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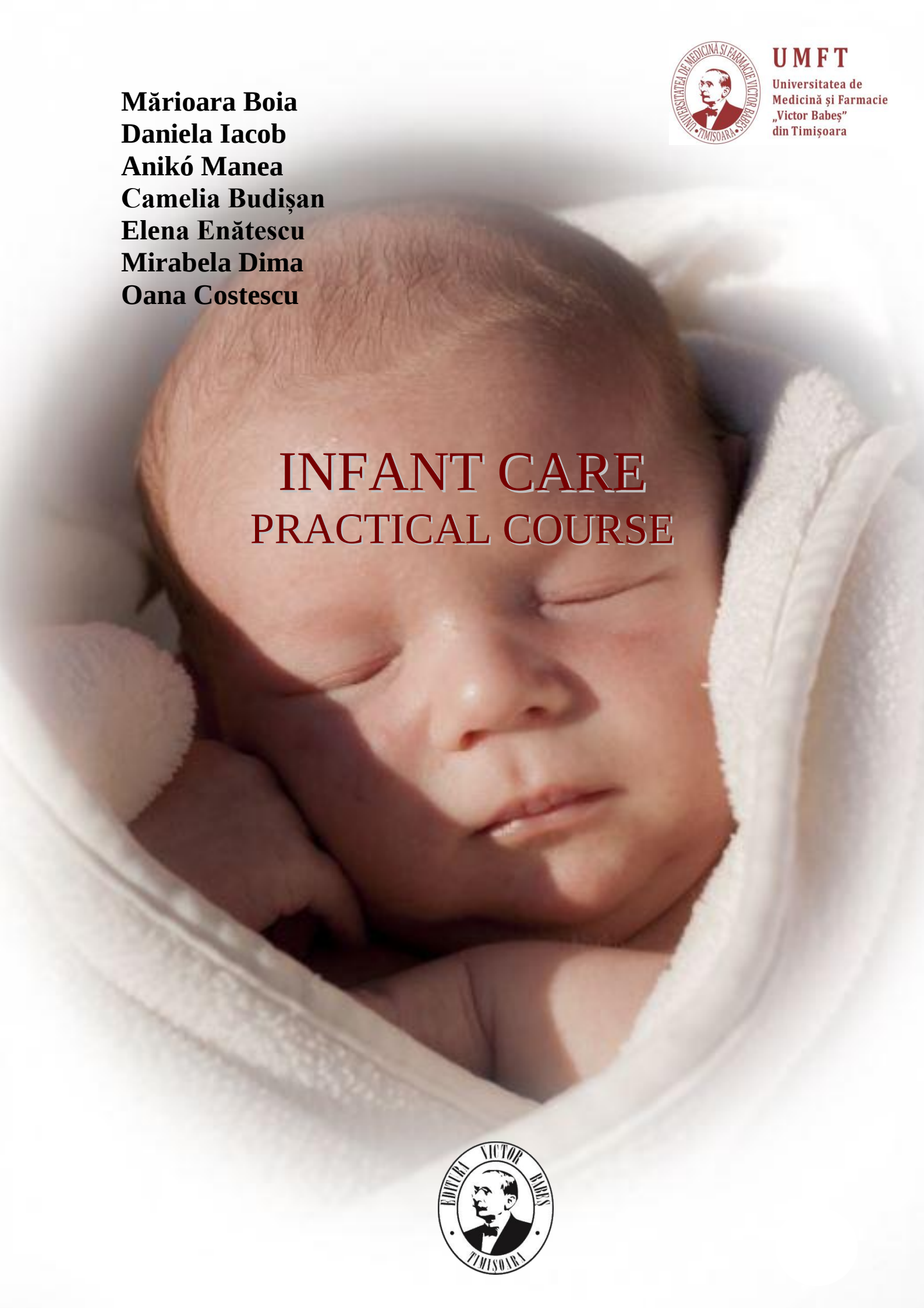

INFANT CARE
PRACTICAL COURSE

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CHAPTER I

ASSISTANCE AND CARE OF A TERM NEWBORN

The neonatal period refers to a transitioning time from the intrauterine life to the extrauterine one, time which includes the first 28 days of life.

Term newborn characteristics include:

- 37-42 weeks gestational age (260 to 293 days)
- birth weight between 2500-4000 grams[1]
- normal length is about 50 ± 2 cm
- head circumference varies between 33-38 cm
- chest circumference is between 31-32 cm.

