WHAT TO KNOW WHEN IT'S TIME TO GO

Getting Ready for a Neonatal Transport

Elizabeth Rex, NNP-BC

- Extreme Prematurity
- RDS
- Pneumonia
- Pulmonary Hemorrhage
- Meconium aspiration
- PPHN
- Diaphragmatic hernia
- Intestinal Obstruction
- Omphalocele
- Gastroschisis
- NEC
- HIE
- Therapeutic Hypothermia
- Seizures
- Myelomeningocele
- Subgaleal Hemorrhage

- Airway
- Vital signs
- IV Access – Glucose
- Umbilical Lines
- Thermoregulation
- Labwork
- Medications/Copy of the Kardex
- Digital imaging/Copies
- Maternal Paperwork/PNL and Delivery
- CPETS Form
- Referrals/ Access Center
- Transport Team composition
- Consent for transport
- Parents accompanying a patient on transport
- Report to the Bedside Nurse
- Communication

EXTREME PREMATURITY

< 28 WEEKS OR <1000 GMS

30 seconds delayed cord clamping

Thermoregulation

Suction with bulb avoid nasopharyngeal suctioning

Resuscitation with 21% heated humidified gas

Maximize non invasive ventilation – PEEP 5-8 cm

Head midline for 72 hrs

Slide diapers under infant do not lift legs up

First blood sugar by 10 minutes of life

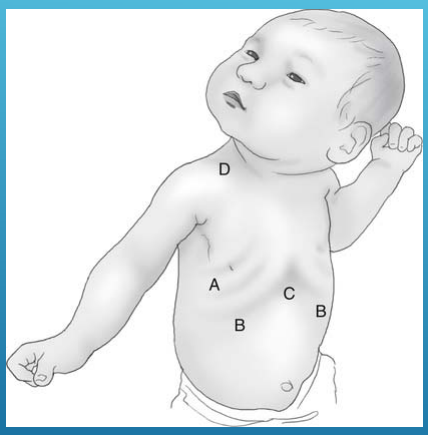
Avoid Na Bicarbonate

Slow withdrawal of blood no faster than 1 ml every 40 seconds

Slow administration of IV meds

Colostrum oral care as soon as possible

RDS



Avoid hypoxemia and acidosis with adequate respiratory support

Minimize lung injury secondary due to volutrauma and oxygen toxicity

Optimize fluid management: avoid fluid overload and resultant body and pulmonary edema while averting hypovolemia and hypotension

Reduce metabolic demands

Goal saturations for premature infant 88-92%

Exogenous surfactant in preterm infants improves oxygenation, decreases air leaks, reduces mortality due to RDS, and decreases overall mortality.

PNEUMONIA

- **Early-onset pneumonia** — Early-onset pneumonia is variably defined as within 48 hours to within six days of birth. Early-onset pneumonia is acquired from the mother by one of three routes:
- ●Intrauterine aspiration of infected amniotic fluid.
- ●Transplacental transmission of organisms from the mother to the fetus through the placental circulation.
- ●Aspiration during or after birth of infected amniotic fluid. The neonate can aspirate vaginal organisms, leading to respiratory colonization and, in some cases, pneumonia. Vaginal colonization with such organisms as group B streptococcus (GBS) does not necessarily result in overt maternal infection.
- **Late-onset pneumonia** — Late-onset pneumonia, which can occur during hospitalization or after discharge, generally arises from organisms colonizing the hospitalized newborn or is nosocomially acquired from infected individuals or contaminated equipment. Microorganisms can invade through injured tracheal or bronchial mucosa or through the bloodstream.

PNEUMONIA

Risk Factors:

- PROM
- PPROM
- Labor greater than 24 hrs
- Unclean vaginal examinations
- Foul smelling amniotic fluid
- Maternal Fever

Pneumonia

- Tachypnea
- Irregular respiratory movements
- Apnea
- Nasal flaring
- Grunting
- Retractions
- Elevated temp may be present in term infant
- Empiric antibiotics after getting cultures
- Respiratory support

PULMONARY HEMORRHAGE

BOX 3. Neonatal medical problems associated with pulmonary hemorrhage

- Asphyxia
- Bronchopulmonary dysplasia
- Chronic lung disease
- Congenital mitral stenosis
- Cor triatriatum, pulmonary
- Hemolytic diseases affecting the newborn
- Hyaline membrane disease
- Instrumentation of the nasopharynx or airway
- Intubation
- Left-to-right cardiac shunts
- Left-sided obstructive cardiac lesions disease
- Mechanical ventilation
- Nasogastric feeding tubes
- Persistent pulmonary hypertension of the newborn
- Respiratory distress syndrome
- Surfactant administration
- Venoocclusive disorders

Results from hypoxia and subsequent capillary damage

In massive pulmonary hemorrhage the lungs appear somewhat homogeneously opaque and airless.

