Stanford University Anesthesiology
Residency Program

Rotation specific tasks, goals and objectives for residents

OB anesthesia at Lucille Packard Children’s Hospital

Rotation Director: Edward Riley

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Tasks

1. Decide with you colleagues before the month begins if your group is going to have any variation in the schedule as listed below. If so, contact Ed Riley (edriley@stanford.edu) and inform him of you plans.

2. You MUST take the web based training (WBT) for Cerner and pass the competency test BEFORE coming on the service. Instructions for taking the WBT are included in this handout. The test is also included as well as the manual for Cerner. Upon starting the rotation we will give you an orientation and get you signed up for the computer system.

3. Know if you are scheduled for Neosym and plan to attend if you are scheduled. Communicate if you cannot make it. Note: Neosym is always on Monday. If you are on call Monday night, we still expect you to attend Neosym during the day.

Description of the Service:

The labor and delivery unit at the Stanford Medical Center is located in Lucille Packard Children’s Hospital (LPCH). There have been just over 5,000 deliveries there for the last several years. The cesarean section rate is just under 30% and over 70% of laboring women receive epidural analgesia. The patients come from several clinics. The Stanford Woman’s Clinic contributes about 2,000 deliveries. These are a combination of high risk and normal deliveries. San Mateo County Clinic has their patients deliver at LPCH. There are about 1,000 deliveries a year from the county clinic. The rest of the deliveries are brought to Stanford by way of private practice obstetricians. The Stanford Department of Anesthesia provides anesthesia services for all these patients.

The resident assigned to the OB anesthesia rotation at LPCH will gain a wealth of experience and become proficient and confident with performing the procedures associated with obstetric anesthesia. The resident will also gain the knowledge base to efficiently run a labor and delivery anesthesia service. The resident is supervised and taught by attending physicians at all times. Four residents cover the service 24/7.

Schedule

There are 4 residents on each month and overnight call will rotate every 4rth night. Each weekday, two residents should show up at 0700 (except on Monday, they go to conference first and then go to relieve the call person at 0800). These two residents stay until 4:30. The call resident comes in at 2:30. Between 2:30 and 4:30 there will be teaching and/or patient rounds conducted with all three residents. The post call person is not expected in until 0700 the next day.

On weekend days (Saturday and Sunday) and designated holidays (check to make sure) only the call person comes in and they come in at 0700. If all residents are in agreement, the weekend day shifts can turn over at 0800, but no later.
Under the supervision of the attending anesthesiologist, the OB anesthesia resident is responsible for the routine and emergency anesthetic care of all patients in the Stanford Labor and Delivery Suite. This includes the provision of anesthesia for labor and vaginal deliveries, cesarean sections, postpartum tubal ligations, and other surgical procedures performed in the Delivery Suite. The Department of Neonatology assumes primary responsibility for neonatal resuscitation at Stanford. However, if the baby needs resuscitation, it is appropriate for you to initiate this while awaiting the arrival of the pediatric team. The anesthesia team is also responsible for care of post-cesarean section patients receiving spinal/epidural opioids for the first 16 to 48 hours depending on which drug was given.

At the beginning and end of each month, the residents meet with the Director to go over their expectations and experience of the OB Anesthesia Rotation at LPCH. At the end-of-the-month meeting, residents anonymously evaluate the attendings they have worked with. Likewise, the attendings evaluate the residents and a summary evaluation will be provided to the main campus through our Site Residency Coordinator.
Anesthesia Record Training and Certification

LPCH Anesthesia - Accessing the Anesthesia Module WBT

For the WBT to work you must:
- Have Internet Explorer, version 6.0 or higher
- Have your Pop Up Blocker/Phishing Filter disabled
- If you have a Mac, you must have the ability to access Windows
ALL 3 OF THE PREREQUISITS MUST BE MET!

- You should be at a computer that will allow you to print the Certificate of
Completion at the end of the WBT.
- Allow for 60 to 90 minutes to complete the WBT and Competency Eval
- Go to the website: http://www.learnlinks.lpch.org
- Click on “Providers (MD,NP, PA)”
- Click on “Anesthesia Training”
- The next few steps will allow you to set-up your account so that you can
access the WBT and complete the end of course assessment.

1. Each user must setup an account and create a personalized user identification and
password before accessing the WBTs. We suggest just entering your familiar LPCH User
Name & Password so that you don’t have another to remember.
   a. Click on “New to Cerner Learning Manager? Click Here to Register”

   ![Login Page](image)

   • This will open a page where you will create your unique user ID and password.
   Please complete all fields noted by a red asterisk. Enter LPCH’s Registration
   Key: LUCI021408
2. When you have completed, click **Submit**.

![Self Registration Form]

3. You have successfully created your account, next you must log on. Select the **Login** link in the bottom left corner.

![Home Page]

4. The home page will then appear.
   a. Click on the “**My Learning**” box on the left side of your screen.

![Cerner Learning Manager]

   b. You will see Cerner Millennium – SurgiNet Anesthesia appear
c. Click on the “Begin” link on the far right hand side. If you can’t see it, expand the column width.
d. The WBT will begin to load and another box will appear. Again, click on “Cerner Millennium – SurgiNet Anesthesia” to launch the WBT
5. Resuming the Course
   a. If you elect to finish the course at a later time, you can access the course from the My Learning link on the left side of the Learning Manager. Simply click Resume from the links on the far right column.

6. After you have practiced the functionality, you will be asked to complete a “Performance Check”.

Print a copy of this page and bring with you to the class!
7. Once you complete the “Performance Check” you must print this document and present it to your Preceptor or Department Chair or for OB, Ed Riley!
Anesthesia Module End-User Competency Test

Answer the questions by circling the right answer and bring it to your training session.

