithm every 15-30 minutes until desired contraction frequency is achieved.

Dose	Rate/Hour
1 mU/min	1 cc
2 mU/min	2 cc
4 mU/min	4 cc
8 mU/min	8 cc
12 mU/min	12 cc
16 mU/min	16 cc
20 mU/min	20 cc
25 mU/min	25 cc
30 mU/min	30 cc

Then increase 1 milliunit per minute every 15-30 minutes

At 40 milliunits, the attending physician is to be notified. If ordered, continue to increase oxytocin at 1 milliunit per minute every 15-30 minutes.

#### Labor Augmentation Titration Procedure

Oxytocin is initiated as outlined in the induction section above.

Oxytocin is increased by 1 milliunit per minute (milliunits/min=1cc/hour) every 15 -30 minutes until desired contraction frequency achieved.

### **Obstetrics Guidelines**

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At 20 milliunits, the attending physician is to be notified.

Intake and output should be monitored closely.

## Obstetrics Guidelines

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### **SPECIAL CONSIDERATIONS: SECOND TRIMESTER ABORTION**

#### **I. Medical or Surgical Termination: Evidence-based Findings**

- Second trimester inductions are safe (Level A)
- D&E may be safer than inductions. Lack of data concerning misoprostol use (Level B).
- In well-trained hands, D&E complication rates are similar to D&C complication rates (Level B).
- D&E may be safer than induction in the scarred uterus (Level C).
- Sublingual misoprostol administration is as good (or better) than vaginal administration (Level B).
- Vaginal misoprostol administration is more effective than oral administration (Level B).
- Misoprostol is a teratogen (Level B) – do not crush.
- Laminaria tents (or mifepristone) may speed the process (Level C).

#### **II. Demographics**

- 1.3 million induced abortions in the United States in 2000
- 12% at or after 13 weeks gestation (95% of these procedures are dilation and evacuation)
- 1.5% of procedures occur after 20 weeks gestation (80% are by dilation and evacuation)

#### **III. Termination Protocol**

##### **A. Surgical Termination: First Trimester**

13 completed weeks or less – Center for Reproductive Health

- Ibuprofen 800 mg PO prior to clinic visit
- Ultrasound
- Blood type
- Optional misoprostol 200 mcg dose (9 0/7 weeks or more OR no previous vaginal delivery or MD choice)
- Pre procedure medication (Ativan)
- Suction aspiration procedure performed
- Post recovery observation – Rhogam as indicated
- Home with Doxycycline and Ibuprofen

##### **B. Surgical Termination: Second Trimester**

14 0/7 weeks to 23 0/7 weeks with maternal, fetal or pregnancy related indication- UIH  
OR

- Referral received

## Obstetrics Guidelines

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- Day prior to D&E – Center for Reproductive Health clinic appointment
  - Ibuprofen 800 mg prior to coming to clinic
  - Ultrasound if warranted
  - Insertion of laminaria
  - APEC pre-op visit/ labs
  - Return for additional laminaria placement as indicated
- Day of D&E procedure
  - Patient presents to Surgicenter
  - Procedure performed
  - Post procedure recovery – Rhogam as indicated
  - Home with Doxycycline and Ibuprofen

### C. Medical Termination: First Trimester

9 1/7 weeks or less- Center for Reproductive Health

- Ultrasound
- Blood type (Rhogam as indicated)
- Mifepristone 200 mg PO in clinic
- Discharge with 4 misoprostol 200 mcg tablets, 4 Vicodin 5/500, 4 Ibuprofen 200 mg
  - 6 to 48 hours later patient places misoprostol tablets in vagina
  - Pain medication as needed
  - Return clinic visit in 7-14 days for ultrasound to check that pregnancy has passed

### D. Medical Termination: Second Trimester

22 weeks or less for maternal, fetal or pregnancy related indications and beyond 22 weeks for fetal abnormalities not compatible with extrauterine life- UIH Labor and Delivery

Misoprostol (PGE1 Analogue)

- Ideal dosage and interval range maximize efficacy while minimizing side effects
- Recommend misoprostol 400µg every 6 hours to decrease induction to abortion interval and to minimize side effects
- Possible severe complications
  - Uterine rupture (no scar: <0.5%, scar: < 1.0%): Misoprostol may be used for second trimester pregnancy termination in a patient with a scarred uterus
  - With misoprostol >3000 mcg PO: Hyperthermia, hypoxia, rhabdomyolysis (2 Brazilian case reports)
- High rate of retained products of conception necessitating surgical intervention

**Obstetrics Guidelines**

**Common dosing regimens for misoprostol induction of labor in the second trimester, associated side effects, induction-to-abortion interval and complete abortion rates**

