I. PURPOSE

To outline the role for the RN to support the patient during the administration of oxytocin for induction and augmentation of women in labor.

II. REFERENCES

American College of Obstetricians and Gynecologists (2006, Reaffirmed in 2015). Induction of labor. Washington, DC: Author. ACOG practice bulletin No. 107.

American College of Obstetricians and Gynecologists Committee Opinion Vol. 108 No. 2 (2006, Reaffirmed in 2015). Induction of labor for vaginal birth after cesarean delivery (Committee Opinion 342). Washington, DC: Author

Begley CM, Gyte GML, Devane D, McGuire W, Weeks A. Active versus expectant management for women in the third stage of labour. Cochrane Database of Systematic Reviews 2011, Issue 11. Art. No.: CD007412. DOI: 10.1002/14651858.CD007412.pub3.

Cahill AG, Waterman BM, Stamilio DM, et al. Higher maximum doses of oxytocin are associated with an unacceptably high risk for uterine rupture in patients attempting vaginal birth after cesarean delivery. Am J Obstet Gynecol 2008;199:32.e1-32.e5.

Clark et al (2008). Oxytocin: new perspectives on an old drug. American Journal of Obstetrics & Gynecology, retrieved from www.AJOG.org.

Heuser, CC et al (2013). Tachysystole in term labor: Incidence, risk factors, outcomes, and effect on fetal heart tracings. AMJ Obstet Gynecol; 209:32, e 1-6.

Macones, G. A. et al (2008). The 2008 National Institute of Child Health and Human Development Workshop Report on electronic fetal monitoring: Update on definitions, interpretation, and research guidelines. Journal of Obstetric, and Gynecologic, & Neonatal Nursing, 37, 510-515. Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN).

III. DEFINITIONS/CRITICAL POINTS

A. Induction or augmentation of labor with oxytocin should be initiated only after a physician/CNM has evaluated the mother and fetus and determined augmentation/induction will be beneficial to the mother and fetus.

B. A physician/CNM or qualified nurse should consider a vaginal examination in proximity to the oxytocin infusion to assess for and document cervical readiness

(i.e., Bishops scoring (**see Appendix A**)) and any contraindications to the initiation of the induction/augmentation.

Exceptions to exams: recent vaginal exam performed (i.e., in clinic); women with confirmed ROM.

C. Oxytocin is a synthetic endogenous hormone that stimulates rhythmic contractions of the uterine muscle. When properly administered, oxytocin can stimulate uterine contractions comparable to those seen in normal, spontaneous labor.

D. Cervical ripening prior to oxytocin induction should be considered.

E. If there are too many contractions occurring after the last dose of a cervical ripening agent to redose (see Cervial Ripening policy), consider reevaluating in 1-2 hours to see if contractions space out, or placing a Foley balloon, before transitioning to oxytocin per protocol.

F. Avoid giving IV fluid boluses to decrease uterine contraction frequency, unless clinical evidence of dehydration is present.

G. Indications for induction of labor may include, but are not limited to, the following situations:

1. Preeclampsia
2. Premature rupture of membranes
3. Chorioamnionitis
4. Suspected fetal threat as evidenced by biochemical or biophysical indications (e.g., IUGR, post-term gestation, and isoimmunization).
5. Maternal medical problems (e.g., diabetes, renal disease, chronic obstructive pulmonary disease, cardiac disorders)
6. Fetal demise
7. Safety factors (e.g., risk of rapid labor, distance from hospital)
8. Post-term gestation

H. Relative contraindications may include, but are not limited to the following:

1. Placenta or vasa previa
2. Abnormal fetal presentation
3. Cord presentation
4. Prior classical uterine incision
5. Primary genital herpes infection
6. Contraindication to a vaginal birth

I. Augmentation of labor is initiated when a diagnosis of hypotonic dysfunctional labor is made. The principles employed in administering oxytocin

for augmentation of labor are the same as those used for oxytocin induction of labor.

J. Hypotonic dysfunctional labor is defined as:
   1. The failure of progressive cervical dilation and descent of the presenting part x 2 hours
   2. Usually in the active phase of labor
   3. In association with inadequate uterine contractions

K. Oxytocin is prepared by the UCSF pharmacy and only ordered through specified order sets.

L. All oxytocin infusions will be infused via a hospital approved infusion pump.

IV. POLICY

A. It is the policy of UCSF Benioff Children's Hospital that an RN competent in the care of laboring patients may administer oxytocin. Oxytocin is administered during the induction or augmentation of labor in a continuous intravenous infusion with a device that permits precise control of the rate and amount administered. While oxytocin is being administered, both FHR and uterine contractions are generally monitored continuously.

