Tips for NICU Residents
DRESS CODE

Wear scrubs every day – you may be called upon to attend deliveries or perform procedures on any day you are not post-call

Our motto: “Babies have the right to bare arms”

What this means:
- Take off your rings & watches
- Roll up your sleeves
- No long sleeves under your scrubs or jackets with long sleeves while in patient care areas
- No hairbands, elastics, etc. on your wrists
- Hand hygiene audits
Wash! Wash! Wash!

Soap
- First wash of day
- Hands visibly dirty
- After a few foam/gel washes

Soap or foam or gel
- Before and after entering patient “zone”
  - Patient
  - Patient bed (including stuffed animals)
  - Patient monitors

• Bare Arms!

alcohol wipe
Who Are We?

20+ neonatal nurse practitioners (NNPs)
8 neonatology fellows
~20 hospitalists
15+ attending neonatologists
150+ nurses
5 nurse transport specialists
15+ respiratory therapists
12+ clerks
The Nurseries

- LPCH NICU
- LPCH PICN
- LPCH WBN (“Well Baby”)
- LPCH Satellite SCN at Sequoia (LPCH MDs, RNs, EMR)
- Affiliated Nurseries (not LPCH-owned, but Neos are Stanford MDs)
  - El Camino
  - Dominican
  - Watsonville
  - Salinas
- Joint ventures
  - John Muir
  - CPMC
<table>
<thead>
<tr>
<th>LPCH NICU</th>
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<tbody>
<tr>
<td><strong>Red Team</strong></td>
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<tr>
<td>- Medical Student / Sub-I/Intern (sometimes)</td>
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<tr>
<td>- 1 or 2 Junior or Senior Resident</td>
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<tr>
<td>- 1 NNP/Hospitalist</td>
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<tr>
<td><strong>Purple Team</strong></td>
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<tr>
<td>- Medical Student / Sub-I/Intern (sometimes)</td>
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<tr>
<td>- Visiting Resident on some rotations</td>
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<td>- Blue team Fellow</td>
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**Most weeks, there will be a fellow on each team; when only one fellow, he/she will round with the Blue Team but oversee all patients in NICU. One NNP/Hospitalist on the red team will serve as red team resident supervisor when there is only one fellow.**
Patient Load & Distribution

- 40 patients. 8-9 Front line Providers
- Residents assigned up to 7 patients each.
- Try to keep patients that you admit
- Multiples MUST BE on same team (but not same provider)
- Patient load may be redistributed at discretion of fellow or attending
DOCUMENTATION IN THE NICU

• Admission H+P
• Daily Progress Notes – Problem Based
• Transfer Summaries
• Discharge Summaries
• Delivery Room Notes
• Procedure Notes
• Update Problem List and Handoff
Pre-Rounding

Arrive at 7am
- Examine your patients, review labs/x-rays
- Pick up new patients (green open squares on board)

Sources of information
- People (bedside nurse, on-call team)
- Computer
- The PATIENT!
Morning Rounds (DAILY)

9:15am Weekdays and Weekend:

• PRESENTING:
• The NICU is starting nurse led rounds this year 2018. You do not have to repeat information already presented by nurse
  ▪ Problem-based mandated by Epic
  ▪ Synthesize your thoughts
  ▪ Many problems/systems overlap; it’s OK to have an overall assessment and plan rather than by each problem

X-ray rounds with radiologist

• 8:50am – 9:15am
• Give a one-liner for the patient and why film was obtained
Sign-out Rounds

- Update signout in Epic BEFORE 4pm!!!
- 4:00 pm M-F in NICU conference room
  - Frontline providers rotate in/out, order determined each day. The residents must stay on the unit until sign out is completed.
- 4:00 pm Sat/Sun in NNP office to incoming team/24-hour team
- Do not need to attend post-clinic
- Check on your patients before sign-out
- Only present information needed for the night
  - One-liner summing up current issues
  - Briefly detail fluids/feeds, issues with fluid balance or feeding tolerance PRN
  - Vent settings, blood gas goals, and weaning parameters
  - Important meds
  - Labs, x-rays, or I/Os to check
Late Night Rounds

Who?
- Resident
- NNP / Hospitalist
- Fellow
- Resource/charge nurse

Where?
- Room 1 → Room 4

Why?
- Be sure “To Do” list is done
- Check on AM lab orders
- Follow-up on any issues signed out
- Anticipate issues
- Make a plan for the night
Conferences

