The following guidelines are intended only as a general educational resource for hospitals and clinicians, and are not intended to reflect or establish a standard of care or to replace individual clinician judgment and medical decision making for specific healthcare environments and patient situations.

Guideline for the Use of Oxytocin
December 2012

INTRODUCTION

The benefits of labor induction and augmentation must be weighed against the potential maternal and fetal risks associated with this procedure (1). The induction or augmentation of labor may increase the likelihood of neonatal complications or result in unnecessary cesarean section. These risks may be necessary to assume in complicated pregnancies, in which prolongation of gestation presents further risk to the mother or fetus.

Prior to initiating oxytocin, the patient should be counseled about the indications for the use of oxytocin, the methods of administration to be employed, and the risks of failure, cesarean delivery, or fetal compromise.

A physician capable of performing cesarean section should be readily available during the induction or augmentation of labor (2).

UNIT STRUCTURE

Each hospital’s department of obstetrics should develop a standardized, single, universal written protocol for the use of oxytocin for labor induction or augmentation. Standardization of an oxytocin infusion protocol is recommended to reduce medication dosing error and improve patient assessment.

Elements of a protocol should include (2):

- Indications for the use of oxytocin for labor induction and augmentation.
- Methods for preparation and administration of oxytocin.
- Qualifications of staff authorized to administer oxytocin and monitor patients.
- The level of the initial dose and subsequent doses.
- The timing interval of changes in doses
- A protocol for patient assessment, including definitions of normal and abnormal conditions evaluated by monitoring.
- Methods of managing complications should they develop.
DEFINITIONS

**Elective Induction:** Induction of labor when there is no clear medical benefit to mother or child for delivery at that point in time compared with continuation of pregnancy.

**Medically Indicated Induction:** Induction of labor when there is clear medical benefit to either mother or baby from ending the pregnancy rather than continuing with it.

**Cervical Ripening:** The process of causing softening of the cervix, ultimately leading to partial cervical dilatation and effacement. This is employed when the cervix is considered unripe, prior to induction of labor, for the purpose of increasing success with induction of labor.

**Induction of Labor:** The purposeful stimulation of uterine contractions for the purpose of accomplishing delivery, prior to the natural onset of labor.

**Augmentation of Labor:** The stimulation of ineffective uterine contractions after the onset of spontaneous labor, to manage labor dystocia.

**Labor:** Painful and regular contractions with progressive cervical change.

**Dystocia:** Abnormal labor resulting from abnormalities of “power, passenger, or passage” that results in slower than normal (protraction disorders) or complete cessation of progress (arrest disorders).

**Tachysystole:** More than 5 contractions in 10 minutes, averaged over a 30 minute period of time.

INDICATIONS FOR THE USE OF OXYTOCIN

For recommendations regarding indications for induction of labor, refer to the NNEPQIN publications, “Guideline for Medically Indicated Induction of Labor” and “Guideline Suggestions for Elective Induction of Labor”.

The use of cervical ripening methods is indicated when labor induction is indicated, but the cervix is considered unripe or unfavorable for induction of labor. For recommendations regarding cervical ripening, refer to the NNEPQIN publication, “Guideline for Cervical Ripening”.

Oxytocin is used for labor induction when the cervix is considered ripe or favorable for induction.

When dystocia is present, the adequacy of labor should be assessed. Augmentation of labor may be necessary when there is a failure of cervical dilatation or fetal descent with spontaneous uterine contractions (3). In general, contractions occurring less than 3 minutes in a 10 minute window, or with an intensity of less than 25 mm Hg above baseline, or both, may indicate insufficient labor requiring augmentation (3) (Level C).
PATIENT ASSESSMENT:

Refer to “PRE-OXYTOCIN CHECKLIST” in appendix.

A thorough evaluation of the mother and fetus is necessary prior to induction or augmentation in order to identify potential risks and to estimate the likelihood of success.

Factors to assess include:
  - The patient’s pregnancy history and medical history
  - Gestational age of the fetus
  - Estimated fetal weight
  - The fetal presenting part
  - The adequacy of the pelvis
  - The cervical status

Gestational age and fetal lung maturity

In cases of indicated induction of labor prior to term, the risks of fetal prematurity need to be weighed against the benefits of early delivery.