B. This policy only applies to use of Pitocin for pregnant women in labor and for immediate postpartum care (see Management of the 3rd Stage of Labor with Oxytocin).

V. PROCEDURE

A. Equipment List
   1. Electronic fetal monitor and tocodynamometer
   2. IV start kit (18-gauge catheter or 16-gauge)
   3. Bi- or tri-fuse IV connector
   4. One liter lactated ringers (LR) as mainline
   5. One premixed bag of oxytocin (per UCSF hospital formulary)
   6. IV pump tubing (1)
   7. IV pump tubing with Volutrol (1)
   8. IV tubing labels at each port
   9. Infusion pump

B. Procedure

Nursing Actions	Special Considerations
Initiating 1. Obtain and evaluate baseline maternal vital signs and baseline FHR/uterine activity tracing such as a non-stress test (NST) prior to administration of oxytocin infusion. 2. Obtain baseline laboratory values as indicated. This may include a complete blood count (CBC) and/or type and screen (T&S) to the blood bank. 3. Establish a main IV line with LR, NS, or other physiologic electrolyte solution to infuse at a minimum of 10 mL/hr. 4. LR should remain accessible for use in case of emergency while oxytocin is infusing. 5. Intake and output should be documented at a minimum of q 4 hours. 6. Use infusion pump to titrate Oxytocin dosage in milliunits per minute (mU/Min) and program the infusion pump using the "Guardrails drug library" for Oxytocin.	Verify fetal position and Bishop score have been documented. Connect Oxytocin infusion to bi- or tri-fuse connector port and label all lines per UCSF Medication Administration (General) Nursing Procedure. Other medications should not be given via the Oxytocin line but may be given through the main IV fluid line. **Oxytocin Side Effects** • Hypotension with rapid IV infusion or IV push. • Nausea and vomiting and water intoxication are rare but potential complications of oxytocin administration. • Water intoxication can occur when oxytocin is administered in combination with large volumes of non-electrolyte solutions.
Dosing 1. The initial dose should begin at 1-2 milliunits/min. 2. The dose should be titrated up at increments of 1-2 milliunits/min, at 30 minute intervals until the	Unless other contraindications are present, continue to titrate up or increase oxytocin per protocol if: • Contractions are frequent but palpate mild or mild to moderate.

desired contraction pattern has been established. *Criteria* a. Uterine contractions that last for at least 60 seconds, palpate firm and occur q 2-3 minutes on average. *Alternative Criteria* b. For patients making cervical change of 1-1.5 cm/hr., no up titration is required. AND/OR c. For patients with an IUPC, Montevideo units of >200 - < 300 (**see Appendix D for Montevideo Units**). 3. Oxytocin's onset of action is immediate but it takes up to 40 minutes to reach a steady state in maternal serum. The pharmacokinetics of oxytocin support increasing the dose every 30 to 40 minutes. ******If there is a disagreement about the management of the Oxytocin dosing, a multidisciplinary team huddle is indicated. Team huddle should include bedside RN, Charge RN and Attending OB provider. ******	• Contractions are frequent but less than 60 seconds in duration. • The patient is not anesthetized and rates her contraction pain as mild or less than 3/10. Per the UCSF Medical Center Pain Policy: • Mild: 0 - 3/10 • Moderate: 4 - 6/10 • Severe: 7 - 10/10 • An acceptable level of pain from the patient should be documented in their report. **MAX DOSING** The maximum protocol driven dose is 30 milliunits/min. If the provider deems it necessary per the patient's condition to go > 30 milliunits/min, a provider order must be written to "increase Oxytocin dose > 30 milliunits/min" (usually to a maximum of 40 milliunits/min). This should be evaluated on an individual basis. **TOLAC** The exception of this is with patients undergoing a Trial of Labor After Cesarean (TOLAC). In these cases the maximum protocol driven dose is 20 milliunits/min. To go beyond 20 milliunits per minute, a provider must put in a written order after evaluating the patient to determine an optimal plan of care.
Assessment and Documentation **Maternal** Blood pressure and pulse should be monitored and recorded at least every 60-minutes while receiving Oxytocin infusion.	**Provider Escalation** **RN must notify the provider of clinical status within 15 minutes if the Oxytocin start is delayed, held or stopped.**