Dosing regimen	Side effects (%)			Mean induction-to-abortion interval (hours)	Complete abortion rate (%)
	Nausea ± vomiting	Diarrhea	Fever ≥ 38°C		
200µg q6 hours	9-47.2	0-2	23.4-26	13.8-16.9	43.9-62.2
200µg q12 hours	3.9-11	0-8	0-11	12-45	33.3-64.7
400µg q4 hours	0	0	25	19.6	92
400µg q6 hours	3.75	0	0	14.5	57.1
400µg q12 hours	12-16.2	6-20.6	2-67.6	33.4-35.8	72-89.7
600µg q12 hours	20	22	28	22.3	78

**HIGH DOSE OXYTOCIN**

Administration of oxytocin in a higher dose may be indicated:

- After a premature delivery when there is a retained placenta.
- For evacuation of second trimester products of conception

**I. Retained Placenta**

If the placenta is not delivered within 30 minutes after the delivery of the baby, the physician may order “high dose” oxytocin.

Procedure:

1. Obtain an order for high dose oxytocin. Recommended concentration is 50 units of oxytocin in 500 ml IV fluids specified by the physician. UIMC Pharmacy will clearly label this oxytocin bag to differentiate it from the standard oxytocin bag.
2. Piggyback oxytocin infusion into the mainline IV at the hub closest to the patient and infuse per pump at 125cc/hour.
3. Continue infusion of oxytocin until placenta is delivered or an alternative method of placenta removal is undertaken.

## Obstetrics Guidelines

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### II. Second Trimester Termination

High dose oxytocin protocol for evacuation of second trimester products of conception

- Cervical ripening with laminaria for at least 6 hours prior to admission is highly recommended
- Some protocols administer misoprostol vaginally prior to high dose oxytocin administration
  - 200 mcg q 4-6 hours placed at the external os (better melting of tablet); increase dose to 400 mcg q 4-6 hours after first dose (up to 72 hours; higher doses may increase side effects)
  - Allow 12 hours after last misoprostol dose prior to high dose oxytocin or PGE2
- An alternative to high dose oxytocin is PGE2 suppositories
  - Premedicate with acetaminophen, phenergan or compazine, and lomitol
  - Place ½ of a suppository (10 mg) as a test dose, followed by the other half in 1 hour if well tolerated
  - Place 20 mg suppository into the posterior vaginal fornix every 3 hours
  - Use alternate agent if unsuccessful after 48 hours or sooner if side effects are not tolerated

#### Procedure:

- 50 units of oxytocin is added to 500 ml of IV fluids specified by the physician.
- This infusion is administered IV piggyback via an infusion device to infuse over a 3 hour period.
  - Rate: 166 ml/hour
  - Volume to be infused: 500 ml
- Following this infusion, the oxytocin must be stopped for one hour allowing for rest with maintenance fluids only (promotes diuresis)
- After one hour of rest, the oxytocin infusion is restarted adding 100 units of oxytocin to a new 500 ml bag of IV fluid. This infusion is administered over three hours at the same rate/volume to be infused as above.
- Following this infusion, the oxytocin must be stopped for one hour allowing for rest.
- This is repeated with the following increments until the products of conception are aborted or a final solution of 300 units of oxytocin in 500 ml IV fluid is reached as follows:
  - 150 units in 500 ml IV fluid (833 milliunits/ minute)
  - 200 units in 500 ml IV fluid (1100 milliunits/ minute)
  - 250 units in 500 ml IV fluid (1384 milliunits/ minute)
  - 300 units in 500 ml IV fluid (1667 milliunits/ minute)
- Nursing Considerations:
  - This protocol balances oxytocin administration with a period of rest
  - High dose oxytocin administration is intended to promote uterine contractions that will accomplish delivery of the products of conception. As with any oxytocin

## Obstetrics Guidelines

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administration, uterine tetany may lead to placental abruption. Therefore, the nurse must be observant for signs and symptoms of concealed abruption and hemorrhage.

- Assessment:
  - Vital signs (BP/P/R) every 30 minutes during oxytocin infusion or more often as necessary. During rest periods, vital signs are assessed as indicated. Temperature is assessed every four hours or more often as necessary.
  - Uterine activity should be assessed every 15-30 minutes and an external TOCO should be used.
  - Intake and Output every hour
  - Assess emotional status of the patient throughout the procedure
  - Assess the patient's pain/discomfort perception and provide pain management as necessary
  - Observe for signs of hypovolemic shock including:
    - Decrease in BP, increase in pulse, dyspnea, pallor
    - Abruption placenta
    - Shock symptoms out of proportion to observed hemorrhage that may indicate concealed hemorrhage

## Obstetrics Guidelines

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### **Obstetrics Guidelines**

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### Obstetrics Guidelines

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