Misc.
1. When is it appropriate to open a “Blank Record”? Mark all that apply
   - Each time a record is opened
   - In emergency situations when a case has not yet been scheduled in SurgiNet
   - Whenever you feel like it
   - Whenever you are opening an Anesthesia Record before the case is scheduled
2. When there is a downtime lasting more than 30 minutes you would initiate the following process
   - Get scrap paper and make notes until the end of the case
   - Ask the circulating nurse to call the Help Desk
   - Obtain a paper Anesthesia Record and complete documentation of the case on paper
   - Have the Anesthesia Tech get you a new computer
3. Using the cursor to hover over documented Actions allow you to view the charted detail.
   - True
   - False

Infusions
4. When documenting an infusion, you need to change the bag. To do this, you would;
   - Double click on the medication in the meds list, enter dosage information and click OK.
   - Click on the existing bag in the medication grid, click the “start next bag” button, click OK.
   - Double click on the medication in the meds list, click the “start next bag” button, click OK.
   - Click the medication button at the top of the screen, search and select the medication, enter dosage information, click OK

EMAR/I&O Integration
5. Medications documented in the Anesthesia record will be displayed on the EMAR
   - Immediately upon being documented
   - Never
   - Once the Anesthesia record is finalized
   - Once the Nursing record has been finalized

6. Intake and Output values documented on the Anesthesia record will display (Mark all that apply)
   - On the clinical notes tab
   - In the I&O Flowsheet in IView
• In the Anesthesia record
• In the All Results Flowsheet

Monitored values
7. If a monitored value, such as a vital sign, that is feeding the record from BMDI needs to be modified, what is the correct process?
• Click on the value to be modified in the monitors section, enter the correct value in the “modify monitor value” screen, click OK.
• Click on the value to be modified in the monitors section, enter the correct value directly into that cell, click ENTER.
• Once a monitored value has posted to the Anesthesia record, it cannot be modified.
• Monitored values can only be modified by the Help Desk via changing them in the viewlink module.

8. The simplest way to start Monitors on a new Anesthesia record is;
• Go to the Task menu and select “start monitors”
• Monitors will auto start once the record is opened
• The action of starting Monitors will be included in your macro. Once you click “execute”, the monitors will automatically start.
• Click the Monitors button at the top of the screen, and manually select each monitor by double clicking it to add it to the grid.

To-do List
9. The To-do list is created by launching a Macro and is used to display and track specific items that anesthesia must complete during the case.
• True
• False

Finalize / re-finalize
10. If you sign an Anesthesia record, you are; choose all that apply
• Also finalizing the record
• Attesting to the clinical correctness of the record at the point in which you are signing.
• Posting the record to clinical notes
• Allowing anesthesia charges to be generated (supplies)

11. If you Finalize an Anesthesia record, you are; choose all that apply
• Also signing the record
• Posting the record to the Clinical Documents tab
• Allowing EMAR and I&O values to post to the patient record
• Posting monitored parameters to IView
Record viewer

12. Which of the following reports are available from SARecordviewer? Choose all that apply

• Unfinalized cases report
• Finalized cases report
• Completed Case analysis
• Cases with no monitors report

How/where to view

13. The Anesthesia record can be viewed from the following places (with proper security access) choose all that apply;

• The Clinical Documents tab
• From within the Anesthesia Module
• SARecordviewer
• The scanned documents tab

How/where to print

14. The Anesthesia record should be printed from the following location;

• From Medical Record Publish (MRP) with the rest of the patient chart
• Only by HIM
• From the Clinical Documents tab, but should only be printed for quality review purposes
• From the case selection window

Actions

15. There are several actions that will update the surgery nursing record, choose all that apply

• Patient positioning
• Anesthesia start/stop time
• ASA class
• Line placement

16. When an action is documented, how is it displayed on the record?

• On the To-do list, as a completed item
• In the Action bar at the bottom of the screen, designated by icons
• In the monitors section of the record
• In both the Anesthesia record and the Nursing record.
Macros
17. A macro can only be executed at the beginning of a case
   • True
   • False

18. When launching a macro, which options are available for each item in the macro? Choose all that apply
   • Edit
   • Execute
   • Put on To-do list
   • Remove

Medications
19. The correct process for adding a dose to an existing medication on the Anesthesia record would be to click on the existing medication in the grid, enter the dose amount, then click OK.
   • True
   • False

Blank record
20. A blank record can be opened and associated to a patient later. In order to associate a patient to a blank record, what is required?
   • A surgical case must be scheduled
   • The patient must be admitted to the hospital
   • The monitors must be started on that record
   • A full H&P must be completed on the patient

Personnel
21. If personnel that have been added to a record need to be removed, what is the process? Choose all that apply
   • Click on the personnel button at the top of the screen to get the “modify personnel” dialogue box, select the person to be removed, click “remove” at the bottom of the box
   • Right click on the person in the actions bar and remove
   • Double click on the person in the actions bar to get the “modify personnel” dialogue box, select the person to be removed, click “remove” at the bottom of the box
   • Highlight the person in the actions bar and click “delete”
Helpful Aids

You can print these out in any format you like and carry them with you, copy them to a PDA, or just know where they are to refer to. If you put them on a PDA or iPhone, please share with us what you did and allow us share what you have done with others.

Information from the Departmental Handbook

Obstetric Anesthesia

Revised by Michael Chen MD (Nathaniel F. Simon, MD, Catherine Brummel M.D.)

Introduction

- Labor and Delivery ward (L&D) is located on the 2nd floor, Packard Children’s Hospital across the hall from the pediatric holding area.
- Residents perform blocks for labor analgesia as well as anesthesia for C-Sections, cerclage, and post-partum tubal.

Important numbers

<table>
<thead>
<tr>
<th>L&amp;D main desk</th>
<th>723-5403</th>
<th>OR A</th>
<th>57550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending phone</td>
<td>736-7814</td>
<td>OR B</td>
<td>57551</td>
</tr>
<tr>
<td>Resident phone</td>
<td>724-7938</td>
<td>OR C</td>
<td>87101</td>
</tr>
<tr>
<td>Attending call room</td>
<td>57556</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OB anesthesia tech pager</td>
<td>19003</td>
<td>Resident call room</td>
<td>57538</td>
</tr>
<tr>
<td>Men’s bathroom code</td>
<td>7499</td>
<td>Code for Carts</td>
<td>1234</td>
</tr>
<tr>
<td>Women’s bathroom code</td>
<td>26262</td>
<td>Code for all doors except one: 1 1</td>
<td></td>
</tr>
<tr>
<td>Recovery Room</td>
<td>57555</td>
<td>Code for Med Room door: 2222</td>
<td></td>
</tr>
</tbody>
</table>

Schedule:

There are 4 residents on each month and overnight call will rotate every 4th night. Each weekday, two residents should show up at 0700 (except on Monday, they go to conference first and then go to relieve the call person at 0800). These two residents stay until 0430. The call resident comes in at 0230Between 0230 and 0430 there will be teaching and/or patient rounds conducted with all three residents. The post call person is not expected in until 0700 the next day. On weekend days (Saturday and Sunday) and designated holidays (check to make sure) only the call person comes in and they come in at 0700. If all residents are in agreement, the weekend day shifts can turn over at 0800, but no later.