Fetal Assessment of FHR including baseline, variability, baseline changes, periodic and episodic changes should be evaluated and documented every 30 minutes in early labor, and every 15 minutes in active labor. **Uterine** • Assess by hands on palpation and electronic toco monitoring, the resting tone, frequency, duration and relaxation time between uterine contractions • Contractions should be evaluated and recorded at least every 30 minutes. The patient should perceive these contractions as strong. • Contractions should be quantified as the number of contractions present in a 10 minute window averaged over 30 minutes. • Contractions should palpate as firm. These may be difficult to assess in patients with an elevated BMI. • Tachysystole (is defined as greater than 5 contractions in 10 minutes, averaged over 30 minutes) and should be managed according to the algorithm in **Appendix B**. • When occurring, tachysystole should always be qualified as to the presence or absence of FHR decelerations. • Per the 2008 NICHD article on electronic fetal monitoring, the terms hyperstimulation and hypercontractility were not defined and should not be used in charting. • If an IUPC is used and the uterine resting persistently records > 25 mmHg, consider the following troubleshooting interventions:	Adverse effects of Oxytocin are primarily dose related. Most common adverse effect is FHR decelerations associated with uterine tachysystole. Intrauterine resuscitative measure may include (see **Table 2 in Appendix B**): 1. Cervical exam 2. Increasing IV fluids if due to dehydration 3. Changing the patient's position 4. Administration of oxygen via face mask If the patient does not respond to these conservative intrauterine resuscitative measures administer: • Terbutaline 0.25 mg SQ per OB provider order OR • Nitroglycerine 100 mcg sublingually administered by anesthesia provider **<u>PROVIDER COMMUNICATION DURING AN URGENT EVENT</u>** **RN must call provider for a bedside evaluation when stopping Oxytocin during an urgent event.** Urgent events that warrants a STAT provider bedside evaluation includes (but not limited to): Category III FHR tracing defined as: 1. Absent baseline FHR variability AND (any of the following): a. Recurrent (> 50% of the time with UCs) late decelerations

1. Re-zero catheter initially and after intervention. 2. Assess for uterine relaxation by palpation. 3. Reposition patient. 4. If amnioinfusion infusing, check for entrapment of fluid.	b. Recurrent variable decelerations c. Bradycardia d. Sinusoidal pattern (true sinusoidal patterns persist for ≥ 20 minutes). e. Prolonged decelerations (> 2 minutes but <10 minutes as that would indicate a change in baseline). **Considerations for restarting Oxytocin** Discussion with OB provider should occur on time and dose of Oxytocin restart. It will be the OB provider's discretion depending on clinical situation. A bedside evaluation by the provider may be requested.

C. Summary

1. Oxytocin should be administered at the lowest possible dose to achieve adequate uterine contraction pattern and strength, contractions every 2-3 minutes and palpating firm, or adequate MVU of 200-300, resulting in cervical change. During this process, care should be maintained to promote maternal and fetal well-being.

D. Management of the 3rd Stage of Labor with Oxytocin

1. If there is an induction/augmentation infusion of Oxytocin used for the patient, the same infusion bag can be used for the management of 3rd stage of labor order.
2. Oxytocin IV infusion should be initiated at 30units/500ml LR at 150 ml/hr x 1 hour or 10u IM if no IV access is established immediately after the birth of baby. The oxytocin infusion may be titrated by OB RN to uterine tone per provider order during active management of 3rd stage of labor.
3. Any additional agents needed to manage postpartum hemorrhage are available as PRN orders but must be directed to be given by provider per clinical situation.
4. When administering PPH medications, closed loop communication among caregivers should be utilized and documented.

VI. RESPONSIBILITY

For information about this policy, please contact the Birth Center Unit Director.

VII. HISTORY OF THE POLICY

Issue Date: January 2001
Reviewed and Revised: April 2014 by M. Killion, CNS, M. Mullen, RNC
Last Revision/Review: May 2019 by M. Duck, RNC, F. Rocha, MD, V. Tatsis, MD, J. Manantan, RN

VIII. APPENDICES

APPENDIX A: Bishop Scoring System
APPENDIX B: Uterine Tachysystole & Management of Category II & III Tracing
APPENDIX C: Acute Medical Management of Postpartum Hemorrhage
APPENDIX D: Montevideo Units

inquiries to the Office of Origin or Medical Center Administration at (415) 353-2733.

