

Oxytocin Induction/Augmentation Protocol

General Information¹

1. Oxytocin is a polypeptide hormone produced in the hypothalamus and secreted from the posterior lobe of the pituitary gland in a pulsatile fashion.
2. Its synthetic analog is one of the most commonly used drugs and is used to stimulate labor in a fashion similar to spontaneous labor.
3. Individual patients vary in response to oxytocin, but pharmacokinetics is similar in that uterine response generally ensues after 3-5 minutes of infusion and reaches a plasma steady state by 40 minutes.
4. Both low doses and high dose regimens exist and are appropriate for labor induction¹
5. To date, no conclusions have been drawn in regard to whether low dose or high dose is more efficacious for induction or augmentation in nulliparous or multiparous women.
 - a. Low dose protocols have been associated with lower total dosage of Pitocin, less frequent uterine tachysystole and associated changes in fetal heart rate.^{1-5,7}
 - b. High dose protocols have been associated with a shorter duration of labor, decreased cases of chorioamnionitis and cesarean delivery for dystocia.¹⁻⁷
 - i. Although High dose protocols are associated with increased episodes of tachysystole and associated changes in fetal heart rate, there has consistently been no difference in fetal outcomes when low and high dose Pitocin are been compared.^{2-4,6-8}
6. Oxytocin can also be used for cervical ripening
 - a. In women who present with PROM, oxytocin is associated with a decreased risk of chorioamnionitis and reduced risk of neonatal antibiotic use but was also associated with an increased risk of failure to deliver within 24 hours compared with vaginal prostaglandins.¹¹
 - b. Oxytocin and misoprostol have been found to have similar rates of vaginal delivery when used for cervical ripening, without differences in maternal complications or neonatal outcomes noted.^{12,13}

Contraindications¹:

1. Active genital Herpes Simplex infection
2. Placenta or vasa previa
3. Umbilical cord compromise/prolapse
4. Fetal malpresentation (breech, transverse lie)
5. Non-reassuring fetal status indicating need for urgent delivery
6. Previous classical cesarean section, T-incision, or uterine surgery entering the uterine corpus

Adverse Effects:

1. Tachysystole
 - a. >5 uterine contractions in 10 minutes averaged over a 30-minute period with or without fetal heart rate decelerations.

- b. Treat by repositioning, administering a fluid bolus, decreasing/discontinuing oxytocin infusion rate, or administration of 0.25 mg terbutaline subcutaneously
- 2. Hyponatremia
 - a. Oxytocin and vasopressin (antidiuretic hormone) share a similar structure and oxytocin can cross-react with the renal vasopressin receptor which can result in dilutional hyponatremia.^{9,10}
 - b. Although uncommon, hyponatremia can occur with oxytocin administration in large doses (>20mU/min) in large quantities of hypotonic solutions (D5W) for prolonged periods which can result in severe, symptomatic hyponatremia
 - i. Symptoms: headache, anorexia, nausea, vomiting, abdominal pain, lethargy, drowsiness, unconsciousness, seizure, irreversible neurologic injury.⁹
 - c. Treatment: discontinuation of oxytocin and any other hypotonic solutions with slow, careful correction of hyponatremia.
- 3. Hypotension
 - a. Oxytocin relaxes vascular smooth muscle and rapid infusion can lead to hypotension and tachycardia

Low dose Oxytocin Protocol

- 1. Candidates
 - a. Term or preterm pregnant patients with no contraindication to oxytocin use (see above)
 - b. Reassuring fetal status
 - c. Those not qualifying for high dose Oxytocin below
 - d. Patients with ≤ 2 prior low transverse cesarean sections (please see induction of labor protocol for more information)
- 2. Schedule
 - a. Place 20 units in 1000 mL of normal saline to yield an oxytocin concentration of 20mU/mL.
 - b. Start IV infusion at 1 mU/min and increase rate as follows:

Time (Min)	Dose
0	1 mU/min
30	2 mU/min
60	4 mU/min
90	6 mU/min
120	8 mU/min
150	10 mU/min
180	12 mU/min
210	14 mU/min
240	16 mU/min
270	18 mU/min
300	20 mU/min

- c. **Oxytocin is to be started on the half hour to facilitate uniformity in administration for all patients receiving oxytocin**
- d. Oxytocin will be increased until a maximum dose of 20 mU/min is reached or adequate uterine contractions (5 contractions/10 minutes or ≥ 200 MVUs/10 min over a 30-minute period) are reached.
 - i. Oxytocin is not to be increased if tachysystole is present
 - ii. Oxytocin ≥ 20 mU/min requires placement of IUPC for quantitative monitoring of uterine activity and chart documentation of physician rationale and MD consult for non-MD managed patient
- e. Maximum dose is 20mU/min if attempting TOLAC.