Respiratory distress develops quickly

Blood may ooze from the mouth, the nose, or in the ETT

Appearance of fresh frothy pink tinged or blood in the endotracheal tube (ET) or trachea.

Involves clinical deterioration with vasoconstriction, poor perfusion, and worsening respiratory status, accompanied by a drop in hematocrit and abnormal chest radiographic findings.

As increasing amounts of blood are suctioned from the ET, PCO_2 starts to rise as does the need for oxygen

Increased work of breathing.

Increased ventilatory support.

PULMONARY HEMORRHAGE

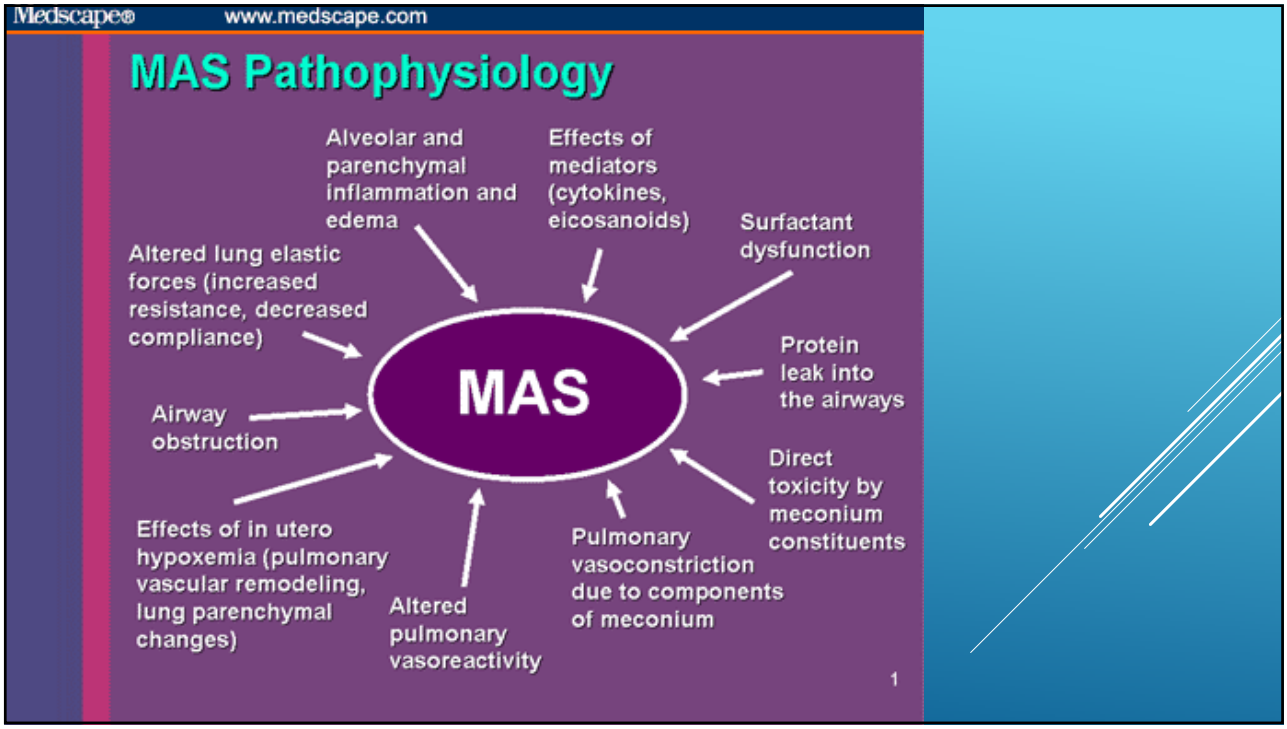
Increase positive end expiratory pressure on ventilator settings PEEP

