



NICU Workbook

A study guide for Interns and Residents

This booklet will help the Interns and Residents during their NICU and nursery rotation. The handbook provide a guide to gathering important data for rounds, writing admitting order, admitting notes, daily progress notes and discharge notes.

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Preface

The Neonatal Intensive Care Unit (NICU) and Newborn nursery are special areas of the hospital that need special attention. This booklet will help the reader in daily NICU rounds and will assist you in writing admitting order, admitting notes, daily progress notes and discharge notes. It will provide links to commonly asked questions in NICU.

The booklet is not a reference source for management. Reading from reference Textbook and Medical journals is highly recommended. Attending daily rounds, reading from books and discussion with consultant is strongly suggested.

I hope this book would be helpful in learning and be an aide to provide quality care to newborn infants.

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First day in NICU

Overwhelming

- Get to know the place
- Work and Call room
- Delivery suite/ OR
- NICU
- How to collect information on assigned cases
- EMR familiarity

TIPS:

- Come early (may be a day before the start of your rotation)
- Look at the cases assigned to you

Basic information needed for rounds (advance information varies with the case)

Today's weight, Total fluids ins and outs in last 24 hrs, Respiratory support, Nutrition details and Current labs.

Where to get these from: Nursing documentation and other EMR tabs.

EMR has a tabulated rounding print sheet option; print the list with patient's details.

NICU Work Flow

7 am- 8 am: Sign-out report/Review/ Exam/Prepare

- **Review : last 24 hrs - All labs / Ins and Out/ Flow sheet / significant event**
- **Prepare: Follow the format for presentation (see below)**

8 am- 9 am: Break for Morning report/ Grand rounds/ Presentation

9 am-11 am: Rounds with attending/ case discussion/ plans/ bedside teaching

11 am – 12 Noon: Complete orders/TPN/Labs/ Notes

12 noon- 1 pm: Break for Noon Conference/ Journal club/ Teaching seminar

1 pm – 1:30 pm: Complete notes/ NICU issues/ procedures

1:30 pm- 2pm: NICU Teaching session

2 pm- 4 pm: Complete notes/ NICU issues/ procedures

NOTE: Delivery attendance (new admissions) should be covered at all the time

NICU Rounds (Do bring computer/tablets for rounds):

Starting statement: Day of life, GEST age, current gest, Birth weight, today's weight (up or down)
e.g. 20 days old, 28 weeker, now 32 weeks, BW 1100 gram, now 1650 up by 50 g overnight

Present ACTIVE problems only: (use mnemonic RICHMAN)

For feeder & growers focus on Nutrition component = metabolic + alimentary (feeds, calories, labs)

RESP: Support (vent, BCPAP, FiO₂); last gas, last CXR, any meds, any Apnea/Bradycardia

ID: Any antibiotics; any risk factors for HIV, HSV, Syphilis, others, last CBC

CVS: Pulse, BP, Last ECHO, any meds

HEME: last H/H, last PRBC, last Bilirubin (phototherapy?), Meds MV with Fe (Follow H/H and Retic)

METABOLIC: Total fluids ML/KG/DAY, Urine output (ml/kg/hr), stool,

If on TPN, what are morning electrolytes (CMP: Na, Cl, K, Ca, HCO₃, Creat, Urea, Phos, Mg, glucose)

Metabolic profile for chronic infants (Alk phos, Ca, Phos; check on Tuesday every other week)

ALIMENTARY: How much Feeds? Breast milk/ formula/Calories, nipping or NG feeds

NEURO: any meds, last head US/follow up plans

Other issues: social, drug history, genetics, etc.

Discharge planning:

Writing TPN ORDERS in NICU

Electronic order has made it very easy. Fill in the blanks.

If infant is getting feeds- note down the total volume in mL.

Write fat emulsion first- note down the total volume in mL.

Then write the TPN. It has 4 sections

A) Date, rate, total volume

B) Protein and Dextrose

C) Electrolytes

D) Additives

Write your first few TPNs with senior supervision. Clinical pharmacist is a big help.