The frequencies of respiratory morbidity are reduced when delivery is at 39 weeks (OR 0.6) as compared to 38 weeks (OR 1.4) or 37 weeks (OR 2.5) (4) (Level B). Other potentially long term morbidities are also reduced with delivery at or after 39 weeks gestation.

ACOG has published criteria for confirmation of term gestation (39 weeks or greater) (5).
  - Fetal heart tones have been documented for 30 weeks by Doppler.
  - Thirty-six weeks have elapsed since a serum or urine hCG based pregnancy test was reported to be positive.
  - Ultrasound measurement at less than 20 weeks gestation supports gestational age of 39 weeks or greater.

Overall neonatal outcome may be improved with delivery at 39 weeks or greater, compared to delivery from 36-38 weeks in the presence of pulmonary maturity determined by amniocentesis (6) (Level B).

Cervical status

The status of the cervix is the most important predictor of the ability to reach the active phase of labor and achieve vaginal delivery.

The best assessment of the cervical status is by use of the Bishop score. A high Bishop score (variably defined as ≥5 or ≥8) indicates a similar likelihood of vaginal birth whether labor is spontaneous or induced. A low Bishop score (<6) is associated with a higher rate of failed induction of labor, particularly in nulliparous women (7) (Level B).

When the cervix is unfavorable, cervical ripening should be considered prior to induction of labor.

Guideline for the Use of Oxytocin - December 2012 - NNEPQIN
BISHOP SCORING SYSTEM (8)

<table>
<thead>
<tr>
<th>SCORE</th>
<th>Dilation (cm)</th>
<th>Effacement (%)</th>
<th>Station</th>
<th>Consistency</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Closed</td>
<td>0-30</td>
<td>-3</td>
<td>Firm</td>
<td>Posterior</td>
</tr>
<tr>
<td>1</td>
<td>1-2</td>
<td>40-50</td>
<td>-2</td>
<td>Medium</td>
<td>Mid</td>
</tr>
<tr>
<td>2</td>
<td>3-4</td>
<td>60-70</td>
<td>-1.0</td>
<td>Soft</td>
<td>Anterior</td>
</tr>
<tr>
<td>3</td>
<td>&gt;/=5</td>
<td>&gt;/=80</td>
<td>&gt;/=+1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

METHOD OF OXYTOCIN ADMINISTRATION:

Refer to “OXYTOCIN IN-USE CHECKLIST” in appendix.

Oxytocin is given IV and reaches a steady state in plasma in about 30-40 minutes (9) (Level A). The therapeutic response to a certain dose of oxytocin is unpredictable, although most patients enter labor and go on to delivery with doses of 11-13 m/U per minute (10) (Level B).

The optimal dose of oxytocin for labor induction has not been established. Low-dose and high dose regimens have been described. Low dose regimens are associated with a lower incidence of tachysystole with associated FHR changes. High dose regimens are associated with a shorter interval until delivery but increased rates of tachysystole (11) (Level B).

Although there is insufficient data to support the superiority of one dosing method of oxytocin over others, it is increasingly apparent that standardization and use of a single universal protocol for the administration of oxytocin reduces errors in medication administration and improves patient assessment and management (12) (Level C). For this reason, NNEPQIN recommends the administration of oxytocin according to the following protocol:

**General care during administration**
- Maternal vital signs, uterine contractions and the fetal heart rate (FHR) pattern should be assessed prior to the use of oxytocin (2).
- During oxytocin administration, maternal vital signs are assessed every 4 hours or sooner if there is a change in the patient condition.
- During oxytocin administration, NNEPQIN recommends continuous electronic FHR and uterine monitoring.
- Bedside providers have authority to discontinue oxytocin when safe administration is a concern.

**Preparation of oxytocin**
- Oxytocin is administered via an infusion pump to allow precise control of the rate of administration.
- Oxytocin is diluted by mixing 30 units in 500 mL to allow an infusion pump setting that matches dose administration, i.e., 1 m/U per minute equals 1 mL per hour.