May need to give surfactant, blood in the lungs shuts down the intrinsic surfactant production (Yes, I know a risk of surfactant administration is a pulmonary hemorrhage)

Check coagulation studies

May need to give fresh frozen plasma FFP to replace coagulation factors

May need to give red blood cells RBCs depending on hematocrit



MECONIUM ASPIRATION

Adequate oxygenation and ventilation

Avoid air-trapping

Watch out for air leak, CXR for acute deterioration

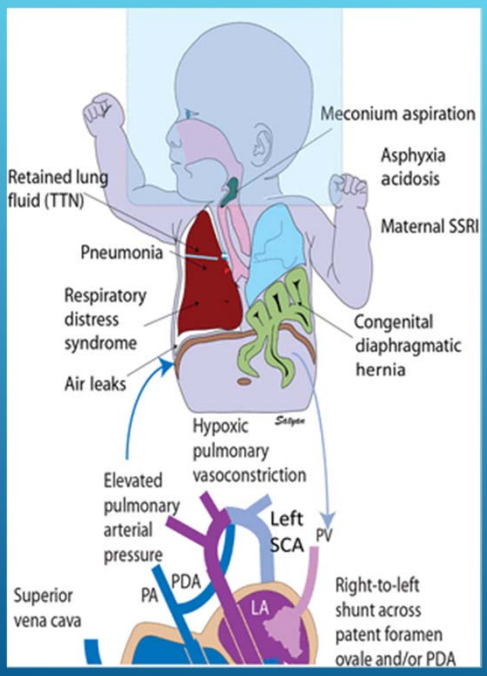
Adequate blood pressure and perfusion

Correction of any metabolic abnormality including hypoglycemia and acidosis, which increase oxygen consumption and risk of PPHN

Empirical antibiotic therapy

Minimal handling of the infant to avoid agitation, which exacerbates PPHN

Care in a neutral thermal environment (unless there are signs of hypoxemic ischemic encephalopathy, which is treated with hypothermia



PPHN - PERSISTENT PULMONARY HYPERTENSION

Adequate oxygenation and ventilation

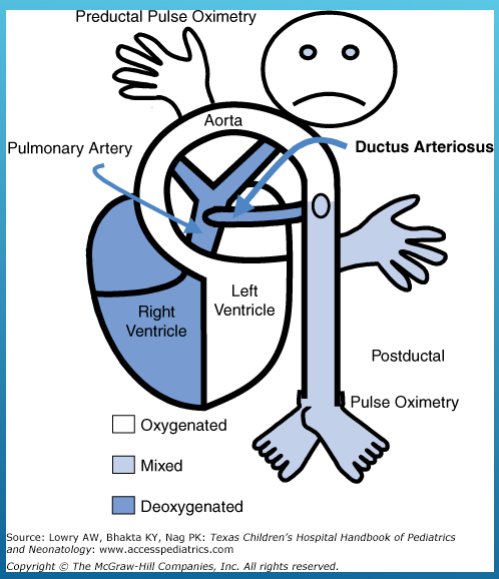
Adequate blood pressure and perfusion

Correction of any metabolic abnormality including hypoglycemia and acidosis, which increase oxygen consumption and risk of increasing PPHN

Minimal handling of the infant to avoid agitation, which exacerbates PPHN

Sedation

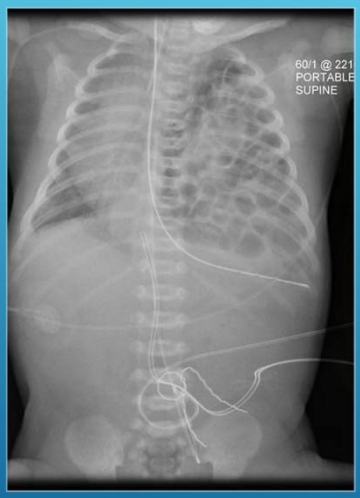
Care in a neutral thermal environment (unless there are signs of hypoxemic ischemic encephalopathy, which is treated with hypothermia



PRE AND POST DUCTAL SATURATIONS

A 10 point difference is considered a split between pre and post ductal saturations and evidence of PPHN

DIAPHRAGMATIC HERNIA



Intubate immediately

Place Replogle (preferred) LCS or OGT LIS to suction as soon as there is access to the infant's face after intubation possible

Place pre- and post-ductal SpO2 monitors

Ventilatory management:

-low PEEP (2-3 cmH2O)

-limit PIP (≤ 30 cm H2O)

-high rate (>100) if chest excursion poor

Give morphine (0.1 mg/kg) and pancuronium or vecuronium (0.1-0.2 mg/kg). These should be prepared before birth. The drugs can be given through the UVC even if tip is not beyond ductus venosus.