Writing admitting ORDERS in NICU

Computer Order Entry:

Use NICU ORDER SETs, select admission orders.

Always check the name and medical record of the patient (**same last names or twins**)

Check appropriate orders.

Admit to NICU/ nursery (level of care), Code status

Admit Labs: Glucose, CBC, Electrolyte/ Blood Cx, Chest x-ray

Medications: Antibiotics/ Caffeine

Nutrition: IVF, PO feeds, TPN

Respiratory support: O2 / Ventilator

Vital Signs (Temp/ Pulse/ BP/ Resp rate) : q3-6 hr (depending upon condition)

NURSING COMMUNICATION:

Input and output charting

Umbilical care

Eye care

Vitamin K

Hepatitis B

Hearing screen/CCDH screen

Bilirubin screen

State Screen

Drug Screen

Format for the Admitting note in NICU

Electronic Medical Charting (Use tabs or create your own note depending upon the EMR)

Four components should be covered: History, Problem list, Exam and Plan

Use smarttext, smartphrase or note generator

Create Problem list:

Prematurity/ Resp Distress/ TTNB/ Hypoglycemia/observation for sepsis/ maternal GBS/ Drug exposure/maternal syphilis-HSV-HIV/ risk for IVH/ Risk for PDA/ Risk for ROP/dysmorphism

NOTE:

Presenting complaints (reason for admission):

1 hr old female infant transferred from labor room with respiratory distress (or 3 day old male infant transferred from referral hospital with poor feeding and lethargy).

Maternal history:

Name: Age: Gravida: Parity: Blood group:

Current Pregnancy History: Gestational diabetes, prolong rupture of membrane, syphilis, TB, HSV, etc.

Labs: HIV status: Hepatitis B: status: CBC : Cultures (Body fluids):

Birth history: vaginal/ CS, rupture of membrane : time & duration, presentation (breech), any anesthesia (epidural/general/local), medications, Apgar score: any resuscitation, birth weight

Interim history (for infant transferred from outside- older babies): what happened after birth and before the presenting complaints.

EXAMINATION:

Vital signs: Temp/Pulse/ BP/ Resp rate/ Saturation / (Glucose)- check chemstrip

Growth measurements (%): Weight : length: Head circ: Gestational age:

General examination: color/activity/ skin

Complete physical examination (head to toe):

Head: Fontanelle, swellings, sutures

HEENT:

Face: dysmorphism; Eye: Red reflex; Ears: Normal configuration; Mouth: palate, lips, tongue, look for facial nerve palsy.; Neck : swellings, thyroid

Chest: Respiratory sounds, heart murmur

Abdomen: masses-organomegaly, bowel sounds, any tenderness

Back & Hip: Sacral dimple, hip click

Genitalia & Anus: external organs, hernial orifice, patent anal opening

Extremities: Limbs and digits

Neurological exam: tone, reflexes

Problem-based NOTE: (generated from the problem list)

System-based NOTE:

(mnemonic **RICHMAN**)

RESP: obtain chest x-ray, Place on oxygen (2 lpm 50%)

ID: CBC, CRP , blood Cx, IV antibiotics

CVS: Follow BP

HEME/BILI: Check H/H, follow bili in am

METABOLIC & NUTRITION: check glucoses, follow electrolytes Start IVFs/TPN, keep NPO

ALIMENTRY: Follow KUB, consider feeds in am, mom wants to breast feed

NEURO: Obtain head US on Day 3, 10 and 30 of life, follow clinically

Neonatal ICU work sheet

(Use electronic listing, print patient list)

Information needed for rounds and progress notes

Patient details	Respiratory	Infection	CVS	Hem/bili	Metabolic	Nutrition	Labs X-ray	Neuro	Plan
Day # Probs	Vent/ O2/RA Gas CXR: Meds:	Temp ABx (day): CBC/ CRP Cultures	BP HR Murmur ECHO Meds	Bili Hb Hct Plt Meds	Wt: TF: I/O : U.O: Stool:	IVF/TPN: Feeds: Calories: Meds:	Lytes Others	HC: HUS: Meds:	1. 2. 3. 4. 5. 6.
Day 3 RDS Poor feeds IVH	On Vent, IMV 7.38/40/32 Hazi lungs	98.6 Amikacin 3/7 CRP 4 BI Cx pend	54/34 145 2/6 M VSD Lasix Digoxin	12.9 13 42 165 No meds	2565 ↑5g 150 210/ 160 4 ml/kg/hr X 3	TPN NPO 76 cal/k/d No meds	Na 132 K 4.2 Ca 8.2	33 cm Grade 2 No meds	Start feeds FU Cx ECHO in am