APPENDIX A

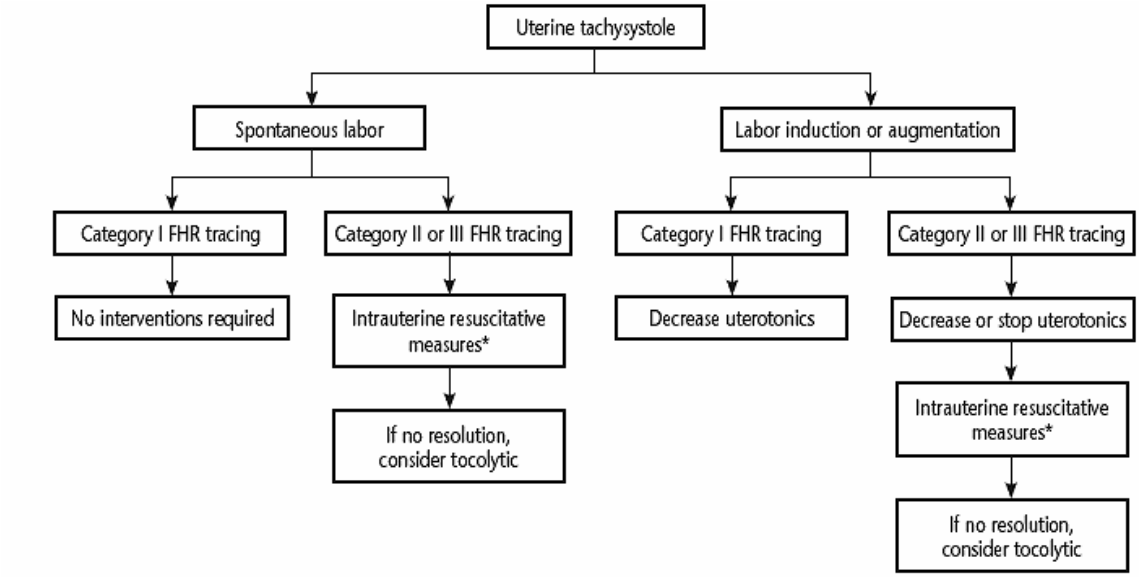
Bishop Scoring System

Predictors of favorable outcomes through induction of labor include accurate assessment of gestational age, documented fetal maturity, and scoring indices that demonstrate inducibility of the cervix. The Bishop scoring system is one of several scoring systems for evaluating inducibility. For example, with a Bishop score of 9 or more, the cervix is considered favorable and induction of labor should be successful (i.e., cervix is soft, effaced 50%, dilated 2cm or more, and anterior in position with an engaged vertex). In contrast, if the Bishop score is low (5 or less), 10 to 12 hours of uterine contractions may be required to attain a cervix favorable for induction or PGE_2 Gel may be used (see procedure for PGE_2 Gel).

	FACTOR				
Score	Dilation (cm)	Effacement %	Station	Consistency	Position of Cervix
0	Closed	0-30	-3	Firm	Posterior
1	1-3	40-50	-2	Medium	Mid-Position
2	3-4	60-70	-1,0	Soft	Anterior
3	≥ 5	≥ 80	± 1, ± 2		

Appendix B

Uterine Tachysystole



*See Table 2 for list of various intrauterine resuscitative measures

Figure 2. Management algorithm for uterine tachystole. Abbreviation: FHR, fetal heart rate.

American College of Obstetricians and Gynecologists (2006, Reaffirmed in 2015). Induction of labor. Washington, DC: Author. ACOG practice bulletin No. 107.

APPENDIX B CONTINUED

Management of Category II & III Tracing

Table 2. Various Intrauterine Resuscitative Measures for Category II or Category III Tracings or Both		
Goal	**Associated Fetal Heart Rate Abnormality***	**Potential Intervention (s)†**
Promote fetal oxygenation and improve uteroplacental blood flow	Recurrent late decelerations	Initiate lateral positioning (either left or right)
	Prolonged decelerations or bradycardia	Administer maternal oxygen administration
	Minimal or absent fetal heart rate variability	Administer intravenous fluid bolus
		Reduce uterine contraction frequency
Reduce uterine activity	Tachysystole with Category II or III tracing	Discontinue oxytocin or cervical ripening agents
		Administer tocolytic medication (eg, terbutaline)
Alleviate umbilical cord compression	Recurrent variable decelerations	Initiate maternal repositioning
	Prolonged decelerations or bradycardia	Initiate amnioinfusion
		If prolapsed umbilical cord is noted, elevate the presenting fetal part while preparations are underway for operative delivery

*Evaluation for the underlying suspected cause(s) is also an important step in management of abnormal FHR tracings. † Depending on the suspected underlying cause(s) of FHR abnormality, combining multiple interventions simultaneously may be appropriate and potentially more effective than doing individually or serially (Simpson KR, James DC. Efficacy of intrauterine resuscitation techniques in improving fetal oxygen status during labor. Obstet Gynecol 2005;105:1362–8).