Daily Routine

- 0700 sign out from night resident. Get the OB Resident’s yellow phone, (724-7938).
- Hand-off of current parturients on L&D, plus epidurals that need troubleshooting, high-risk pregnancies, wet taps, follow-ups, consults, etc.
- Write name and pager number on paging board in front of the L&D front desk.
- Pick up OB anesthesia drug box from LPCH inpatient pharmacy on 2nd floor.
0700 – 0730 review elective C-Section patients in preop area. H&P will be either in patients notes or OB Anesthesia folder at front desk. Liaise with Attending +/- fellow about each case.

- There are a couple of case logs that are of note:
  - **Scheduled cases** (C-sections, Tubal ligation, inductions) in schedule book on LINKS (you can access this for view only in your account)
  - **High risk cases and consults** - red binder located at front desk near fridge.
  - **Followup folder** – white binder in attending call room: used to document complications e.g. dural punctures, neuropraxia, major hemorrhages. If called to review a patient, obtain a pt sticker + fill out a short “what happened” form, and leave in the white binder. Contact one of the fellows about the patient.

- Check all 3 L&D OR rooms, ensuring that they are ready for STAT cases. Check anesthesia machine, suction, blood pump, drugs, etc. In an emergency you may need to rush a pt into OR, attach monitors, + perform rapid sequence induction/intubation without delay.

- **Meds that have to be drawn up daily (this is hospital policy).**
  Label, and put time + date each drug:
  - Propofol vial 20 ml with 20 ml syringe with needle next to it
  - Succinylcholine 20 mg/ml
  - Ephedrine 5 mg/ml—Ready made syringe
  - Atropine 0.4 mg/ml
  - 2% lidocaine with bicarbonate + epi 1:200K (20 ml)
  - Reglan 10 mg + Zantac 50 mg (mixed together)
  - Pitocin (10 mg/ml) 3 ml - label with pink sticker
  - *Phenylephrine 100 mcg/ml. Ready made syring*

  No ‘Hot’ phenylephrine is allowed on OB.
  No other drugs to be drawn up and ready.

- Touch base with attending +/- fellow; some patients may be eligible for a research trial.
- Prioritize things that need to be done, then “divide + conquer.”
- Start elective C-Sections on time while tending to labor analgesia + consults in a timely fashion. Don’t feel like you need to do every block; you’ll get plenty.
- COMMUNICATE with your attending and fellows

**The L&D Board**
- The L&D board lists all partiurients on the unit - 10 unit labor rooms, 3 high risk rooms, and 3 recovery room beds.
- Under the “ANES” column:
  - **Green dot** - epidural is in place.
  - **Blue dot** - consult complete.
- Consult requested - nurses will write “please see” or “wants” or “consult please” in ANES column.
- R side of board: name of parturient’s nurse + OB, plus service type. We are anesthesia for every service (Stanford Univ, private OB, + San Mateo Co pts).

**Labor stage and pain neuropathways**
• **Stage 1 labor**: T10-L1 spinal nerve roots (visceral sympathetic afferents via the sympathetic ganglion → uterine & cervical plexus → hypogastric & aortic plexus → spinal cord nerve roots T10-L1).

• **Stage 2 labor (ie fetal descent)**: S2-4 pudental nerve. Patients will have pelvic and perineal pain at sensory dermatomes T10-S4 (labor stages 1&2).

• **C-Section** requires T4 level to block the exteriorizing the uterus.

**Labor Analgesia**

- Epidural rate at Stanford is approximately 80%. This amounts to over 300 blocks a month.

- **For each epidural**: fill out the boarding pass, an H&P, and the epidural record. If labor has progressed significantly by the time you are able to see them, it is usually acceptable to examine the patient, do the block, and then fill out the paperwork after. Check with your attending.

- Always check labs that have been done and order any that are necessary.

- **PIH** - check platelet count, potential for associated HELLP. In general, platelets should be >85,000 with normal PT, PTT and no evidence of clinical bleeding. Caution if the platelet count is falling rapidly. Proceeding with a regional technique is a risk-benefit analysis for each patient. Check ASRA guidelines at [http://www.asra.com/items_of_interest/consensus_statements/](http://www.asra.com/items_of_interest/consensus_statements/). Consult with your attending if you have any question.

- Two main modalities for labor analgesia:
  - lumbar epidural
  - combined spinal-epidural (CSE).

**Procedure for Regular Epidural (non CSE)**:

- There are three epidural carts on L&D. The combo for the lock is 1-2-3 - 4. **KEEP THE CARTS LOCKED WHEN NOT IN USE!!!**

- Check that emergency drugs, airway equipment + Ambu-bags are available.

- Page your attending

- Assemble equipment:
  - 1x Epidural kit
  - 1x Duraprep stick
  - 1x 100ml bag Bupivacaine 0.0625% plus infusion set
  - 1x 1ml Sufentanil 50 mcg/ml drawn into 1 ml syringe
  - 1x sterile gloves
  - 1x Opsite dressing, tape
  - 1x 3ml syringe of bicarbonate

- Remove watches, rings, and any hanging items from your shirt pockets or neck, and put on mask/hat/sterile gloves.

- Assist with patient positioning, ensure patient has a cap, and that fetal monitoring is adequate.

