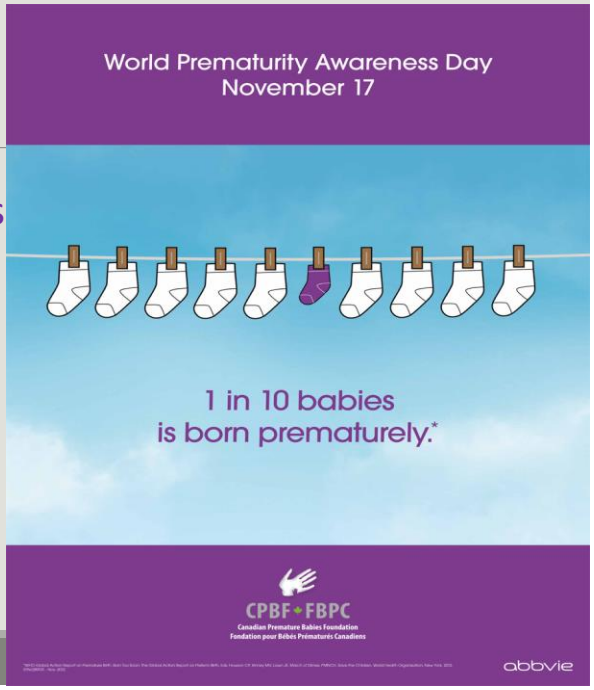
Premature baby

DEPARTMENT OF PEDIATRICS

Definition

A premature infant is a baby born before 37 completed weeks of gestation (by calculating after first day of last menstruation).

Preterm infant / Preemie/ Premie



Children with low birth weight

There are newborns weighing less than 2500 g

Children with very low birth weight

Are infants weighing less than 1500g to 1000 g

Children with extremely low birth weight

There are newborns weighing less than 1000 g

Clasification

1. insignificant premature (37-35 weeks)
2. moderately preterm (34-32 weeks)
3. severely premature (under 32 weeks)

Risk factors of premature infants born with low birth weight

- Risk factors of social and family environment:
- parents illnesses
- parents gene pool
- low social level
- relations of consanguinity
- chronically ill of their parents
- parents' addictions (alcohol, tobacco, coffee, etc.)
- chromosomal diseases

Risk factors related to the mother:

- Number of pregnancy, infertility before the current pregnancy
- sponataneous abortion in maternal history
- weight gain 0.9 kg less than every 4 weeks, or total weight in pregnancy less than 50 kg
- Growth of uterus less than 4 cm in accordance with gestational age
- hypertension in pregnancy, higher than 140/90 mmHg, edemas, eclampsia
- somatic diseases, anemia during pregnancy
- history of preterm birth and IUGR children
- hormonal dysfunctions- diabetes, hyperthyroidism
- mental stress in pregnant
- Malnutrition during pregnancy
- decompensated heart disease during pregnancy
- uterine irritability (contractions)
- vaginal bleeding during pregnancy
- maternal obstetrical anomalies in history (uterine abnormalities, cervical incompetence Isthmus)
- Repeated infections genitourinary, viruses, etc.
- treatment during pregnancy to maintain them (except vitamin therapy and calciterapia)
- venereal disease during pregnancy increases the risk of abortion

Risk factors related predominantly to the fetus:

- abnormal presentations
- genetic factors
- particularities of race, ethnicity and nationality
- chromosomal diseases
- birth defects
- hormonal dysfunctions
- early rupture of the amniotic sac
- twins
- quantitative and qualitative changes of amniotic fluid

Risk factors linked to the placenta:

- morphological abnormalities
- hypoplasia, detachment of the placenta
- small placenta with calcification, placental abrubtio
- anatomical signs (take-stroke, single arteries, prolapse of the umbilical cord, the umbilical vein thrombosis)
- utero-placental insufficiency

Morphological signs of prematurity

-Head consists 1/3 from all body. parietal bones are thin ,the neck looks longer.

-Skin is red,very thin,transparent,gelly consinstanse

-Lanugo on the back side ,rams ,face,and soemtimes legs.

-Ears are very soft.

-Cheast is longer and thiner.