The assistance and care of a term newborn consist of 3 steps:

A). In the delivery room:

The delivery room requires strict asespsis and adequate equipment for assisting the mother and her newborn. In both the labor and delivery room and the c section operating room, the environment and the equipment must be sterile, the medical staff must be dressed accordingly, and the ambient temperature range should vary between 24-26 °C.

Basic care needs should be provided to a normal newborn, without any signs of perinatal affliction, with effective spontaneous breathing, good muscle tone and vigorous cry as following:

- placing the newborn on a firm surface, covered with sterile fields and equipped with radiant warmer and overhead heating unit and light source;

- drying the baby by using sterile and warm fields, then removing the wet ones;

Drying the baby is a means of tactile stimulation, along with foot flicks and back rubbing;

- carefully managing the upper respiratory tract obstruction using a sterile and soft suction catheter attached to an electric vacuum or a bulb syringe, the newborn being in a supine or lateral position and the neck slightly extended. The mouth is suctioned first, then the nose and the suction pressure should not be higher than 100 mmHg. You should avoid vigorous suctioning of the posterior pharynx in order to prevent a vagal response with bradycardia or/and apnea. If the

amniotic fluid is meconium-stained, the obstetrician will apply oropharyngeal suctioning from the moment the baby's head is out, then the neonatologist will continue direct suctioning or/and suctioning using a laryngoscope. In this particular case, oropharyngeal suction will precede tactile stimulation;

- if the newborn is spontaneously breathing and the heart rate is above 100 beats per minute, but the skin coloring is cyanotic, then the one responsible for the resuscitation should administer additional free flow oxygen using a catheter or a mask.
- if the newborn is not spontaneously breathing or the heart rate is below 100 beats per minute, does not respond to tactile stimulation or presents with persistent cyanosis even though free flow oxygen is being given, positive pressure ventilation using a mask or endotracheal intubation will be applied, depending on the case, with further following of the complete resuscitation steps (association of the external cardiac massage at a heart rate below 60 beats per minute, adrenaline administration via the endotracheal tube or via the umbilical vein catheter)[3,4,5];
- the ligature and section of the umbilical cord should be at about 2,5-3 cm from the abdominal base line, after the arterial pulse wave diminishes, then betadine and a sterile field should be applied;
- evacuation of the gastric content using a catheter should be applied if the newborn has swallowed blood or amniotic fluid;
- using a suction catheter the choanal permeability, esophageal and anal permeability should also be checked;
- performing a brief clinical exam for detecting probable external congenital malformations or birth injuries should also be applied;
- estimation of the APGAR score at 1 at 5 minutes of life;

The evaluation of the newborn condition in the delivery room is made by the neonatologist, at the same time while applying the care techniques, by estimating the APGAR score (**A**= Appearance, **P**= Pulse, **G**= Grimace, **A**= Activity, **R**= Respiration), each parameter having a score of 0, 1 or 2 points. This score informs about the newborn's vitality and immediate adaptability and can easily reflect the efficacy of the neonatal resuscitation maneuvers used.[5,6]

Table 1. APGAR score

	0	**1**	**2**
A = Aspect	cyanotic/ pale all over	peripheral cyanosis only	pink
P = Pulse	0	<100	100-140
G = Grimace	no response to stimulation	grimace (facial movement)/ weak cry when stimulated	cry when stimulated
A = Activity	floppy	some flexion	well flexed and resisting extension
R = Respiration	apneic	slow, irregular breathing	strong cry

After applying the mentioned steps, skin washing comes next for the removal of the remaining blood and amniotic fluid, without insisting on removing the vernix caseosa.

The newborn is weighed, the length is measured along with the chest and head circumference, an identification bracelet is placed and a complete clinical exam is performed by the neonatologist.

The Hepatitis B vaccine is given and 1 mg of Vitamin K for the prevention of the hemorrhaging newborn disease. For the prevention of the gonococcal conjunctivitis 2-3 eye drops of silver nitrate 1% are being placed in the conjunctival sac (or eyedrops containing Erythromycin 0,5% for preventing a chemical conjunctivitis induced by the nitrate remedy).

The newborn will be placed on a warm bed or in an incubator until he is thermally, hemodynamically and cardio-respiratory stable. If the respiratory secretions are still present in the upper respiratory tract these will be once again suctioned and the baby will be placed with its head lower than the rest of the body.