Muscular paralysis is used to keep infant from breathing and having air enter the stomach

-In severe cases with herniation of liver into the thorax, it will usually not be possible to advance UVC through ductus venosus because of abnormal anatomy of liver and portal sinus.

In this situation, the line can be maintained below the liver short-term for access for resuscitation, but it cannot be maintained chronically or used for hypertonic fluid administration.

OMPHALOCELE

Midline abdominal wall defect; bowel covered by membrane

Sac may contain large and small bowel, liver, spleen, ovaries, testes

Etiology

- Failure of bowel to complete return to abdomen
- Failure to complete lateral wall closure
- Persistence of primitive stalk

35-50% deliver preterm; 6-35% have growth restriction

Up to 88% incidence of other anomalies

> 30% incidence of chromosomal abnormalities

OMPHALOCELE

If the viscera is exposed, large amounts of insensible water and electrolyte losses may occur.

Insensible water loss from a large defect can cause hypothermia, hypotension, decreased bowel perfusion, and acidosis.

Care must be taken to maintain a neutral thermal environment and minimize fluid loss.

An intact omphalocele may be covered with moistened warm gauze

Place an Replogle to low continuous suction or OGT to low intermittent suction to ensure gastric decompression

Place PIV catheter, preferably not in the lower extremities.

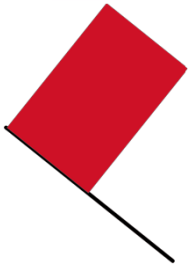
GASTROSCHISIS

- Umbilical wall defect, usually off to the right side
- Herniation of large and small bowel, sometimes stomach, liver, ovaries
- Etiology – vascular accident that disrupts abd wall development, ruptured omphalocele in utero, premature obliteration of the umbilical ring, deficiency of embryonic mesenchyme, thrombosis of omphalomesenteric artery.
- More common in teenage mothers
- Not associated with chromosomal anomalies
- 10-25% incidence of intestinal atresias/malrotation (secondary to problems with vascular supply)
- Gastroschisis patients frequently have Intrauterine Growth Retardation (IUGR), thus hypoglycemia and polycythemia are possible.
- At risk for developing NEC

GASTROSCHISIS

- There should be no dressings placed directly on the gastroschisis defect or ruptured omphalocele.
- For gastroschisis or ruptured omphalocele the entire lower body should be placed in a sterile plastic bowel bag to the armpits.
- Place an Replogle or LCS or OGT to LIS to ensure gastric decompression.
- **With gastroschisis, the bowel may become compromised in a matter of minutes.**
- Position infant on side to avoid compromising bowel blood supply.
- Support the bowel so it does not hang.
- Place PIV catheter, preferably not in the lower extremities.
- Maintaining a normal temperature is important to ensure adequate perfusion and acid-base balance.
- Maintaining adequate hydration and avoidance of hypotension is necessary to ensure good bowel perfusion

Bilious vomit



BOWEL OBSTRUCTION

INTESTINAL OBSTRUCTION

- Place Replogle to decompress bowel low continuous suction
- Low intermittent suction if OG tube
- Correct fluid/electrolyte abnormalities
- Antibiotics
- Surgical resection
  - anastomosis difficult between two intestinal segments of different caliber
  - dilated proximal segment may cause functional obstruction because of poor peristalsis

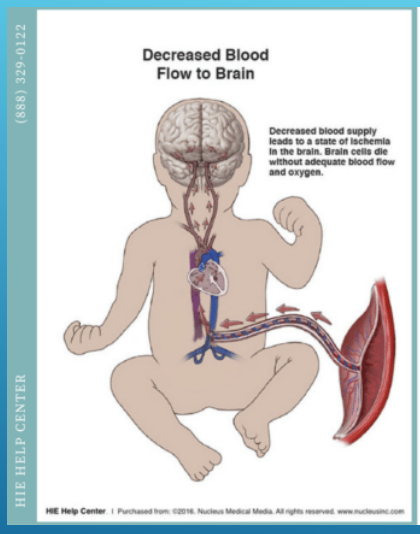
NEC – NECROTIZING ENTEROCOLITIS

A portion of the bowel dies. It typically occurs in newborns that are either premature or otherwise unwell.