- The sitting position is the most commonly used, however lateral decubitus may be preferred in some cases. Once you are proficient with epidurals in the sitting position, you should do some cases with the patient in the lateral decubitus position for experience.
• Wash hands, use Duraprep to clean the back.
• Open Epidural kit, squirt Bicarb into the tray (to be added as a buffer to the Lidocaine 1.5% with epi used for the skin wheal. This minimizes stinging on injection of local.)
• Mix your initial bolus solution:
  - 15 ml total volume, Bupivacaine 0.125%, with 10 mcg Sufentanil
  Bupivacaine 0.25% (7.5 ml) +
  Sterile saline (7.5 ml) +
  Sufentanil 10 mcg (0.2 ml)
• Place the Epidural as you normally would, and leave no more than 5 cm of catheter in the space, to minimize unilateral blocks and catheter kinking.
• NB: Catheter securing – do not tape the catheter until after the patient has assumed the lateral position. The catheter has been shown to move significantly on change of position, leading to extrusion of tip of the epidural from the epidural space if it is tethered to the skin while the patient is sitting. This is especially true for obese patients.
• On L&D, every dose is a test dose. Most do not use the 1.5% lidocaine that comes in the kit for this (so we use it for the skin wheal, see above).
• Inject 5 ml at a time q 5 minutes of your premixed bolus dose, watching for signs of intrathecal injection (rapid onset of high block) or systemic toxicity (tinnitus, circumoral numbness, confusion).
• Cycle blood pressure every 2 minutes during this phase.
• Observe the patient for 15-20 minutes from the last bolus to monitor for hypotension, ineffective block, or subarachnoid block.
• **Complete the epidural record electronically:** The nurse will document vital signs in the Powerchart in LINKS for the rest of labor.
• Prepare the epidural infusion solution by adding 40 mcg sufentanil (0.8 ml) to the 100ml bag of Bupivacaine 0.0625%, via the bag spike port. Final concentration of sufentanil will be 0.4 mcg/ml. NB: sterilize the injection site on bupivacaine bag with alcohol before injecting the sufentanil. Bupivacaine does not come in sterilized packaging.
• JAHCO requires that all epidural infusion bags be labeled with a pt sticker, along with amount and concentration of additives (sufentanil).
• Program and start the PCEA pump (see below), using the 0.0625% bupivacane with sufentanil infusion.
• Place a green dot on the L&D Board next to the patient’s name.
• Catheter removal post delivery: Check the box on the anesthesia note (“catheter d/c’d, tip intact, block resolving”), date and sign.
• The “End Time” box on the anesthetic record is for when the catheter is pulled and active monitoring stops, not for when the catheter is placed.
• Bring the paperwork to the attending so they may sign the bottom of the anesthesia consult once epidural is removed. Whether you do this at night is up to the attending. Discuss this with he or she.

**Combined Spinal-Epidural (CSE)**
• Always discuss with your attending if you plan a CSE, as some attendings do not use this technique. It is a popular technique among the OB attendings, and is particularly useful late in labor to rapidly establish analgesia.
You do not need to discuss this technique specifically with the patients. Start your discussion of risks by saying the spinals and epidurals we do…..The consent for the CSE is the same as for an epidural. This is just a variation in the technique.

- **Equipment:** As for regular epidural PLUS 26 gauge Gertie Marx spinal needle.
- **Initial CSE bolus dose:**
  - 0.25% bupivicaine (0.5-1.0 ml) plus 5 mcg Sufentanil (0.1cc).
- **Place the Epidural as you normally would. After LOR, slowly insert the Gertie-Marx needle. Sometimes you will feel a pop or change in resistance. Remove the stylet and confirm CSF (flow may be very slow.) Inject CSE drugs slowly and **DO NOT** allow air to be injected.
- **Carefully remove the Gertie Marx needle, keeping the Tuohy needle in place. Thread the catheter in gently as you would a regular epidural catheter and secure.**
- **Program and start the PCEA pump (see below), using the 0.625% bupivicane with sufentanil infusion. No epidural bolus will be needed.**
- **When spinal wears off, she should expect pressure but not sharp pain. The latter indicates that the epidural catheter will need troubleshooting. Review the patient and consult with your attending.**

**Programming the PCEA (Curlin) Pumps:**

**A) Loading the pump:**

- PCEA (continuous infusion plus patient-enabled boluses) is the standard for epidural labor analgesia at LPCH L&D
- Attach the epidural tubing to the bag and prime with Bupivacaine mix.
- On the tubing is a little yellow anti-free flow device. There is a little piece on the anti-free flow device that looks like a mouse ear. Break the mouse ear off once the line is primed; this will stop further fluid flow. Once the tubing is primed, you can place the tubing in the pump.
- **Put the tubing in the pump by:**
  - Opening the lever on top of the pump by lifting where it says, “lift to open”.
  - Put the yellow anti-free flow device in the left most slot on the pump.
  - Put the blue plastic piece on the tubing in the slot on the right side of the pump where there is a blue arrow pointing to the slot.
  - Close the lever with the tubing draped in front of the lever.
  - Program the PCEA (Patient Controlled Epidural Analgesia) pump.

**B) Programming the pump:**

- First, turn it on + wait for unit self test to finish (it will beep a few times).
- First screen - enter PROGRAM or BIOMED SETUP. Select PROGRAM + hit the green (YES/enter) button.
- Next screen - RESUME, REPEAT Rx, or NEW PROGRAM. If you want to use the program from the last patient select REPEAT RX + hit the green (YES/enter) button. Otherwise select NEW PROGRAM + hit the green (YES/enter) button.
- To program the pump go through the following screen choices Alert Rx in progress…etc **Select Yes**
The next screen has several choices. With each choice, if blinking choice is not correct, hit Red (NO/change) button + new choice will pop up. When correct choice pops up, hit the green (YES/enter) button.

Units: ml
ADMIN Route: EPI
LOAD DOSE: 0.0
medLMTs: OFF
NEXT? YES
BAG VOL: 94.0 ml (don’t use 100, or you will get air in the line when it runs out)

BASAL RATE: 12 (suggested rate)
Pt. Bolus: 12 (suggested bolus)
BOLS INT: 12 (suggested)
# BOLS/hr: 3 (suggested)
Done: YES

PRESS RUN TO START Hit red/green RUN/PAUSE button

• To refill the pump:
  Hit the red/green RUN/PAUSE
  Select the REPEAT Rx and then hit the red/green RUN/PAUSE.

• If the pump beeps “ALERT, occlusion”, the line has filled with air. Remove the tubing and then push on both sides of the anti-free flow device (along the long axis) and you will feel a subtle give. This opens the device so that you can squeeze fluid through the tubing to re-prime. Reload and restart as above.