-Abdomen is bigger,umbelical cord is thiner,and is located lower

-External genital organs are not formed completely(testicles are not in the scrotum)

Functional signs of prematuriy

- Hypodinamia,voice is very tender,they have the feeling that they need to sleep always.
- Muscular tonus is low, reflexes can be absent.
- Breathing –abdominal type, irregualr, superficial,with grasps)
- Breathing consists 48-52 beats per minute ,for prematures of III-IV degree = 36-82 beats per minute
- Blood pressure is less then at full-term newborn = 45/20 in first 10 days after birth it can rise to 85/40. Heart rate 120 -160 beats per minute . In hypothermia or other perinatal pathology there occurs bradycardia (heart rate less then 60 per minute)

Functional signs of prematuriy

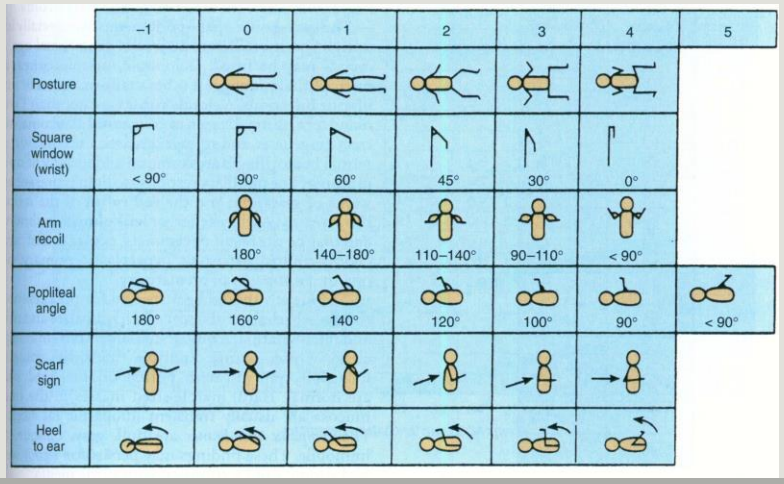
- Immature hypothalamus(simp.Finchilshtein)
- Digestive system –quantity of gastric juice is 3 times less then of a term newborn. Fermentative activity of intestinal juice is low, but enzyme activity of gastric juice is normal.
- Intestinal and abdominal hipotonia.
- Renal function-low glomerular filtration, renal blood flux 1-3 ml/kg, diuresis is low.
- Urea ,Cl, Na,K ,P clearance is low.
- They can lose more then 10% from birth weight and they need more time for reabilitation.
- Premature baby stomach has a vertical position,this causes frequent regurgitations.

Weight-Height index

WHI =Weight at birth(KG) x 100/ Height(cm)

- It is used to identify newborns at which soft tissue weight is lower than normal for the given stage of development of the skeleton (Battaglia, 1967)

Ballard Score



Maturity apreciate	
points	weeks
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

Ballard Score – physical maturity

Physical maturity	–1	0	1	2	3	4	5
Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink, visible veins	Superficial peeling or rash, few veins	Cracking, pale areas, rare veins	Parchment, deep cracking, no vessels	Leathery, cracked, wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	
Plantar surface	Heel–toe 40-50 mm: –1 Less than 40 mm: –2	<50 mm, no crease	Faint red marks	Anterior transverse crease only	Creases on anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola– no bud	Stripped areola, 1-2 mm bud	Raised areola, 3-4 mm bud	Full areola, 5-10 mm bud	
Eye/ear	Lids fused, loosely (–1), tightly (–2)	Lids open, pinna flat, stays folded	Slightly curved pinna; soft, slow recoil	Well-curved pinna, soft but ready recoil	Formed and firm; instant recoil	Thick cartilage, ear stiff	
Genitals male	Scrotum flat, smooth	Scrotum empty, faint rugae	Testes in upper canal, rare rugae	Testes descending, few rugae	Testes down, good rugae	Testes pendulous, deep rugae	
Genitals female	Clitoris prominent, labia flat	Prominent clitoris, small labia minora	Prominent clitoris, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	

The most common complications in preterm baby (1)

- perinatal asphyxia
- Hypothermia
- Respiratory disorders (respiratory distress syndrome)
- Cardiovascular disorders (hypotension, open ductus arteriosus)
- Neurologic intraventricular hemorrhage (HIVE), periventricular leukomalacia
- Gastrointestinal: paralytic ileus, ulceronecrotic enterocolitis (EUN)
- Hypoglycaemia and hyperglycaemia
- Indirect (unconjugated) and direct (conjugated) hyperbilirubinemia