• Research Meeting – 1st Monday.
• CVICU Lectures – 2nd Monday
• Journal Club – 3rd Monday
• Clinical Consensus Conference – 4th Monday
• Additional Resident Lectures – Tuesdays 3 pm
• Thursday – 12pm Small Group Discussion meetings
• Fellows teaching conference – every Friday, 11am, NICU conference room
• neuroNICU “5 minute” teaching rounds – every Friday, 10:50am, NICU Conference Room
• Perinatal Conference – every Friday LPCH Auditorium. No lunch provided but you can pick up lunch prior and bring to conf.
  ▪ Mandatory (even if you have Friday clinic)
Deliveries

Why do I need to go?
- 70% of pediatricians provide Level II care
- 10% of babies require some form of resuscitation after delivery.

Residents should attend COMPLEX deliveries during the day (and all deliveries requiring pediatric team at night) Exceptions can be made for unique/special deliveries - check with the fellow
“Protected” Time

Weekdays 12p-1p is protected time for resident conferences

Tuesdays 3-4 pm is protected for resident didactic conference

However...

- If you have an unstable baby, your phone must stay on for continuity of care
DELIVERY ROOM NOTIFICATIONS

- A "Standard" team call to the DR will include the PICN Hospitalist, the PICN intern during the day time and a NICU nurse.

- L & D will call for the "COMPLEX" Delivery Team for babies less than 32 weeks gestation, complex congenital anomalies, Category 3 (severely abnormal) fetal heart tracings, or for any other delivery where they anticipate a reasonable probability of the baby needing extensive resuscitation. This COMPLEX team will be comprised of at least 2 resuscitation-trained medical providers (fellow, hospitalist and/or NNP), the NICU TL RN and the NICU RT.

- If a delivery room team initiates resuscitation and realizes that more support would be helpful, they will promptly relay that request to the NICU USA, either asking for a full, COMPLEX team to be mobilized, or by specifying who else (e.g. fellow or attending), or what else (e.g. tackle box or other NICU supplies) is required. The phrase "second team" is used for calling a separate team to resuscitate a different baby.
WHERE DELIVERIES HAPPEN

Delivery call over phone with location

- L+D Rm 1-10: Labor rooms
- L+D OR A-C: C-section ORs
- ED

Respond on the walkie-talkie – “Resident responding…”

Keep log of deliveries
The Delivery Room

Who will be with me?

- Supervising MD/NNP (usually a hospitalist)
- Nurse (team leader or “TL”)
- Respiratory therapist (if an extreme preemie)

What do I do?

- Introduce yourself and find out why Peds team called
- Prepare as much as you can
- “Catch” the baby (yellow gown/purple gloves or scrubbed)
- Take the baby to the radiant warmer
- Evaluate and resuscitate (NRP)
- Assign Apgar scores
- Write delivery room note
- NOTE: if the PICN intern is in the delivery with you, you will assume the supervisory role
Apgar Score

Assign at 1 and 5 minutes

If 5 minute score < 7
- Assign q 5 min until ≥ 7
- If < 7 at 20 minutes, stop
- Check cord gases
- If base deficit -10 or greater follow algorithm for screening for HIE

NOT outcome predictor
- Unless persistently < 3
- 75% of children with CP had normal Apgars
Delivery Room Note

• Brief maternal history
• Reason for you being there
• Mode of delivery
• Your assessment and resuscitation
• Apgar scores
• Brief physical exam
• Disposition with recommendations

NOTE: Please do not direct copy/paste of prenatal consults into your DR notes. Instead, briefly synthesize the information in your own words
Where Do Babies Go After the DR?

Well Baby Nursery
- ≥ 35 weeks gestation and well-appearing
- Birth weight ≥ 2 kg

PICN
- ≥ 33 weeks gestation
- septic work-ups
- stable congenital anomalies (info may be available in prenatal consult letter)
- “transient” respiratory distress

NICU

**AS THE MD CALLED TO THE DELIVERY, IT IS UP TO YOU TO DETERMINE THE BABY’S DISPOSITION**
Admitting a Baby

Where do they come from?
- Labor and delivery
- Home (through ED or pediatrician’s office)
- In-hospital transfers (e.g. PICN, CVICU, etc.)
- Transferred from another hospital

What do I do?
- EXAMINE THE BABY
- Get history
- Admission orders
- Perform procedures
- H & P
**Gann Act- document in EMR**

**TRANFUSION INFORMATION FORM**
(Paul Gann Blood Safety Act, Health & Safety Code 1645)

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We provided the patient/parent/guardian with the State's "A Patient’s Good Transfusions" Brochure concerning the advantages, disadvantages, and benefits of autologous blood and of direct and non-directed homologous blood from volunteers. I have allowed adequate time for the patient to a redonation of blood for transfusion purposes, except where there is an emergency, there are medical contraindications or the patient/parent/guardian has waived this right.