Trouble shooting an inadequate epidural.
A) Unilateral block:
• Consider turning the patient on the opposite side so gravity can help with the spread of the epidural drugs.
• Consider pulling the catheter back 1 cm and rebolusing
• Consider replacing the catheter - don’t mess around too long. A low threshold for catheter replacement means more effective analgesia.

B) Perineal or rectal discomfort:
• Indicates more caudal spread needed – consider sitting patient up.
• Second stage labor associated with involvement of lower dermatomes - may need additional bolus to cover that area.
• Give 5 to 10 ml of 0.125%- 0.25% Bupivicaine via the epidural
• If not effective - consult with your attending
• Consider replacing the catheter.

C) No discernable block:
• Consider repeat epidural, a CSE, or single shot spinal if patient is imminently delivering.
• Consider replacing the catheter! “When in doubt, take it out.” You will need a reliable epidural in the event of a crash C-Section.
Keep in mind how much local the patient has received.

**Fetal Bradycardia**
Fetal bradycardia can occur any time in labor, secondary to decreased utero-placental perfusion and fetal hypoxia. Consider and treat reversible events that may cause reduced fetal perfusion e.g. aorto-caval compression from gravid uterus, hemorrhage. Cord compression or placental abruption are indications for stat C-section.

Management:
- Left uterine displacement (to move the uterus off the IVC and aorta)
- Administer IV fluid bolus
- Stop pitocin
- Check BP; treat hypotension. Preferred vasopressor is Neo.
- Maternal O₂ by mask, 10 LPM
- Uterine hypertonus - consider sublingual NTG (1-2 sprays.) (Each spray contains 400 mcg.) Watch BP!

**Prepare for emergency C-Section**

**Cesarean Section**

- **Elective** C-Sections:
  - Regional anesthesia strongly preferred unless there is a contraindication to regional anesthesia. This is because pregnant patients are at significant risk for aspiration, rapid desaturation, and potentially difficult airway (from obesity and swollen airway tissue.)
  - Most Elective (non-labor) C-Sections will get a spinal.
  - CSE may be placed if it is anticipated that surgery will be prolonged (i.e. PPTL to follow, multiple previous uterine surgeries, morbid obesity, etc.) Also short stature pts who will receive ↓ intrathecal dose.

- **Emergent** C-Sections:
  - Urgent – if there is time regional is preferred (spinal, or epidural top-up if there is an epidural in situ). Having a Labor Epidural in place (and a readily available anesthesiologist) minimizes the need for using GA.
  - STAT - done under GA, esp if time is of the essence or the patient is hypovolumic from hemorrhage. See section “GA for C-Section” for more discussion.

**Considerations**

- All C-Sections considered to have a full stomach.
- All patients get anibiotic prophylaxis prior to their c-section. Give 1 g Kefzol if they are not allergic to penicillins or cephalosporins.
- Pretreat every pt (Elective + Emergent) with Reglan 10 mg IV + Zantac 50 mg IV. Emergent C-Sections done under GA also get Sodium Citrate 30 ml PO.
- Obtain good IV access. Add more IV’s if pt is at risk for post-partum hemorrhage (uterine atony, abruption, previa, accreta, etc.).
• Elective Cesarean Sections will come to LPCH 1 to 2 days before their scheduled delivery date for an anesthesiology consult and to have a type & screen drawn for the blood bank.
• Important information for H&P for these consults includes risks and benefits of regional anesthesia, complications, and potential for conversion to GA.
• Mention that spinal and CSEs are typical anesthetics for Cesarean sections. This will keep options open in case there are studies they could potentially be enrolled in.

**Spinal (SAB) for C-Section**

- Bring the spinal cart into the OR (located in the hallway).
- Position pt in sitting position. Attach monitors + give 500 ml bolus Hetastarch.
- If father/partner is present, keep an eye on them; they may become vasovagal. Should be seated on chair during block + section. **You don’t need 3 pts!**
- Wash hands, clean the back with Duraprep.
- Prepare intrathecal drugs in the 5 ml glass syringe:
  - 0.75% hyperbaric bupivacaine (1.6 ml)
  - 10 mcg Fentanyl (0.2 ml)
  - 0.2 mg Astramorph (0.4 ml)
- Insert introducer needle, then the 25 ga Whitacre.  
  - Don’t put the introducer in more than half way in thin patients.
- When CSF is verified, inject intra-thecal drugs. Remove needle + immediately lie pt down with Uterine displacement (bump under R hip.)
- **BE VIGILANT!** Be prepared to give PHE for ↓BP. Cycle BP’s q 1 minute. ↓BP can sometimes manifest as nausea, somnolence, + ↓fetal HR.
- Give 1g of cefazolin IV(current guidelines recommend giving it before incision).
- Use PHE to maintain BP at baseline levels. It is not unusual to use 1000 mcg in order to keep the BP at baseline prior to delivery of the baby.
- O₂ is routinely given to Emergent C-sections but NOT Elective ones.
- Check for bilateral block with alcohol/needle/sharp stick/nerve stimulator. T₄ block desirable.
- The nurse will place a foley catheter once the sacral dermatomes are blocked – check change of sensation as above on the outer soles of the feet (L₅/S₁).
- Cover the patient with warm blankets. OB patients tend to become hypothermic and will shiver.
- After placental delivery, start Pitocin (30 units in a liter bag of crystalloid) and inform surgeons. Pitocin titrated to uterine tone. Watch for ↓BP.
- If spinal or epidural morphine is given, fill out post-op monitoring orders on the computer so that the patient is monitored for post-op respiratory depression on ward.
- NB: ensure all steps followed so that orders are logged correctly. You should complete LINKS training for this prior to commencing your rotation. Also, ask OB if NSAIDS (Toradol) ok.
- Fill out the post-cesarean pain assessment form. This includes ONLY the top of the form. Indicate the long acting opioid given during block (usually AstroMorph, DuraMorph, or DepoMorphine). These forms are left with the nurse in PACU, + the nurse will give them to anes tech. They are used by the fellows + Attending to do postop pain rounds on Day 1 post C/S.
Labor Epidural Used for C-Section
- Begin dosing the epidural aggressively as soon as you get to the patient e.g. 5 ml via epidural in rm and 5 ml on way to OR. 
  Be in constant verbal contact with the patient once you start dosing.
- Place the monitors. Give O₂. Left uterine displacement + fetal monitoring.
- Dose existing catheter in 5cc increments and monitor the block level. 15-20 ml is usually adequate.
- Epidural topup mix:
  - 2% Lidocaine with bicarb and epi
    - Bicarb: 1 ml per 10 ml 2% Lidocaine
    - Epinephrine 1:200,000: 0.05 ml per 10 ml 2% Lidocaine
- After delivery, give Duramorph 4 mg via the epidural prior to removing catheter for post-op analgesia. **If there is any suspicion of problems intra-op, leave catheter in-situ until labs have been checked, post-partum hemorrhage resolved, etc.**