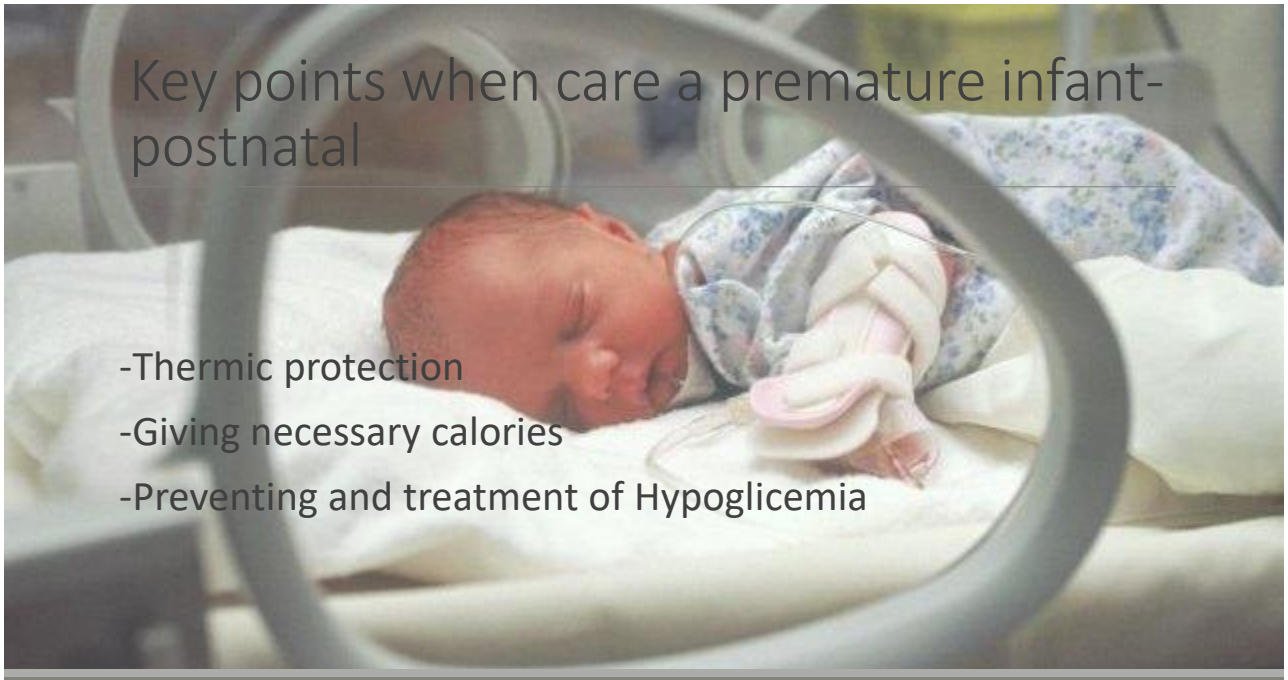
The most common complications in preterm baby (2)

- hypoprothrombinemia-

Fluid and electrolyte balance disorders (hyponatremia, hyperkalemia, metabolic acidosis)
- Anemia
- neonatal Sepsis
- After therapy O2: retinopathy of prematurity (ROP) and chronic lung disease
- Neuro-developmental disorders
- psychosocial issues

Antenatal prophylaxis

- Birth to occure within the level III mathernity
- Transportation "in utero“
- dexamethasone for the prophylaxis SDR
- The administration of antibiotics for the prophylaxis of neonatal infection



Key points when care a premature infant- postnatal

-Thermic protection

-Giving necessary calories

-Preventing and treatment of Hypoglicemia

Management – before and after birth

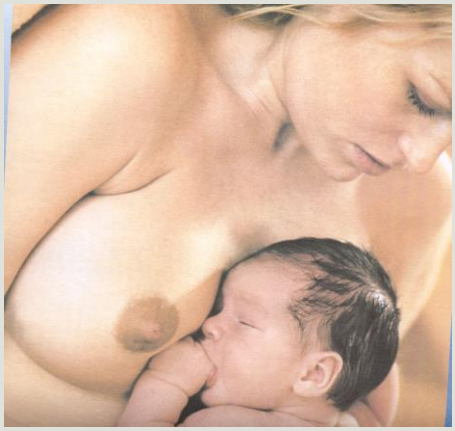
- If anticipate a birth of high risk, increase the temperature in the delivery room to 25-28 ° C, according to WHO recommendations
- Preheat the items before contacting the child.
- These include (not limited to) the mat, your hands stethoscope, radiological and diaper boxes
- Carefully apply the principles of "warm chain“
- Incubator preheating and proper equipment for intensive care in the delivery room
- Air (no O2) moistened (> 80%), heated (40ºC in children <800 g) in the incubator, high moisture level, walled
- Command set to 36,5ºC