**Administration protocol**
- Oxytocin administration is initiated at a dose of 2 m/U per minute.
- *Without contraindication*, the dose is increased by 2 m/U per minute every 30 minutes.
• **Uterine assessment prior to increasing the dose:** In the previous 30 minutes all of the following conditions are met (13) (Level C).
  o No more than 5 contractions in 10 minutes, averaged over the 30 minute time period.
  o No 2 contractions greater than 120 seconds in duration.
  o The uterus palpates soft between contractions.
  o If an intrauterine pressure catheter is in place, MVU must calculate less than 300 mm Hg and the baseline resting tone must be less than 25 mmHg.

• **If above uterine criteria are not met:** refer to the management of tachysystole as described below.

• **Fetal assessment prior to increasing the dose:** In the previous 30 minutes all of the following conditions are met (13) (Level C).
  o There is 1 acceleration of 15 bpm x 15 seconds, OR there is moderate variability for 10 of the previous 30 minutes
  o No more than 1 late deceleration has occurred.
  o No more than 2 variable decelerations exceeding 60 seconds in duration and decreasing greater than 60 bpm from the baseline have occurred.

• **If above fetal criteria are not met:** reduce or stop oxytocin and perform patient assessment.

• Oxytocin is increased until there is normal progression of labor, or there are strong contractions occurring at 2-3 minute intervals, or uterine activity reaches 200-300 Montevideo units.

• Oxytocin should be titrated to the lowest dose necessary for physiologic progress of labor. In some cases this will result in discontinuation after the onset of active labor.

• A numeric value for the maximum dose of oxytocin has not been established. Oxytocin may be increased until regular uterine contractions are established.

**COMPLICATIONS**

**Abnormal fetal heart rate patterns**

• Should a category III FHR pattern develop, prompt evaluation is necessary. Oxytocin administration should be discontinued. Additional measures include maternal oxygen administration, lateral positioning of the mother, and increased IV fluid administration. The administration of terbutaline or other tocolytics may be considered. If the pattern is unresolved, prompt delivery is necessary (14) (Level A).

• Category II tracings require evaluation. Similar measures to those above may be necessary with category II FHR patterns, especially those that involve fetal bradycardia, tachycardia, minimal or absent variability, the absence of accelerations after fetal stimulation, or recurrent or prolonged decelerations (14) (Level B).

• If an abnormal fetal heart rate pattern results in the discontinuation of oxytocin, oxytocin may be reinitiated after a category I FHR pattern is reestablished,
  o Restart oxytocin at half the dose that resulted in the abnormal FHR pattern, then increase per standard protocol.
Tachysystole:
Refer to “UTERINE TACHYSYSTOLE ALGORITHM FOR USE WITH OXYTOCIN ADMINISTRATION” in appendix.

- Tachysystole related to oxytocin use is associated with a progressive decline in fetal oxygen saturation (15) (Level B).
- If tachysystole occurs in the presence of a category I FHR tracing,
  - Reposition the mother into a lateral recumbent position, left or right side, and bolus with 500 mL of IV fluid. (15) (Level C) Reassess in 15 minutes.
  - If tachysystole is not resolved, reduce the oxytocin dose by one half. (15) (Level C)
  - If uterine activity has not returned to normal after 10-15 minutes, discontinue oxytocin until tachysystole is resolved (14, 15) (Level B).
- If tachysystole occurs in the presence of a category II or III FHR tracing,
  - Discontinue oxytocin and reposition the mother into a lateral recumbent position, left or right side, and bolus with 500 mL of IV fluid. (15) (Level C)
  - Consider administration of oxygen and or terbutaline. (14) (Level B).
- After tachysystole has resolved,
  - Restart oxytocin at half the dose that resulted in tachysystole, then increase per standard protocol.

Hyponatremia
- Isolated cases of hyponatremia and water intoxication have been associated with oxytocin administrations. In most cases, high doses (e.g., 40 m/U per minute) are administered in large volumes (e.g., 3-4 liters) of hypotonic solutions (D5W) (16).
- Symptoms include headache, nausea, vomiting, lethargy, unconsciousness, and seizures. Serious neurologic injury can result. Diagnosis is made by the measurement of serum electrolytes.

Failed induction of labor
- There are no standards for what situations constitute a failed induction of labor. Adequate time should be allowed for cervical ripening and the initiation of labor before a determination of a failed induction of labor can be made.
- In general, the beginning of active phase of labor is felt to occur when the cervix is 4-5 cm dilated and there is associated effacement to 80% (17) (Level C).
- Allowing a period of 12-18 hours of latent phase labor after amniotomy and oxytocin administration should be considered before the diagnosis of failed induction is made (18, 19) (Level B).