General Anesthesia (GA) for C-Sections:
- Most General Anesthetics for C-Section that you will encounter will be for STAT emergent C-sections.
- Occasionally, GA may need to be done for infection at site, sepsis, systemic anticoagulation, hypovolemia, severe AS, etc.
  - Note that if a patient is septic and had antibiotics, the risk of central nervous system infection from the spinal or epidural is minimal. If they are floridly septic with severe hypotension then a general anesthetic is probably best (for hemodynamic reasons not because of the risk of infection).
- If a patient refuses a spinal or epidural, they should be counseled why RA is preferred. If they still insist on GA and there are no major contraindications to it, do a GA. Patient refusal is one of the absolute contraindications to a regional.
- **Indications for STAT Emergent C-Sections:**
  - Fetal indications: bradycardia, non-reassuring fetal heart rates, bleeding, prolapsed cord, footling breech, etc
  - Maternal indications: severe maternal disease, bleeding, failure of regional anesthesia, etc.
- Regardless of indication, **you must move fast!** Potential maternal and fetal mortality is high.
- **Emergent GA:** regular RSI + intubation (with a few exceptions)
• **Procedure:**
  - **Clear communication between the OB team and the anesthesia team is vital.**
  - Move the patient to the OR table, build an intubating ramp if needed. Ensure left uterine displacement.
  - Preoxygenate (de-nitrogenate) + place monitors.
  - **Turn on scavenging system for Anesthesia machine.** This is a MUST, + different from the GOR. Call an anes tech if you need help with this.
  - **Induction must not proceed until the pt’s belly is prepped/draped, the surgeons are scrubbed, gowned + poised with scalpel, ready to cut.**
  - RSI with cricoid pressure (STP, sux, tube).
    - STP: 3-5 mg/kg
    - Sux 1 mg/kg
    - Cricoid pressure until cuff inflated + ETT position confirmed
  - Confirm placement of the ETT + tell the OB team to start incision.
  - Give 0.7 to 1.0 MAC of isoflurane or sevoflurane with 50/50 O$_2$/N$_2$O.
  - If ↓BP, support BP with fluids + some pressors.
  - For **hypertensive disorders (PIH),** you may need Remifentanil 0.5–1 mcg/kg ) prior to intubation followed with infusion at 0.125 ug/kg/min.
  - If **uterine relaxation** needed by OB team (big baby, breech, etc), either turn up the inhalational agent or give IV NTG (50-100 mcg).
  - Once the baby is delivered:
    - Turn down the inhalational agent to 0. 5 MAC.
    - Give adequate opioids for analgesia. A minimal dose of fentanyl would be 250 mcg. In addition, consider titrating IV morphine at the end of the case.(discuss with attending).
    - Midazolam for amnesia. Minimal dose of 2 mg. (NB: pregnant patients are very sensitive to benzos. If using Midazolam for sedation only use no more than 0.5 mg with each bolus).
    - Pitocin 30 IU into 1l crystalloid, and run as appropriate for uterine tone.
    - There is no restriction of breastfeeding after a general.
  - Extubate once the patient is **fully awake** + protecting her airway.
  - Fill out PCA orders.
  - Prepare the room for the next C-Section, + **turn off the scavenging system for the anesthesia machine.**

**OB Emergency Equipment:**

**OR Hallway**

- **Anesthesia workroom** is just inside the big double doors. The OB Anesthesia Tech is available most days and evenings by pager (19003).
- **Difficult airway cart-** Fastrach LMAs, light wands, bougies, fiberoptic, etc. There is also a Melker Emergency Cricothyrotomy kit on the spinal cart.
- **Level 1 rapid fluid infuser** with A-lines and IVs setups.
• Crash Cart with defibrillator.
• Malignant Hyperthermia cart

OR Rooms
• Hetastarch and Mast Trousers located in glass cabinet.
• Handheld fiberoptic scope in OR B.
• OR B has a Storz Video system for fiberoptic and laryngoscopic viewing;

OR Medication Room
• Located between Operating rooms A & B.
• Hemabate and Methergine in the refrigerator
  Be sure to inform nurse about Hemabate use/wasted. This med is $$ + tracked.
• Warm Blankets
• Nurse’s Pixis machine – OB Anesthesia attendings + fellows also have access
• Extra epidural cart
• Code is 1 to enter from OR A or B, 1-2-3-4 to enter from hallway.

L&D Hallways
• Crash carts and Ambu-Bags are in various places along the main hallways.
• 2x Epidural carts (+ airway equipment/pressors)