Thermic protection

Skin – to –skin contact

putting the newborn in direct contact with the mother's breast, covering his head with a cap newborn child and keeping dressed

Effective for premature infants with low birth weight set



Mattresses filled with water - is good for infants weighing from 1.5 kg

Heaters ray

- Newborns are naked and placed on tables radiating to allow observation of their conduct intensive care procedures.

It is welcome for infants weighing up to 1.5 kg.

It is useful to keep warm during the newborn initial examination, treatment administration and procedures and to reheat newborn

Incubators heated air -

It applies to care for newborns weighing less than 1.5

Make temperature environment neutral

A neutral thermal temperature is the temperature at which the infant body spends minimal amount of energy to maintain normal body temperature. When energy is spent minimal time and oxygen consumption is minimal.

For child aged gestation <36 weeks incubator heate to the desired temperature before placing the baby inside.

Make temperature environment neutral

Age	< 1500 g	1501 - 2500g	> 2500 g
1 day	34.3	33.4	33.0
2 day	33.7	32.7	32.4
3 day	33.5	32.4	31.9
4 day	33.5	32.3	31.5
5 day	33.5	32.2	31.2
6 day	33.5	32.1	30.9
7 day	33.5	32.1	30.8
8 day	33.5	32.1	30.2
9 days	33.5	32.1	29.5
10 days	33.5	32.1	29.5

The polyethylene bag

To ensure thermal control infants aged gestation to 28 weeks (birth weight less than 1500 g) are coated (up to the neck) in a polyethylene bag that closes to prevent heat loss and then placed under light source radiant. Put a cap on his head. If available, you can use portable mattress. Monitor axillary tºC which must be 36,5ºC;

Transfer from the delivery room to the intensive care unit:

If available, use transport incubator. If not, the child is placed in polyethylene bag wrapped in cloth heated before transfer

If baby's breathing is inadequate, intubate and ventilate the child hold it with Ambu bag with oxygen during the transfer.

Transfer from the delivery room to the intensive care unit:

New born weight	Incubator temperature			In ° C
	0 – 24 h	2 - 3 days	4 - 7 days	> 8 days
< 1500 g	35 – 36	35 – 36	34 – 35	34
1500 – 2000 g	34 – 35	34	34	34
2001 – 2500 g	34	33	33	33
>2500 g	33	32	32	32

If the incubator has unique wall, increase the incubator temperature 1 ° C for every 7 ° C difference in temperature between the room and incubator.

The need for incubator

- The child should be kept in the incubator without just cause vital. Children who have been in the incubator for about 3 days old should take blood culture.
  If the baby's condition is stable and he maintains constant temperature even having normal when weight <1500 g should be dressed and placed on a lambskin.

- Transfer premature baby with the mother immediately after being stabilized his vital functions (FR, FC, metabolic indications, etc.) and does not need the support of O2.

Fur – in incubator

Nest method

- Rank quiet nest midline hand-stands head and shoulders forward, legs bent and brought to the midline Use a comfortable position
- It should be space for movement
In case of transfer from the incubator using free swaddle

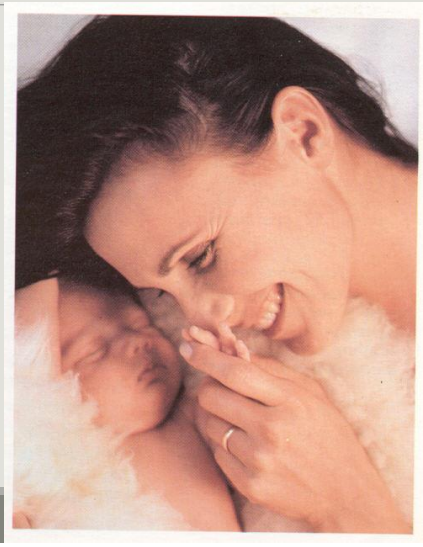
The Gamac

- Creating comfort in incubator
- Positioning
- Soft toys for support
- Silk fabric wraps

To support the roll using a diaper for placing children in different positions
Eliminating external pathogenic agents: light, sound
cover incubator