PROPOSED PERFORMANCE MEASURE
Percentage of cases of induction or augmentation of labor in which tachysystole is identified and corrected within 30 minutes.
REFERENCES

3. ACOG Practice Bulletin #49, December 2003, Dystocia and Augmentation of Labor
5. ACOG Practice Bulletin #97, August 2008, Fetal Lung Maturity
APPENDIX ITEMS

1. Methods for grading studies
2. Pre-Oxytocin Checklist
3. Oxytocin “In-Use” Checklist
4. Oxytocin Induction/Augmentation Order Set
5. Uterine Tachysystole Algorithm For Use With Oxytocin Administration
Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventative Services Task Force

I Evidence obtained from at least one properly designed randomized controlled trial.

II–1 Evidence obtained from well–designed controlled trials without randomization.

II–2 Evidence obtained from well–designed cohort or case–control analytic studies, preferably from more than one center or research group.

II–3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.

III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.
PRE-OXYTOCIN CHECKLIST

HCA Perinatal Safety Initiative

For Women with Term-Singleton Babies

“This Pre-Oxytocin checklist represents a guideline for care; however, individualized medical care is directed by the physician.”

If the following checklist cannot be completed, oxytocin should not be initiated

Date and time completed ____________________

☐ Physician or Midwife Order on chart
☐ Current history and physical on the chart*
☐ Prenatal Record on chart*
☐ Indication for induction is documented
☐ Pelvis is documented by physician to be clinically adequate (should be on prenatal record)*
☐ Estimated fetal weight within past week (clinical or ultrasound) less than 4500 grams in a non-diabetic woman or less than 4250 grams in a diabetic woman*
☐ Gestational age documented
☐ Consent signed (General L&D consent)
☐ Physician with C-section privileges is aware of the induction and readily available and this is documented in the medical record
☐ Status of the cervix is assessed and documented
☐ Presentation is assessed and documented (physician required to come in if nurse unable to determine)
☐ Fetal Assessment completed and indicates: (complete all below)
☐ A minimum of 30 minutes of fetal monitoring is required prior to starting Oxytocin

☐ At least 2 accelerations (15 bpm x 15 sec) in 30 minutes are present, or a biophysical profile of 8 of 10 is present within the past 4 hours or adequate variability.**

☐ No late decelerations in the last 30 minutes

☐ No more than 2 Variable deceleration exceeding 60 seconds and decreasing greater than 60 bpm from baseline within the previous 30 minutes prior to starting Oxytocin infusion.

*May be delayed for non-elective admissions.

**This document does not apply to a formal Oxytocin challenge test without the intent to induce or augment labor.

**There will be some situations in which alterations in management from that described in the protocol are clinically appropriate. If, after reviewing the fetal heart rate strip and course of labor the responsible physician feels that in his or her judgment, continued use of Oxytocin is in the best interest of the mother and baby, the physician should write or dictate a note to that effect and order the Oxytocin to continue. The RN will continue to provide safe, high quality nursing care.

OXYTOCIN “IN-USE” CHECKLIST

HCA Perinatal Safety Initiative

For Women with Term-Singleton Babies

“This Oxytocin “In-Use” Checklist represents a guideline for care:

however, individualized medical care is directed by the physician”

Checklist will be completed every 30 minutes. Oxytocin should be stopped or decreased if the following checklist cannot be completed*.

Date and time completed___________________________________________

☐ Fetal Assessment indicates:

☐ At least 1 acceleration of 15 bpm x 15 seconds in 30 minutes or adequate variability for 10 of the previous 30 minutes.

☐ No more than 1 late deceleration occurred.

☐ No more than 2 Variable decelerations exceeding 60 seconds in duration and decreasing greater than 60 bpm from the baseline within the previous 30 minutes.

☐ Uterine Contractions

☐ No more than 5 uterine contractions in 10 minutes for any 20 minute interval

☐ No two contractions greater than 120 seconds duration

☐ Uterus palpates soft between contractions

☐ If IUPC is in place, MVU** must calculate less than 300 mm Hg and the baseline resting tone must be less than 25 mm Hg.