Miscellaneous Pearls
• Ed Riley almost always is available by cell(650-804-0514). Question about anything? Something is not going well? Do not hesitate to call him.
• Cerclages + post-partum tubals - usually require smaller spinal doses. (1.2 ml 0.75% bupivacaine (9 mg) +10 mcg fent, no Morphine). You will need a T6 level for tubals + a T10 level for cerclage. If there is a labor epidural still in place, then you can use that as well.
• Lectures – Fellows will cover for Wednesday regular resident lecture. Please do not abuse this privilege, and return once it is over.
• C/Sections start late on Mondays – attend the M&M.
• “Expectant Parents Lecture” given by fellows – attend at least once. Sessions are held twice/month + run 7-7:30pm. Ask the fellow for the schedule for the month.
• NeoSim is given on the the second Monday of the month. If this is your first rotation on OB you will attend this.
• When on call, “sleep” in the resident call room in the back hall connecting L&D to F2. Don’t leave valuables in the call room, as it can no longer be locked.
• Nurses will always want you in 3 places at once. Be courteous, be as efficient as possible, wear a smile, + do your best. Always keep your patient’s well-being foremost in your mind + you’ll seldom be wrong. If you have more than one thing to do (two epidurals or you are doing a c-section and they need an epidural) call your attending. Do not delay things because you want to do everything yourself. You and your attending can always call for help (e.g. the first call resident is always in-house).
• ANY concerns about any patient, get your attending and the OB team in the loop ASAP.
• During the day, ALWAYS inform the attending BEFORE doing an epidural. At night, check with the attending on call as to their preference.
• Baked goods are an obstetric nurse’s second best friend, next to the resident who provides them.
• Do not answer the phone with the greeting, “Anesthesia”. This communicates that you are just a technical service (in addition to being grammatically incorrect). A suggested greeting is, “this is Dr. XYZ from anesthesia”.
• HAVE FUN!!
<table>
<thead>
<tr>
<th><strong>A.K.A.</strong></th>
<th><strong>PITOCIN</strong></th>
<th><strong>METHERGINE</strong></th>
<th><strong>HEMABATE</strong></th>
<th><strong>CYTOTEC</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drug class</strong></td>
<td>Oxytocin</td>
<td>Methylergonovine maleate</td>
<td>Carboprost tromethamine, PGF-2α</td>
<td>Misoprostol, PGE-1</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>Post. pituitary hormone Augmentation of labor, Treatment of PPH</td>
<td>Ergot alkaloid Treatment of PPH</td>
<td>Prostaglandin Treatment of PPH</td>
<td>Prostaglandin Treatment of PPH</td>
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<tr>
<td><strong>Mechanism</strong></td>
<td>Stimulate Uterine contraction Alpha-adrenergic vasoconstriction and stimulate Uterine contraction</td>
<td>Stimulate Uterine contraction</td>
<td>Stimulate Uterine contraction</td>
<td></td>
</tr>
<tr>
<td><strong>Dose</strong></td>
<td>20-40 units/L of IVF. AVOID IV BOLUSES</td>
<td>0.2 mg IM q 2-4hrs, DO NOT GIVE IV. 15-90min (max 2mg). DO NOT GIVE IV</td>
<td>250 mcg IM (or intramyometrially) q 15-90min (max 2mg). DO NOT GIVE IV</td>
<td>400-600 mcg PR/PO. DO NOT GIVE IV</td>
</tr>
<tr>
<td><strong>Adverse Effects</strong></td>
<td>Serious: anaphylaxis, arrhythmias, uterine rupture Common: hypotension</td>
<td>Serious: CV, severe HTN, angina, MI (rare). Common: N/V, HA, dizziness, hypertension, sweating</td>
<td>Serious: pul.edema</td>
<td>Serious: abortifacient Common: shivering, pyrexia, diarrhea, abdominal pain, nausea, HA</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>Relative: uterine hypertonus, breech presentation, significant CV disease</td>
<td>Relative: CV, renal, hepatic disease. TIAs, Raynaud's. Pt’s on CYP 3A4 inhibitors (protease inhibitors, azoles, macrolides)</td>
<td>Relative: Pt with cardiac, renal, or hepatic disease. Asthma, anemia, epilepsy, DM, jaundice, or prev. uterine sx</td>
<td>Not FDA approved.</td>
</tr>
</tbody>
</table>

NOTE: Use these uterotonic agents ONLY IN COLLABORATION WITH THE OB team. Options to control uterine bleeding include: uterine massage, uterine artery ligation, MAST suit, IR-guided embolization, or hysterectomy.
Failed Epidural Top-up For Cesarean Delivery

✓ PREVENT
Most failed top-ups can be predicted. Make sure the epidural is functioning adequately during labor. More than one requests for an additional physician bolus must be a warning sign of an inadequate epidural!

✓ CHECK THE BLOCK CAREFULLY
1. DENSITY
Labor epidurals provide analgesia not anesthesia. Adequate density is best determined using light touch (± peripheral nerve stimulator)
2. ADEQUATE BLOCK HEIGHT
Block height of >T6 are necessary for reliable anesthesia for cesarean delivery
3. BILATERAL BLOCK
Check both sides to ensure no missed segments
4. SACRAL SPARING
Check S1 (outside of the foot) to ensure no sacral sparing

✓ TRICKS TO IMPROVE THE BLOCK
1. Titrate the local anesthetic in early (e.g. start on route to the OR)
2. Check that the epidural catheter is still in-situ and not displaced
3. If the clinical situation allows, wait an adequate time for the onset (20 minutes) of anesthesia
4. Turn the patient into the lateral position to improve cranial spread
5. If the block is not “coming up” do not keep administering more local anesthetic (beyond 15 ml) as this may limit the amount available if the block is replaced.

✓ FAILED BLOCK OPTIONS
Prior to the cesarean starting
Options available will depend on the indication urgency (fetal distress) for the cesarean delivery and the maternal airway (reassuring/non-reassuring)
1. No urgency:
Replace the epidural or perform a CSE (reduced dose 2/3rd, ½ or 1/3rd depending on the block height and clinical situation)
2. Urgent cesarean and reassuring airway:
GA
3. Urgent cesarean and non-reassuring airway
CSE (reduced dose) or a CSA (continuous spinal anesthetic) or a GA with an awake FOI.
BEWARE: A full dose single-shot spinal in a patient who has received significant amounts of epidural local anesthetic has a high risk of a high/total spinal!