Natural silk -Amniotic fluid sensation

Conditions with no incubator

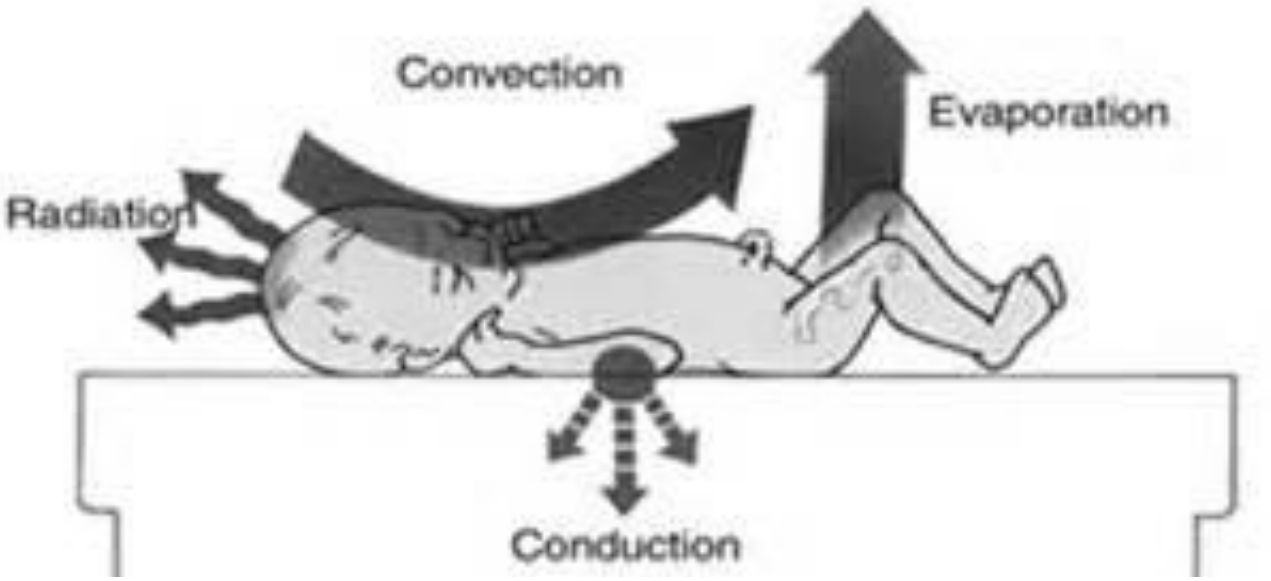


Kangaroo method

It is applicable to all the infants stabilized weighing 1.5 to 2.5 kg, but especially recommended care for children with a weight of 1.5 to 1.8 kg. Studies have shown that evidence-based Kangaroo method has a set of health benefits children with GMN (NE1, GR), including growth, the addition of weight and breast feeding rates, reduced risk of nosocomial infection and severe disease (. 1; A). The impact of the MRI method is 0-100%, 43-66% among children with GMN reduce the incidence of morbidity due to infections by 51%.

Kangaroo method for twins

Thermolisis - Ways of losing the warmness



Causes of low termogeneses

- Big body area comparing with weight
- Typical position
- Muscular activity is reduced
- Adipos tissue is reduced
- Brown fat tissue is reduced
- The quantity of norepinephrine after cold stress is low
- Can't tolearet aditional energetical aport wich is necessary for termogenesis.
- Lungs diseases which are present in 95% of cases,makes termogenesis limtated,due to aditional consumption of oxygene.
- Termolisis is high due to skin iradiation and vascularisation particulations of skin.
- All this are the result of often hipotermia at premature babies

Complications of hypothermia

- Hipoglycemia
- Metabolic acidosis caused of periferical vascular spasm
- Lungs bleedings
- Shock
- Apnee
- Intraventricular bleedings

Simptomes of hipothermia

- Feet are cold (before the rest of the body gets cold)
- Imposibility of nursing.
- Less movments, need of sleeping
- Low voice

Reheating method in incubator

Secure incubator on how to work with the air temperature and set the temperature so as to 1-1.5 ° C above the temperature in central, rectal.
Some newborns may need a gradient greater than the one above to see an appreciable increase in core temperature.