Symptoms may include poor feeding, bloating, decreased activity, blood in the stool, or vomiting of bile.

The exact cause is unclear

Management:
NPO
Place Replogle to low continuous suction, low intermittent suction if OG tube to decompress bowel
Take down IVFs that contain potassium
CBC with Diff and platelets
Coagulation studies
Antibiotics



HYPOXIC-ISCHEMIC ENCEPHALOPATHY

Hypoxic-ischemic encephalopathy (HIE) is a limitation of oxygen and blood flow around the time of birth. HIE causes brain injury and can result in cerebral palsy and other cognitive and developmental impairments. Other terms used for HIE include birth asphyxia, perinatal asphyxia, and neonatal encephalopathy.

THERAPEUTIC COOLING

- Turn off radiant heat source
- Begin passive cooling
- Goal core temp 33.5 +/- 0.5°C (92.3°F +/- 1.0°F)
- Document when core temp is reached
- Expect baseline HR to fall as patient approaches target temp. Can be < 100 bpm normally
- Keep patient comfortably sedated (avoid shivering)
- Avoid Benzodiazepines (Ativan, Versed, etc...)
- Watch temperature babies get cold fast!
- If patient is too cold < 33°C, turn heater on low. Rewarm at 0.5°C/hr
- Avoid big changes in heater temp that may over correct.

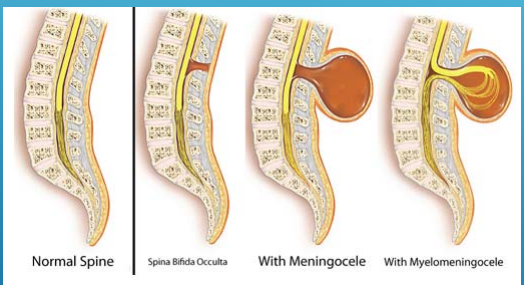
SEIZURES

- Check glucose & calcium
- Document:
- Quality of movement
  - Tonic - stiff posturing
  - Clonic – rhythmic single body part
  - Subtle (ex bicycling, orofacial movements, tremulous movements)
  - Myoclonic - rapid “shock-like”
  - Erratic, non-rhythmic
- Body part
- Level of consciousness
- Response to stimulus; Is it extinguishable?
- Duration

CLINICAL FEATURES OF SEIZURES IN NEWBORNS

Clinical feature	More likely to be seizure	Less likely to be seizure
Abnormality of gaze or eye movement	✓	
Movements are stimulus sensitive		✓
Predominant movement	Clonic jerking	Tremor
Movements cease with passive flexion		✓
Autonomic changes	✓	
Body part	Focal	Generalized

MYELOMENINGOCELE



Place infant prone

Infants born with myelomeningocele (an open lesion) should have a sterile antibiotic solution soaked dressing (Telfa) applied over the lesion.

No Silvadene or Betadine, is to be used.

Potential irritation and drying of exposed neural tissue can destroy CNS tissue in an open wound.

Infants with spina bifida are at high risk for latex allergy. Latex products should be avoided.

SUBGALEAL HEMORRHAGE

- Clinical Manifestations:
- Mean time to diagnosis is 1-6 h after birth.
- Early manifestations: Diffuse swelling of scalp, pallor, hypotonia.
- Pitting edema
- Progressive posterior and lateral spread.
- Periorbital swelling
- Ecchymosis
- Hypovolemic shock
- Multiorgan failure,
- Signs of cerebral irritation