Inadequate block during the cesarean
1. Inform surgeon and request avoidance of uterine externalization if possible
2. Request local anesthetic instillation into the wound (advise re the maximum allowable dose considering all local anesthetic already administered)
3. Utilize the epidural catheter: Administer more local anesthetic (up to 30 ml), fentanyl up to 100 mcg
4. Analgesia: Consider IV fentanyl 50 mcg IV PRN, 50% nitrous oxide with oxygen
5. Sedation: Useful especially if highly anxious, but remember pregnant patients are more sensitive to anesthesia and have an unprotected airway. Midazolam 1 mg IV PRN, ketamine 10 mg IV PRN, propofol 10 mg PRN, sevoflurane 0.2-4%
6. Convert to GA. If the airway is not reassuring, consider an awake FOI. (Note: The maximum allowable local anesthetic may be limited due to prior local anesthetic administration)
7. DOCUMENT: An inadequately managed failed block for cesarean is a cause for medico-legal action.
**Obstetric Hemorrhage**

- **Key Points:** Maintenance of intravascular volume, an adequate hematocrit, proper coagulation function, maintenance of body temperature, and ventilation and oxygenation are the goals.
- **CALL FOR HELP** early (even if it is to run the rest of the service while you are busy. Call the front desk of the main OR to get the 1st OR attending or resident or anyone else in the OR’s
- Call Ed Riley 650-804-0514
- Call the on call OB anesthesia fellow (list in the call room).
- Start at least 2 large bore IV’s and use the Level One fluid transfusion system to deliver your blood products. Call the main OR tech if you want a second.
- Start an arterial line sooner than later.
- Start a CVP if central monitoring needed, but use IJ approach.
- Use the Bair Hugger to maintain normothermia
- **LABS** Clinical Lab at LPCH Phone: 497-8613
- **TO ORDER BLOOD:** Phone Number for Transfusion Services: 723-6444
  - STAT Type and Cross will take 1 hour
  - Send a runner to pick it up if need is immediate.
  - If no cross-matched blood available, you need blood now, and bleeding is ongoing activate the Massive Transfusion Protocol (MTP):
    - 6 Units of PRBC
    - 4 Units of FFP
    - 1 apheresis unit of platelets.
  - If blood is needed quickly, but you do not need the full complement of components, order the Trauma Pack (2 units of uncross-matched blood).
- If you begin to give FFP and/or Platelets call transfusion services and ask for consult by transfusion doctor on call. They can be helpful.
- **CELL SAVER** Call the main OR anesthesia tech and ask them to bring it over and help our tech set it up.
- If time is crucial, send the labs by runner.
- Transfuse based on vital signs, estimated blood loss, and pathological bleeding if labs are not fast enough.
TREATMENT FOR LOCAL ANESTHETIC-INDUCED CARDIAC ARREST

- Maintain CPR. Outcomes after local anesthetic induced cardiac arrest are often excellent.
- Call for the cardiopulmonary bypass machine right away and use it if the patient is unresponsive to intralipid therapy.
- In the event of local anesthetic-induced cardiac arrest that is unresponsive to standard therapy, in addition to standard cardio-pulmonary resuscitation, Intralipid 20% should be given as listed on the other side of this card.
- If you use Intralipid to treat a case of local anesthetic toxicity, please report it at www.lipidrescue.org.

How To Give Intralipid—It is stored in the MH kit box in the back hall by the ORs

- Intralipid 20% 1.5 mL/kg over 1 minute (this is 100 ml in a 70 kg person)
- Follow immediately with an infusion at a rate of 0.25 mL/kg/min (For a 79 kg patient give the rest of the bag over 15 to 20 minutes)
- Continue chest compressions (lipid must circulate)
- Repeat bolus every 3-5 minutes up to 3 mL/kg total dose until circulation is restored
- Continue infusion until hemodynamic stability is restored. Consider increasing the rate to 0.5 mL/kg/min if response not adequate.
- A maximum total dose of 8 mL/kg is recommended
Ecclampsia

During/After seizure, Do:

• Call for help (OB, Anesth, nursing, techs)
• Prevent patient harm (head trauma, bite block)
• Left uterine displacement or lateral decubitus
• Open airway, Suction, Administer 100% O2
• Support ventilation (O2/Ambu bag)
• Apply monitors (Maternal & Fetal) & Check Vitals
• Start Magnesium 6 Grams Over 20 Minutes--NO FASTER!!
• If seizure continues small dose of anticonvulsant (midazolam, propofol, thiopental)
• Prepare for intubation if inadequate ventilation

After seizure:

• TRY TO AVOID POLYPHARMACY – Magnesium is FIRST LINE, and the seizure is usually self limited. Benzodiazepines, thiopental, propofol are back-up for refractory seizures. Magnesium is critically important for prophylaxis against further seizures.
• TRY TO AVOID Delivering fetus IMMEDIATELY – Let fetus resuscitate in utero provided FHR reassuring
• INTUBATE ONLY IF: patient remains unconscious after the seizure, has aspirated, or remains hypoxemic. [Sympathetic outflow associated with laryngoscopy and tracheal intubation could potentially cause hypertension and result in stroke. Consider Labetolol if patient hypertensive; remember Magnesium will temporarily decrease blood pressure.]
**General Anesthesia**

- Premed
  - Bicitra 30 ml PO
  - Reglan & Ranitidine optional.
  - Left uterine displacement
  - Pre-Oxygenate At least 4 VC Breaths

- *Induction: Wait until pt. draped & surgeon ready*
  - Propofol 2mg/kg & Sux 1.5 mg/kg with Cricoid
  - Confirm Ett placement and loudly state: START
  - Pre-delivery 50% Nitrous & 1 MAC Sevoflurane or Isoflurane
  - Post-delivery: 70% Nitrous & 0.5 MAC Sevoflurane
  - Versed 2 mg; Fentanyl ~250 mcg IV
  - Small doses of NDMR’s if needed (eg Roc 10mg)

- Extubate Awake after titrating more opioid to RR

  Options
  - Long acting opioid at end of the case titrated to resp rate.

- An antiemetic
**OB Maternal Code**

- Call for HELP: OBs, Anesth, Nurses, Techs (Ob&Anesth), Peds
- Chest compressions – 100/min (push hard, push fast)
- Left Uterine Displacement (wedge/manual)
- Call for Crash Cart, Stat C/S pack and equipment
- Ventilate: Ambu/O2; Early Intubation/Cricoid; LMA if difficult
- Usual BLS/ACLS Algorithms and Defibrillation
- START STAT C/S in OR or patient’s room after 4 min if > 20 weeks gestation and no response.
  - Don’t Relocate Prior to Delivery: unacceptable delay!
  - *No hypnotics, paralytics, or analgesics needed!
- Delivery by 5 minutes improves maternal outcome if gestation > 20 weeks and both maternal AND neonatal outcome if gestation > 24 weeks
- Deliver compressions slightly higher on sternum
- Try to avoid use of femoral veins because of caval compression
- If mother resuscitated, can move to OR for completion of C/S