Concepts that should guide assistance during reheating:

- Concept # 1. When reheating hypothermic babies skin temperature will be higher than rectal, so it is important to monitor rectal temperature to normalize after axillary temperature can be monitored.
- Concept # 2. Reheating too quickly can also lead to clinical deterioration.
- Concept # 3. Reheating newborn can use either an incubator or a radiant heat. An incubator will allow better control over the pace reheating.

Reheat Guide

- closely monitored
- central temperature
- The frequency and heart rate
- Blood pressure
- Respiratory rate and respiratory effort
- Oxygen saturation
- Glycaemia

Monitorize carefully - the frequency and heart rate

- Bradycardia is common if the baby is hypothermic;
- Heart rate should increase slowly during reheating
- If it becomes tachycardia - "may be a sign of low cardiac output!
- Attention arrhythmia
- Blood pressure!

Food initiation Scheme

- AE initiated the first 2 hours of life, the first diet sol. Glucose 15% (or Maltodextrin 15%), then with milk
  - 10 ml / kg / day on the first day for children up to 1000 g
  - 20 ml / kg / day - for older children de1000g

- For a more effective follow enteral nutrition intestine release. If necessary, it administers suppository glycerine, stimulate the anus, microenema.

The volume and frequency of consumption depending on the body weight

0,5 mlX12	<750 g
1 mlX12	750-1000
2 mlX12	1000-1250
3 mlX12	1250-1500
5 mlX12	1500-1750
10-15 mlX12	1750-2000

- For daily use, every child in intensive weight curve graph for a visualization of the dynamics of body mass demonstration
- Children up to 1500g are supplied with LMS
- If not breastfed, children of 1500-1800g are fed with PreNAN, Prematil or PreHIPP
- Those weighing less than 1800g - mixing breast milk or adapted

Kcal needs for a premature

Days 1 – 3: 30 – 60 kcal/kg/day

Days7 – 10 :70 – 80 kcal/kg/day

Days10 – 14 : 100 – 120 kcal/kg/day

1 moth: 135 – 140 kcal/kg/day

2 month:

if NW>1500 gr :130 – 135 kcal/kg/day

dacă NW<1500 gr. : 140 kcal/kg/day

3 – 5 months: 130 kcal/kg/day

Fluids

- Administration of fluids. Start taking sol injection 10% glucose, which may be administered during the first ten days of life.
- The solutions containing glucose can cause tissue necrosis in the subcutaneous tissue and their flow should be avoided.
- After stabilizing the child over 2-3 hours install central catheter (under sterile conditions)
- Initial infusion of 70 ml / kg / day, in premature infants <1000 g to 90 ml / kg / day
- Membership infusion Sol. Glucose 10%; amino acids 1.5 g / kg (the first day)

The methods of transition from gavage to breast feeding 'dancing arm' 'tubing'

- Encourage non-nutritive sucking during feeding by gavage
- Meet the child with breast milk smell, using a tissue soaked in milk and offering her to smell before and after eating

The methods of transition from gavage to breast feeding 'dancing arm' 'tubing

- Monitoring of arterial blood saturation with O2 using transcutaneous pulse oximetry (SaO2 87-92%)
- If resuscitative drug for premature use of expander volume, the speed of their management should be lower because rapid infusions or large volumes associated with HIVE

Common tests performed on a premature infant

- Blood gas analysis to check oxygen levels in the blood
- Blood tests to check glucose, calcium, and bilirubin levels
- Blood test with white blood components and report differentiation of immature / total
- Blood culture
- Chest and abdominal x-ray if necessary
- Continuous cardiorespiratory monitoring (monitoring of breathing and heart rate)

Routine monitoring include:

- Measure the perimeter of head / waist every 24 hours in neonates with birth weight ≤1000 g
- Measuring waist circumference every 4-8 hours;
- Auscultation abdomen every 4 hours
- Measuring tºC every 2-4 hours
- Making stool occult blood test (not meconium) in neonates with birth weight ≤1500 g
- The weighing every 12 hours for children weighing ≤1000 g, while that of ≤750 g - every 8 hours
- Eye exam 4 weeks in neonates with birth weight ≤1500 g

Electrolyte balance

- The first day should not be given Na + and K +

On the fourth day of life, if urine output is stabilized, administer glucose solution of 10% with a minimum of 2 mmol / kg body weight of sodium and 1 mmol / kg body potassium

- To prevent hypocalcemia start gluconate administration as 200 mg / kg / day

- Monitorise blood electrolytes

Appreciate daily hydration:

- If there are signs of dehydration (such as sunken eyes or fontanelle, skin turgor decrease or dry tongue and mucous membranes), increase the amount of fluid infused with 10% of body weight newborn in first day it was observed dehydration;

- If there are signs of extrahydration (adding excessive weight, eye edema, or swelling of the lateral parts of the body progression), reduce the volume by half the solution for 24 hours after being diagnosed extrahydration.