There is not a reasonable probability that blood products will be needed hospital admission. Information regarding directed or autologous blood has therefore not been provided to the patient/parent/guardian for an emergency transfusion.

**Physician’s Signature**

**Medical Record Number:** 
**Social Security Number:**

**Type of Procedure Scheduled:** 
**Date of Birth:**

**Expected Surgery/Transfusion Date:** 
**ICD-9:**

**Location for Transfusion:**  
- [ ] SHC  
- [ ] LPCHS  
- [ ] ECH  
- [ ] Other:

**Patient’s Blood Type (designated only):** 
**Performed By:**

**Physician Name (please print):** 
**Date:**

**Physician Signature:** (Note: For autologous patients, please fill in the shaded box below.)

**Physician Phone:** 
**Physician Fax:**

**PHYSICIAN AUTHORIZATION FOR AUTOLOGOUS COLLECTION**

Blood donation involves an acute loss of 10-15% of the patient’s blood volume and may cause transient hypotension. The Stanford Medical School Blood Center (SMSBC) requires authorization by a physician familiar with the patient’s condition prior to performing phlebotomy for patients with the following conditions. Note that the failure to provide authorization at the time of ordering will cause delays in donation.

This patient has a history of the following (check all that apply). I am familiar with the patient's condition and authorize SMSBC to perform phlebotomy(ies) for autologous blood collection.

**Must be signed in the chart**

**Info for the parents is available at the front desk**
DAILY PROGRESS NOTES

- Problem-based with ACTIVE ISSUES only
  - Uses imported “Problem List” in Epic
- Represent ~11am – 11am time period
  - Update plans after rounds
  - Some pre-populated data is from 6am-6am
- Do not “copy forward” the Progress Note from the previous day
- Goal: submit by 2pm or before you leave, whichever is sooner
MORE ON NOTES

**Please review details of Progress Note and Interim Summary process with NNPs**

- More examples / flow diagram in resident office
Transferring a Baby

Where do they go?
- PICN
- WBN
- CVICU (via the OR or cath lab)
- PICU
- Other floors at LPCH
- Satellite nurseries

What do I do?
- Transfer orders
- Call appropriate MDs
- Examine baby
- Transfer note
Discharging a Baby

Where do they go?
- Home
- Outside hospital, skilled nursing facility

What do I do?
**Review discharge process with NNPs**
- Paperwork
  - Outpatient prescriptions
  - Discharge summary
  - Discharge packet
- Coordinate with case manager/social worker
- Order / coordinate follow-up appointments
- Call PMD or receiving MD and document this in the discharge record
Procedures

Common Resident Procedures
- Intubation. Fellows will have first chance to intubate
- Lumbar puncture
- UAC/UVC placement

Less Common
- Suprapubic aspiration
- Thoracentesis
- Chest tube placement
- Paracentesis
- Exchange transfusion

Process
- Discuss with parents
- Get supervision
- Coordinate with nurse
- Have a “timeout”
- Clean up after yourself
- Write procedure note
- Procedure log
Total Parenteral Nutrition

• Use TPN program on computer desktop for orders
• Work with Pharmacist (Yvonne) daily on TPNs
• All daily orders should be submitted by 1pm
Antibiotics

Don’t forget to order drug levels

- gentamicin
- vancomycin
Research Studies

Networks/Collaboratives
- NICHD Neonatal Research Network
- Vermont Oxford Network
- California Perinatal Quality Care Collaborative

Staff
- Principal investigators
- Study coordinator
- Research nurses

- Various registries
- Extremely preterm
- CDH
- ECMO
- NeuroNICU database
- Various cooling / HIE studies
STUDIES CURRENTLY ENROLLING IN THE NICU/PICN

1. Preemie Cooling for HIE
2. High Dose Erythropoietin for Asphyxia and Encephalopathy (HEAL)
3. Milk (Neurodevelopmental Effects of Donor Milk vs. Preterm Formula in ELBW Infants)
4. Remodulin as adjunct to iNO for PPHN (RAIN)
5. Intermittent Phototherapy
6. Pharmacology of Aminophylline for Acute Kidney Injury in Neonates (PAANS)
7. Non-Contact Vital Sign Monitoring
8. Rainbow Acoustic Monitoring Study (RAM)
9. Masimo Pulse Ox Sensor
10. Bilirubin Capacity Point-of Care System
11. Bilirubin Binding Capacity to Assess Bilirubin Load in Preterm Infants
12. Listening to Mom
13. NRP eSim (enrolling clinicians, contact akristen@stanford.edu)
14. Neo Family Study-Developing Measures for Family Centered Care
THE MFM RCTS CURRENTLY ENROLLING:

1. CHRONIC HYPERTENSION AND PREGNANCY (CHAP) PROJECT: A Pragmatic Multicenter Randomized Trial Antihypertensive Therapy for Mild Chronic Hypertension during Pregnancy
2. Clinical and Molecular Characterization of Placenta Accreta: A Prospective, Observational Study to Establish a Database and Tissue Bank
3. Evaluation of Probiotic Oral Supplementation Regimen Effects on Group B Streptococcus Rectovaginal Colonization in Pregnant Women: A Randomized Placebo-Controlled Trial
4. Non-Invasive Fetal and Pregnancy Biomarker Discovery Project
5. Stress and Preterm Labor in Multiple Gestations
6. Endothelial dysfunction in preeclampsia (EDiP)
A LITTLE ABOUT: MECHANICAL VENTILATION
## DESIRED ABG RANGES

<table>
<thead>
<tr>
<th></th>
<th>Premature Infants</th>
<th>Term Infants</th>
<th>PPHN Patients</th>
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<tbody>
<tr>
<td>pH</td>
<td>7.25-7.35</td>
<td>7.35-7.45</td>
<td>7.35-7.45</td>
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<tr>
<td>PCO2</td>
<td>50-60</td>
<td>40-50</td>
<td>35-50</td>
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<tr>
<td>PO2</td>
<td>50-70</td>
<td>60-80</td>
<td>60-80</td>
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<tr>
<td>O2sat</td>
<td>90-95%</td>
<td>92-97%</td>
<td>&gt;92-95%</td>
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**THESE ARE BALLPARK VALUES TO AIM FOR**

Each infant will have their own targets on any given day.
MAJOR INDICATIONS FOR MECHANICAL VENTILATION

1. Apnea
2. Inability to oxygenate
3. Inability to ventilate
FORMS OF MECHANICAL VENTILATION

• CPAP
• NIPPV (e.g. CPAP with rate, not synchronized)
• Conventional Mechanical Ventilation
  ▪ Use SIMV = synchronized intermittent mandatory ventilation
• High Frequency Ventilation
  ▪ Use HFOV = high frequency oscillatory ventilator
SIMV SETTINGS

Pressure Control
- PIP
- PEEP
- Rate
- iTime
- PS

Volume Guarantee
- Volume
- PEEP
- Rate
- iTime
- PS
- Max PIP
WHEN / HOW TO CHANGE SETTINGS

To Improve O2
- Increase mean airway pressure
  - Increase PEEP
  - Lengthen I-time
- Increase FiO2

To Improve CO2
- Increase minute ventilation
  - Increase rate
- Increase tidal volume*
  - increase PIP
  - decrease PEEP
- Increase PS
- Check your tube position

*Note: if CXR shows the lungs are already overdistended, this may make ventilation worse
GOAL TIDAL VOLUMES

Small and Average Baby: 4-6ml/kg
Big, sick PPHN Baby: 6-8ml/kg
HFOV SETTINGS

- Mean Airway Pressure
- Amplitude
- Frequency
WHEN / HOW TO CHANGE SETTINGS

To Improve O2

- Mean Airway Pressure
- Increase FiO2

To Improve CO2

- Increase Amplitude
- Decrease Hz (discuss with fellow or attending before doing so)

Note: since you cannot assess lung compliance with pressure-volume loops, periodic CXRs may be needed to assess lung expansion.
If you see a bad gas...

1. Determine: oxygenation, ventilation, and/or acid-base issue?

2. Evaluate the baby...Things to consider:
   - Respiratory vs. metabolic acidosis / alkalosis
   - Agitation
   - Mechanical problem: tube out / obstructed / at carina
   - Atelectasis
   - Pneumothorax
   - Pulmonary interstitial emphysema

3. Intervene – don’t be afraid to ask for help
Keys to Success

- Stay on the unit (unless at conference/clinic)
- Work as a team
- Be flexible
- Read your NICU guide, look at online cases
- Ask questions
- Ask for help
- Take a few moments to reflect and be inspired by the babies and their families
- Talk to families