Data from Young BK, Katz M, Klein SA, Silverman F. Fetal blood and tissue pH with moderate bradycardia. Am J Obstet Gynecol 1979;135:45–7; Chauhan SP, Roach H, Naef RW 2nd, Magann EF, Morrison JC, Martin JN Jr. Cesarean section for suspected fetal distress. Does the decision-incision time make a difference? J Reprod Med 1997;42:347–52; Schauberger CW, Chauhan SP. Emergency cesarean section and the 30-minute rule: definitions. Am J Perinatol 2009;26:221–6; and Schifrin BS, Hamilton-Rubinstein T, Shields JR. Fetal heart rate patterns and the timing of fetal injury. J Perinatol 1994;14:174–81.

APPENDIX C

Acute Medical Management of Postpartum Hemorrhage

Table 3. Acute Medical Management of Postpartum Hemorrhage

Drug*	Dose and Route	Frequency	Contraindications	Adverse Effects
Oxytocin	IV: 10–40 units per 500–1,000 mL as continuous infusion or IM: 10 units	Continuous	Rare, hypersensitivity to medication	Usually none. Nausea, vomiting, hyponatremia with prolonged dosing. Hypotension can result from IV push, which is not recommended.
Methylergonovine	IM: 0.2 mg	Every 2–4 h	Hypertension, preeclampsia, cardiovascular disease, hypersensitivity to drug	Nausea, vomiting, severe hypertension particularly when given IV, which is not recommended
15-methyl $PGF_{2\alpha}$	IM: 0.25 mg Intramyometrial: 0.25 mg	Every 15–90 min, eight doses maximum	Asthma. Relative contraindication for hypertension, active hepatic, pulmonary, or cardiac disease	Nausea, vomiting, diarrhea, fever (transient), headache, chills, shivering hypertension, bronchospasm
Misoprostol	600–1,000 micrograms oral, sublingual, or rectal	One time	Rare, hypersensitivity to medication or to prostaglandins	Nausea, vomiting, diarrhea shivering, fever (transient), headache

Abbreviations: IV, intravenously; IM, intramuscularly; PG, prostaglandin.

*All agents can cause nausea and vomiting.

Modified from Lyndon A, Lagrew D, Shields L, Main E, Cape V, editors. Improving health care response to obstetric hemorrhage version 2.0. A California quality improvement toolkit. Stamford (CA): California Maternal Quality Care Collaborative; Sacramento (CA): California Department of Public Health; 2015.

APPENDIX D

Montevideo Units

1. An IUPC may be used to determine Montevideo units. Montevideo units are a unit of measure reflecting the intensity or force of a contraction.

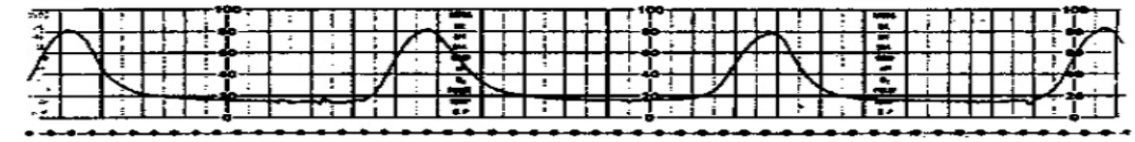


Figure 1. Montevideo units of 240 (baseline tone subtracted).

Figure 1. Montevideo units of 240mmHg (baseline tone subtracted).

2. MVU are determined by taking the sum of the acme of the contractions in a 10-minute period.
   Adequate MVU are considered to be in the range of:
   - 200-240 mmHg if you subtract the baseline uterine tone from the total.
   - 240-300 mmHg if the baseline tonus is included in the total.
   - Maximal uterine activity is considered to be 280-300 MVU.

3. Adequacy of uterine activity with an IUPC may also be established when the following criteria are met:
   - An established pattern of uterine contractions which are > 2- 3 minutes apart with,
   - Uterine contractions that are 50 mm Hg above the baseline tone
   - Progressive cervical dilation of 1-1.5cm/hr despite MVU <200-240mmHg, not counting baseline tone

4. Average baseline tonus is considered to be 5 - 20 mmHg. An elevated baseline tone of > 20 mm Hg may warrant further evaluation. If an amnioinfusion is ongoing, an artificial increase in baseline resting tone to 35-40 mmHg may be present. When the amnioinfusion is shut off average resting tone should be restored.