Monitoring the level of glucose

- Blood glucose should be kept between 2.8 to 6.0 mmol / l (see protocol newborn hypoglycemia).
- Some children may become hyperglycemic GEMN and require modification of soil concentration of glucose or its management speed
- Children deeper levels of hyperglycemia premature tolerate up to 16 mmol / l, so that it is permissible level

- Insulin is used rarely because it is the danger of sudden hypoglycaemia and need frequent blood sugar control

Monitoring (continue)

Record when the child urinates (weighing diapers, diaper, urine collector). Normal diuresis 1-4 ml / kg / hr (75-300 mOsm / l).

Measure the child's weight daily

-Children aged up to 32 GW weight <1500 g in weight should not lose --more than 5% of the weight at birth.

-Premature babies should reach mass birth not later than 14-15 days, the time to a7-10 day

-This will ensure the advancement of food account with 20 ml / kg / day and higher volume infusion 20 ml / kg / day observing the correlation kcal non-protein and protein (the non-protein must duplicate the protein)

-If you decrease the child's weight exceeds 5% Add 10-25 ml infusion for a day to compensate for inadequate fluid administration

-Newborns weighing <1000 g will have weighed every 12 hours, while the smallest 750 g - every 8 hours

-In case of intensive phototherapy lamps to infusions two 20 ml / kg / day

Monitoring (continue)

Correction of anemia.

All children and many of GFMN GEMN requires at least one red blood cell transfusion. Supplementary iron premature baby needs during the first year of life.

- It is given Vitamin E (also decreases the incidence of retinopathy), folic acid in the 3rd week of life.
- Correction hypotension (keep blood pressure (BP) average> in weeks gestation). TA is calculated by the average systolic + diastolic blood pressure / 2
- If the child is hypotensive for optimizing the initial TA correction is carried out with volume 10 ml / kg 20-30 minutes by administering:
  - 0.9% saline may be repeated once, then switch to amines;
  - Albumin 5% (if you have ground. 25% using 2-4 ml / kg, diluting it with 0.9% NaCl to 20 ml / kg);
  - fresh blood if the child is anemic.
  - inotropic infusion was administered later (Dopamine Hydrochloride).

Infection prophylaxis

- Transplacentar passage of gamma globulins occurs at 32 weeks of gestation which is why infants are highly susceptible to infection.
- Assess the child for infection, clinical and laboratory tests.
- Some useful tests are:
  a) complete blood count (complete with differential)
  b) C-reactive protein after 12 hours of life
  c) calculation ANC
  d) the ratio of neutrophils imature / total neutrophil
- If you suspect intrauterine infection PCR> 6 after 12 hours of life

Infection prophylaxis

- - 1day ANC> 7200, 2 day> 12600, 3 days 8500 <1500 regardless of age I / T> 0.20 use the broad spectrum antibiotics to stop their action when the negative or improvement of clinical signs data laboratory (blood count, PCR), or operating a narrower spectrum prepared according antibioticogramei
- If indicated a prolonged course of AB therapy, it should be argued by a confirmed diagnosis (sepsis, meningitis, pneumonia, osteomyelitis)
- Do not use AB therapy only if the child was intubated central catheterized, more effective infection prevention methods

Supplements

At birth:

- vitamin K if birth weight ≥800 g - 1 mg IM; 800 g - 0.5-1 mg i / v slowly 8
- vitamin A and 5,000 IU / m X 3 times / week. X 4 weeks. (children weighing ≤1000 g + requires respiratory support 24 hours after birth)
- day 8 of life if the volume of enteral nutrition is about 2 ml / hour and the baby is not added to parenteral nutrition multivitamins and folic acid 0.5 ml 0.1 mg
- at 30 days of life elementary iron (Fe) is added 2-3 mg / kg / day, the duration of 3-4 months

A premature baby can be extrenated from hospiatl when

- Weight 1800-2000g or even at 1500g if the following conditions are respect:
- Good health conditions
- At least last days baby adds some grams
- Termogenesis is better
- Normal nursing
- Mother's ability to take good care of baby

Thank you for your attention