*If Oxytocin is stopped the Pre-Oxytocin Checklist will be reviewed before Oxytocin is reinitiated.

** MVU = Montevideo Units

OXYTOCIN INDUCTION / AUGMENTATION

Check boxes require additional information or a choice. There must be a mark of check in the box for the order to be valid. Fill in blanks as applicable. Use additional Physician Order Sheets as needed.

Pt Weight: ___________  Pt. Height: _______________  ALLERGIES/REACTIONS: __________________________________________

Date: ________/_____/______  Time: ________  □ Labor Induction  □ Labor Augmentation

Gestational Age: ____________________  Indication for Induction: ____________________

Estimated Fetal Weight: ____________  □ SGA (under 2500gm)  □ AGA  □ LGA (over 4000 gm)

FHR assessment: □ Category I  □ Other: ____________________________

Clinical Pelvimetry: □ Pelvis adequate to proceed  □ Other: ____________________________

Pelvic exam: Dilatation______  Effacement_______  Station_________  Presentation_________

Bishop Scoring System – Completion Necessary Prior To Elective Induction of Labor

<table>
<thead>
<tr>
<th>Factor</th>
<th>Dilation (cm)</th>
<th>Effacement (%)</th>
<th>Station*</th>
<th>Cervical Consistency</th>
<th>Position of Cervix</th>
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<tr>
<td>Score</td>
<td></td>
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<tr>
<td>0</td>
<td>Closed</td>
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<tr>
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</tr>
<tr>
<td>3</td>
<td>5-6</td>
<td>80</td>
<td>+1, +2</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*Station reflects a -3 to +3 scale.

(please circle) Total Score: 1 2 3 4 5 6 7 8 9 10 11 12 13

Most favorable score greater than 8

Medications

- Start IV of LR at ________mL/hr (if not already infusing)
- Oxytocin (Pitocin) Infusion: Start at 2 milliunits/minute. Increase by 2 milliunits/minute every 30 minutes, until contractions are 2-3 minutes apart and of moderate to strong quality.
- Notify provider if dose exceeds 20 milliunits/minute.

Monitoring

- Continuous electronic fetal and uterine monitoring.
- Perform assessment according to Oxytocin “In-Use” Checklist every 30 minutes prior to increasing the dose of oxytocin.
- Discontinue oxytocin and notify provider for category III FHR patterns or category II FHR patterns that involve fetal bradycardia, tachycardia, minimal or absent variability, the absence of accelerations after fetal stimulation, or recurrent or prolonged decelerations.
- If oxytocin has been discontinued for an abnormal FHR pattern, once a category I pattern is established, resume oxytocin at half the rate that caused the heart rate abnormality. Increase as previously ordered.
If tachysystole is present, follow *Uterine Tachysystole Algorithm For Use With Oxytocin Administration.*

If oxytocin has been discontinued for tachysystole, once the tachysystole is resolved, resume oxytocin at half the rate that caused the tachysystole. Increase as previously ordered.

MD/CNM Signature: _________________________________ Date: __________ Time: ______

Noted by: ________________________________________ Date: ___________ Time: _______

NNEPQIN Oxytocin Collaborative, modified from EHS Pitocin orders 1/21/11 DSBP

**UTERINE TACHYSYSTOLE ALGORITHM FOR USE WITH OXYTOCIN ADMINISTRATION**

More than 5 uterine contractions in 10 minutes (averaged over a 30-minute window)

- **YES**
  - Is fetal heart rate Category I?
    - **YES**
      - Maternal reposition (left or right lateral)
      - IV bolus 500mL LR
      - If uterine activity has not returned to normal 15 minutes after above interventions, decrease oxytocin by half; if uterine activity has not returned to normal after 10-15 more minutes, discontinue oxytocin until tachysystole has resolved
    - **NO**
      - Continue to increase oxytocin as ordered

- **NO**
  - Discontinue oxytocin
  - Notify MD/CNM
  - Maternal reposition (left or right lateral)
  - IV bolus 500mL LR
  - Consider O2 10L/min via nonrebreather mask
  - If no response, consider Terbutaline 0.25mg subcutaneous

Once tachysystole is resolved