RA= Room air, CXR= chest x-ray, ABx= antibiotics, TF= Total fluids, I/O= input / output, U.O= urine output, IVF= intravenous fluids, TPN= total parental nutrition, HC= head circ, HUS= head ultrasound, IMV= intermittent mechanical ventilation

Progress notes format

Four components should be covered: Last 24 hrs, Problem list, Exam and Plan

Day of life : Birth weight : : Today's weight : (±) Gestational age :

Vital signs: Temp : Pulse: BP: Resp rate: Saturations:

Weekly : monitor growth head circ, length

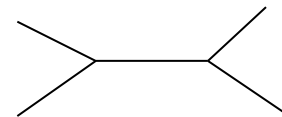
- Problem List :**
1. Prematurity
 2. RDS – (S/P surfactant)
 3. Hyperbilirubinemia
 4. Grade 2 IVH
 5. Hypernatremia -resolved
 6. PDA -resolved

EXAMINATION:

Alert, no distress
 Resp: good air entry
 CVS: No murmur
 Abd: soft, BS positive
 Neuro: normal tone

Respiratory: Vent settings : SIMV(PSV), Rate , Pressure (PIP & PEEP), FiO₂, Sats
 Blood gas : (ABG/ CBG) pH/ pCO₂/pO₂/ HCO₃/ BE/ Sat
 Last CXR :
 Meds : Caffeine, Nebs, Diuretics

Infection: WBC : Diff: N B L M E ANC : I/T ratio:
 Culture (s) : Blood Others body fluids
 Antibiotics : day #

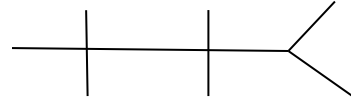


CVS : Color: Heart Rate: Blood Pressure: Cap refill :
 Last ECHO:
 Meds : Dopamine (3 µg /kg/min), Dobutamine (5 µg /kg/min), S/P Indocin x 3 doses

Hematology : Hb/Hct : Retic: Platelet : Bilirubin : (direct)
 Meds : Multivitamin with Fe- dose, phototherapy (overhead / Biliblanket)

Metabolic / Nutrition :

Weight: (change), Total fluids : mL/kg/day
In / Out (mL): Urinary output: mL/kg/hr
Stool: Other output: Naso-Gastric, drains
Feeds : Type /Volume / Frequenc/ Calories :
TPN (Parenteral nutrition) : Dextrose %, Protein g/ kg , Fat g/kg
TPN Calories : + Feeds calories = Total Calories /kg/day
Labs : Na K Ca BUN Creatinine



Alimentary : Feeding tolerance, Readiness, PO attempts, Last KUB (date) :

Neurology: Last head US (date) : Meds: none

Discharge planning:

Social /family issues: Mom involved in care, regular visits, daily updates, Custody issue?
Developmental issues: Occupational/ Physical Therapy/Speech
Screenings: ROP, Hearing, CCHD, Car Seat, Bili
Home supplies : Apnea / Saturation monitors, Oxygen, Home nurse, Early intervention
Medications/ Immunization : Prescriptions/ Synagis/ Hep B/ DTaP/ IPV/ Hib /PCV
Follow up plan: High risk clinic/ Subspecialty clinic (s) / Surgery / Genetics / Eye

Plan: (Problem-based)

1. Wean from vent, gas q 12 hr, Stop Dopamine /dobutamine
2. Cont phototherapy, Check bili in pm, Cont antibiotics, follow cultures
3. Repeat CXR, and head US today

Electronic signature:

Discharge Checklist

- ✓ Wean to crib, maintaining temperature
- ✓ Feeding mostly orally (preferably breast) and gaining weight.
- ✓ Completed newborn screen, hearing screen, bilirubin check, car seat test, ROP screen
- ✓ Completed routine vaccinations (RSV vaccine during season)
- ✓ Discharge follow up appointment (PCP, ROP, developmental clinic)

Discharge Note (outline)

Copy of admit note (presenting complaints, maternal Hx, birth Hx, PE)

Date of admission:

Date of discharge:

Length of stay:

Admitting diagnosis:

Discharge diagnosis:

Procedures during stay:

Hospital course:

Discharge medications:

Follow up plan:

Common problems and questions

Follow your own UNIT's Guidelines and Policies whenever available.

Click on the links for quick access to the answers (apply lab values as indicated).

Low Glucose:

<http://pediatrics.aappublications.org/content/127/3/575.figures-only>

High Bilirubin:

<http://bilitool.org/>

GBS positive mom:

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5910a1.htm>

Scroll down and refer to Figure 9

Mom is Drug Positive:

<http://pediatrics.aappublications.org/content/129/2/e540.figures-only>

Mom has Syphilis:

<https://www.uptodate.com/contents/congenital-syphilis-clinical-features-and-diagnosis#H30079845> (need UpToDate subscription), see RED BOOK by AAP.

Mom is HIV Positive:

<http://pediatrics.aappublications.org/content/131/2/e635>

Scroll down and refer to Figure 2 and 3

Mom is HSV Positive:

<https://aidsinfo.nih.gov/guidelines/html/3/perinatal/187/infant-antiretroviral-prophylaxis>

Mom has fever and Prolong Rupture of Membranes (PROM):

<https://neonatalesepsiscalculator.kaiserpermanente.org/>

Synagis (RSV prevention) dose and time:

<http://pediatrics.aappublications.org/content/134/2/415>

Scroll down to see Summary

Outcome of extreme premature infants:

https://www1.nichd.nih.gov/epbo-calculator/Pages/epbo_case.aspx

Daily sign out sheet (with examples)

Patient	Diagnosis	Respiratory	Nutrition	Medication	Labs/ X-rays	To follow & do
John doe	E coli Sepsis	On vent	IVFs	Amikacin Ampicillin	Blood Cx positive High CRP	Blood gas Wean vent
Jane doe	Jaundice	Room air	Po feeds	phototherapy	Bili 21	Bilirubin
Baby Sam	Pneumonia	O2 3 lpm 40%	IVFs and feeds	Meropenem Ceftazidime	High WBCs	Nothing to Do
Baby XYZ	Meconium Aspiration	On vent	TPN	Sildenafil Tolazoline	Abnormal x-ray	Blood gas
Baby ABC	Perinatal asphyxia	O2 4 lpm 100%	NG feeds	Phenobarb	Abnormal ECG	Nothing to do

Daily sign out sheet

(Blank)

Patient	Diagnosis	Respiratory	Nutrition	Medication	Labs/ X-rays	To follow & do

Suggested Reading:

For common NICU procedures like Blood gas (arterial, venous, capillary), IV access, Intubation, Umbilical lines, Bladder tap, Chest tube, lumbar puncture, nasogastric tube insertion refer to :

Atlas of Procedures in Neonatology (MacDonald, Atlas of Procedures in Neonatology) by Mhairi G. MacDonald and Jayashree Ramasethu.

Practical learning by doing it in simulated labs and real patients under supervision is highly recommended in addition to referring to the book.

For On-call problems like Bloody stool, vomiting, hypoglycemia, follow the unit protocols. Referring to following book is highly suggested.

Neonatology: Management, Procedures, On-Call Problems, Diseases, and Drugs, Sixth Edition (LANGE Clinical Science) by Tricia Gomella , M. Cunningham , Fabien Eyal.

For Topics like BPD, RDS, PPHN, NEC, ROP and other, please refer to:

Fanaroff and Martin's Neonatal-Perinatal Medicine: Diseases of the Fetus and Infant.