AIRWAY

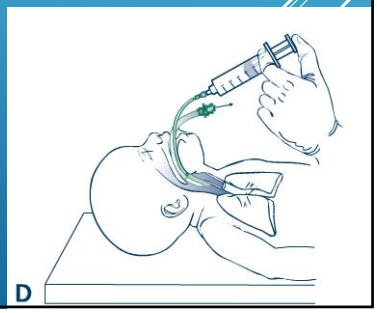
Nasal Cannula

High Flow Nasal Cannula
– vent stomach with OGT

CPAP
– vent stomach with OGT

Intubation
- Size of ETT
- Measurement at gum or lip
- Blue line to the left

LMA Laryngeal Mask Airway
- Will back away slightly when the balloon is inflated
- Cannot suction through it



VITAL SIGNS

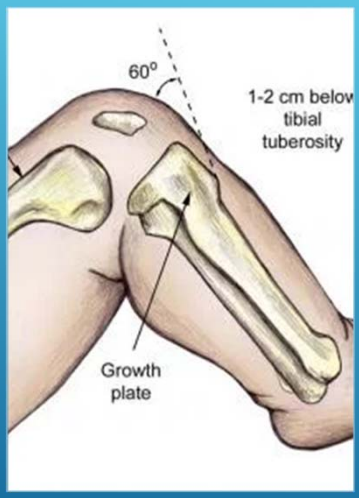
The initial call for referral the access center will need a full set of current vital signs

Temp /HR/ Resp/ BP/ Saturation

Frequently monitor your infant's vital signs

Make a check of perfusion your standard when assessing an infant

IV ACCESS



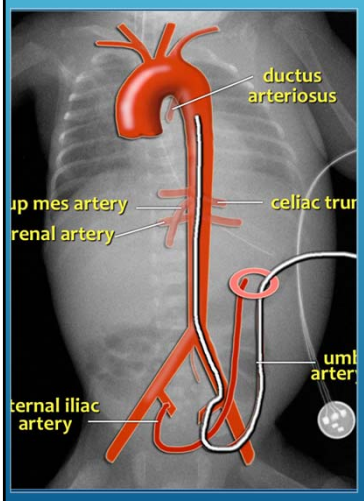
PIV – 2 Peripheral IVs

Umbilical lines – UAC/UVC

IO Interosseous

UMBILICAL LINES - UAC

Umbilical lines must have heparin added to IVF



UAC:

Placement T6-T9 or L3-L4

Must be transduced

Air tight system using leurlock connections

Watch for arterial spasm: white, blue, or black discoloration of toes, legs, back. Decreased femoral pulses

Contraindications:

Evidence of vascular compromise to lower limbs or buttocks

NEC - Necrotising enterocolitis

Omphalocele /Gastroschisis

Omphalitis

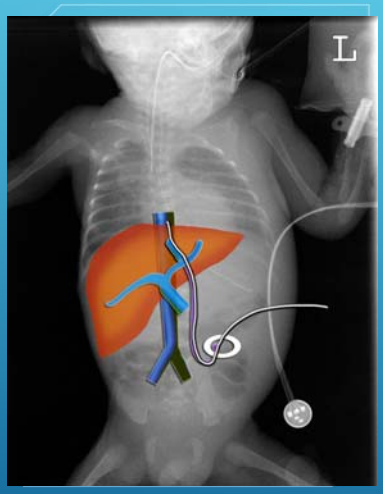
Caution with IUGR infant

Administration of blood or vassopressors

Complications:

Sepsis / Embolisation from air or blood clot / Extravasation / Cardiac tamponade Insertion Of Umbilical Lines (UAC, UVC) Thrombosis, which may involve: Femoral artery – lower limb ischaemia, / Renal artery – hypertension, haematuria, renal failure, mesenteric artery – gut ischaemia, NEC / Hemorrhage due to accidental disconnection

UMBILICAL LINES - UVC



Umbilical lines must have heparin added to IVF

UVC:

Placement at the RA and IVC junction – right above the diaphragm

Emergency placement 2-4 cm until blood return: must flush after every medication as non-pulsatile

Contraindications:

Omphalocele /Gastroschisis

Omphalitis

Complications

Catheter inserted too deep in the right atrium, tip may cross foramen ovale into left atrium