High Dose Pitocin Protocol

- 1. Candidates
 - a. Term (37w0d-41w0d) pregnant patients with no contraindication to oxytocin use (see above)
 - b. Bishop score ≥ 6
 - c. Reassuring fetal status in pregnancies not complicated by fetal congenital anomalies
 - d. No history of uterine surgery or prior uterine rupture
 - e. Absence of pre-eclampsia with severe features, diabetes requiring an insulin drip, heart disease, or severe anemia < 7.5 , grand multiparity (G5P4 or greater)
 - f. Third trimester IUFD*
- 2. Schedule
 - a. Place 20 units in 1000 mL of normal saline to yield an oxytocin concentration of 20mU/mL.
 - b. Start IV infusion at 4 mU/min and increase rate as follows:

Time (Min)	Dose
0	4 mU/min
30	8 mU/min
60	12 mU/min
90	16 mU/min
120	20 mU/min
150	22 mU/min
180	24 mU/min
210	26 mU/min
240	28 mU/min
270	30 mU/min

*IUFDs were excluded from all studies comparing high and low dose oxytocin. However, given the shorter induction time, high dose oxytocin is a reasonable choice for IOL in this patient population as long as no contraindications are present (no history of uterine surgery/uterine rupture, pre-eclampsia with severe features, diabetes requiring insulin drip, heart disease, severe anemia, or grandmultiparity).

Pitocin for Cervical Ripening

1. Candidates
 - a. Term and preterm PPRM and PROM patients with no contraindications to oxytocin use (see above)
 - b. Bishop score ≤ 5
 - c. Reassuring fetal status
 - d. Patients with ≤ 2 prior low transverse cesarean sections (please see induction of labor protocol for more information)

2. Schedule
 - a. Place 20 units in 1000 mL of normal saline to yield an oxytocin concentration of 20mU/mL.
 - b. Start IV infusion at 1 mU/min and increase rate as follows, until 3-5 contractions every 10 minutes is reached:

Time (Min)	Dose
0	1 mU/min
30	2 mU/min
60	4 mU/min
90	6 mU/min
120	8 mU/min

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- c. If 8 mU/min is reached, oxytocin to remain to 8 until bishop score is ≥ 6 .

References

1. American College of Obstetricians and Gynecologists. Practice Bulletin 107: Induction of Labor. *Obstet Gynecol.* 2009;114:386-397.
2. Frigoletto FD, Lieberman E, Lang JM, et al. A clinical trial of active management of labor. *NEJM.* 1995;333:745-750.
3. Merrill DC, Zlatnik FJ. Randomized, double-masked comparison of oxytocin dosage in induction and augmentation of labor. *Obstet Gynecol.* 1999;94:455-463.
4. Wei SQ, Luo ZC, Qi HP, Xu H, Fraser WD. High-dose vs low-dose oxytocin for labor augmentation: a systematic review. *AJOG.* 2010;203:296-304.
5. Patka JH, Lodolce AE, Johnston AK. High- versus low-dose oxytocin for augmentation or induction of labor. *Ann Pharmacother.* 2005;39:95-101.
6. Xenakis EMJ, Langer O, Piper JM, Conway D, Berkus MD. Low-dose versus high-dose oxytocin augmentation of labor-A randomized control trial. *AJOG.* 1995;173:1874-1878.
7. Manjula BG, Bagga R, Kaira J, Dutta S. Labour induction with an intermediate-dose oxytocin regimen has advantages over a high-dose regimen. *J Obstet Gynecol.* 2015;35:362-367.
8. Erdogan K, Yapar Eyi EG. Comparison of high and low doses of oxytocin protocols in multiparous pregnant women in terms of labor durations and fetal-maternal complications. *Perinatal Journal.* 2017;25:11-18.
9. Ruchala PL, Metheny N, Essenpreis H, Borcherdig K. Current practice in oxytocin dilution and fluid administration for induction of labor. *JOGNN.* 2002;31:545-550.
10. Bergum D, Lonnee H, Hakli TF. Oxytocin infusion: acute hyponatremia, seizures and coma. *Acta Anaesthesiol Scand.* 2009;53:826-827.
11. Alfirevic Z, Kelly AJ, Dowswell T. Intravenous oxytocin alone for cervical ripening and induction of labour (Review). *Cochrane Database of Systemic Reviews.* 2009, Issue 4. Art. No.: CD003246.
12. Fonseca L, Wood HC, Lucas MJ, et al. Randomized trial of preinduction cervical ripening: misoprostol vs oxytocin. *Am J Obstet Gynecol.* 2008;199:305.e1-305.e5.
13. Ferguson II JE, Head BH, Frank FH, et al. Misoprostol versus low-dose oxytocin for cervical ripening: a prospective, randomized, double-masked trial. *Am J Obstet Gynecol.* 2002;187:273-280.