Injury to the liver from infusion of hypertonic solutions

GLUCOSE

Monitor blood sugar levels closely

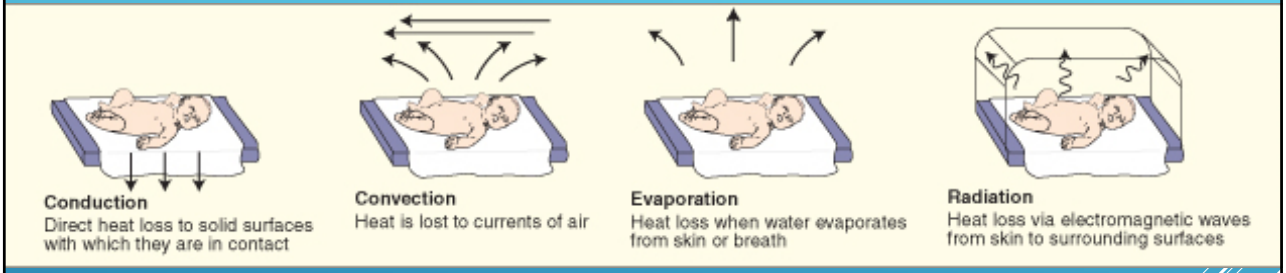
If blood sugar levels lower than desired or infant displays signs of hypoglycemia

- Increase dextrose concentration
  - Up to D12.5W in PIV
  - Up to D15W in UAC
  - UVC is a central line so can give higher dextrose conc.

GIR 4-6

D10W at 80 ml/kg/day gives a GIR of 5.5 mg/kg/min

THERMOREGULATION



The smaller or more premature the newborn is, the greater the risk of heat loss. When heat loss exceeds the newborn's ability to produce heat, its body temperature drops below the normal range and the newborn becomes hypothermic.

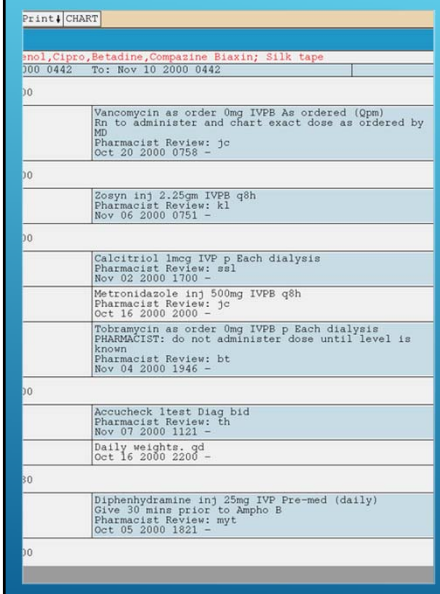
Lab work

- Blood gases
- Electrolytes
- CBC's
- Cultures
- Glucose / CS
- NBS

We don't need and cannot take umbilical blood samples

Abnormal labs that may require transport

- Persistent Hypoglycemia
- Hyperbilirubinemia
- Polycythemia
- Hypocalcemia


Print CHART

enol,Cipro,Betadine,Compazine Biaxin; Silk tape

000 0442 To: Nov 10 2000 0442

Vancomycin as order 0mg IVPB As ordered (Qpm)
Rn to administer and chart exact dose as ordered by MD
Pharmacist Review: jc
Oct 20 2000 0758 -

Zosyn inj 2.25gm IVPB q8h
Pharmacist Review: kl
Nov 06 2000 0751 -

Calcitriol 1mcg IVP p Each dialysis
Pharmacist Review: ssl
Nov 02 2000 1700 -

Metronidazole inj 500mg IVPB q8h
Pharmacist Review: jc
Oct 16 2000 2000 -

Tobramycin as order 0mg IVPB p Each dialysis
PHARMACIST: do not administer dose until level is known
Pharmacist Review: bt
Nov 04 2000 1946 -

Accucheck 1test Diag bid
Pharmacist Review: th
Nov 07 2000 1121 -

Daily weights. qd
Oct 16 2000 2200 -

Diphenhydramine inj 25mg IVP Pre-med (daily)
Give 30 mins prior to Ampho B
Pharmacist Review: myt
Oct 05 2000 1821 -

MEDICATIONS

Infant: All medications given to the infant

Copy of the MAR with most recent medications documented

Vaccine Information

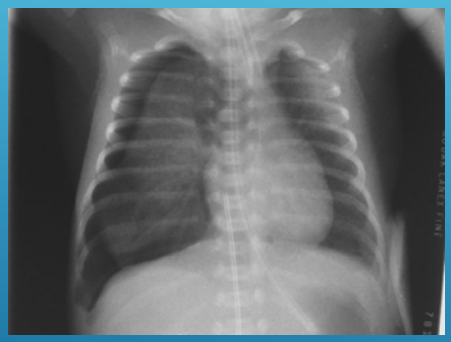
Mother: All medications given to the mother

Betamethasone

Magnesium

Pain Medications

DIGITAL IMAGING

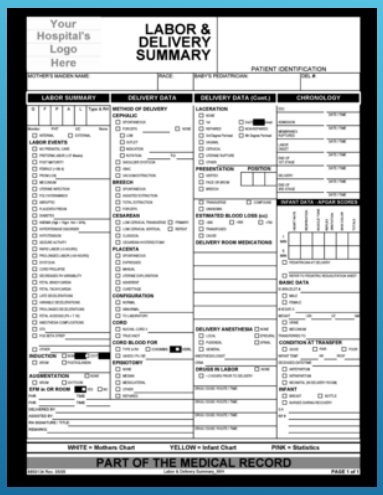


Copies of X-rays

Any Radiology Studies: HUS, MRI, Upper GI, Barium enema

Echocardiograms

MATERNAL PAPERWORK


Your Hospital's Logo Here

LABOR & DELIVERY SUMMARY

PATIENT IDENTIFICATION

LABOR SUMMARY | DELIVERY DATA | DELIVERY DATA (Cont.) | CHRONOLOGY

WHITE = Mothers Chart YELLOW = Infant Chart PINK = Statistics

PART OF THE MEDICAL RECORD

Maternal history to include any prior medical history

Prenatal Labs

Medications taken during pregnancy

Toxicology reports

Labor and Delivery Record

CORE CPeTS Acute Inter-Facility- Neonatal Transport Form - 2014 PLEASE PRINT ELIGIBLY

CPETS FORM

The California Perinatal Transport Systems (**CPeTS**) provides collection and analysis of perinatal and neonatal transport data for regional planning, outreach program development, and outcome analysis

Every infant 28 days or less transferred between hospitals must have one completed

UCSF Benioff Children's Hospital has streamlined the process for transferring, transporting and admitting maternal, neonatal and pediatric patients.

Contact the Access Center at (877) UC–CHILD or (877) 822–4453.

The center's services include:

Provides a single point of access 24 hours a day, seven days a week.

Connects you with an experienced registered nurse dedicated to this service.

Connects you with a UCSF attending physician as you refer your patient.

Facilitates the transport of patients from home, an emergency department, a community hospital or office.

Simplifies the admission and registration process.

REFERRALS - UCSF ACCESS CENTER

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Connects you with a UCSF attending physician as you refer your patient.

Facilitates the transport of patients from home, an emergency department, a community hospital or office

TRANSPORT TEAM COMPOSITION

Neonatal Nurse Practitioner and Dedicated ICN Transport RN

Neonatal and Dedicated ICN Transport RN

2 Dedicated ICN Transport RNs

There may be extra RNs in infant is very critical

There may be more team members in training

CONSENT FOR TRANSPORT

- UCSF transport consent for parents

If traveling by Rotor or Plane:

- An air company consent for parents
- An air company consent for transferring facility

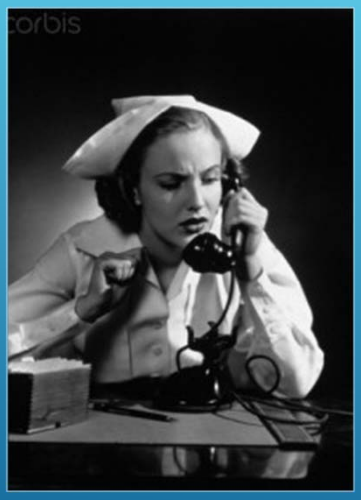
PARENTS ACCOMPANYING PATIENT

Depends on:

- Crew configuration
- Weight of parent and fuel load
- Postpartum status
- Social situation
- Language Barriers

The pilot makes the final call

Taking a parent is never guaranteed



REPORT TO UCSF BEDSIDE NURSE

Brief History including gestational age & BW

IV access

IV Fluids

Medications

Feedings and last feed

Social issues


communicate with others.
I will effectively
communicate with others.
I will effectively
communicate with others.
grammarly
Image: The Simpsons Show, Matt Groening