B). In the nursery:

In the nursery, favorable environment (temperature of 22-23 °C, humidity of 60-70%, adequate lighting, oxygenation and lack of air currents) as well as clean clothes and bed linen should be provided. The following objectives should be kept in mind:

- the appreciation of the correct gestational age and anthropometric indexes (weight, length, circumferences),
- daily clinical examination,
- careful monitoring of the first stool and first urine emission,
- care of the umbilical cord stump, first feed initiation, monitoring the moment and intensity of jaundice,
- metabolic and hearing screening (for detecting hearing loss),
- administration of routinely medication and vaccines belonging to a national immunization programme.[7,8]

In the first hours of life, newborns are provided with thermal comfort by being placed on a warm bed or in an incubator, Hepatitis B vaccine, Vitamin K will be administered and gonococcal conjunctivitis prevention will be done (if one of these steps is not completed in the delivery room). The newborn is washed with warm domestic water and soap for the removal of the remaining blood and/or meconium and a local treatment with topical antibiotic will be applied if necessary on the cutaneous excoriations.

Before the first bath, the medical staff managing the newborns needs to protect itself against infection by wearing gloves and to avoid contact with blood, saliva, meconium and other biological fluids.

Newborn bathing will be done only if the baby is thermally stable, otherwise it will be postponed. [7,9]

In the nursery, the Neonatologist will routinely examine the newborns, repeating the clinical exam performed at birth, for reassuring that the transition from the fetal life to the extrauterine one was successfully done.

For the exact appreciation of the health status, the physician will gather as much information as he can from the family medical history, information on the pregnancy and the peripartum period. The clinical examination will be oriented on the respiratory signs, skin coloring (pale, cyanotic, pletoric), on tonus (hypotonia, hypertonia) and possible congenital disorders, infection signs, neonatal afflictions (due to medication administered to the mother during labor) will also be sought or even signs of metabolic disorders.[7]

The newborn will be classified within a certain category by gestational age and birthweight, for anticipating a certain pathology linked to prematurity, postmaturity, small/large for gestational age.

If the newborn is healthy, he will be placed in the same ward as the mother, as early as possible after delivery. The medical team need to closely asses the way in which this transition period happens.

In the first 2 hours after delivery (preferably within the first 30 minutes of life) initiation of breastfeeding is necessary while the newborn is active, early breastfeeding being beneficial for both the child and mother, for the mother providing a special bond between her and her offspring. Mother's own milk is a newborn's ideal aliment because of its nutritional, immunological, endocrine, digestive and neurodevelopmental benefits.

The passing of the first stool (meconium) is expected in the first 24-36 hours; in case of delay (over 36 hours), one can suspect: intestinal obstruction or atresia, congenital megacolon, cystic fibrosis. The first emission of urine must be in the first 24-48 hours, it's delay possibly

being caused by: bilateral renal agenesis, urethral stenosis, renal secondary necrosis due to shock or hypoxia.

The umbilical cord stump will fall off after 8-10 days after birth, meanwhile it is necessary for it to be maintained clean and dry. For this to happen, at each diaper change the stump and its implantation base will be swabbed with sterile pads and rubbing alcohol, which is a painless technique for the newborn because the umbilical cord stump lacks nervous endings.

During the second or third day of life, routine screening of each newborn is being done. These are done for detecting phenylketonuria and congenital hypothyroidism and as an optional feature for other 50 metabolic and endocrine disorders. The test consists of collecting a few drops of blood from the heel or from a vein and placing them on a special screening card which is made from filter paper. After the blood has dried, the test is sent to a certain lab where it is going to be analyzed in a short period of time.

One day prior to discharge, hearing loss screening will be done for each newborn using a series of specific hearing tests. Preliminary testing from the maternity allows us to achieve specific information about the hearing level of each and every newborn and thus taking immediate action for the treatment of the hearing impairment.

The criteria necessary for discharge consist of: newborn and mother's good health, proper care conditions at home (including general practitioner), family training regarding the bathing of the newborn, care for the umbilical cord stump, correct breastfeeding method. Furthermore, at discharge, the newborn will be vaccinated with the BCG vaccine (against tuberculosis).

C). After discharge (at home): initial objectives started in the hospital will be continued at home:

- proper hygiene;
- follow the feeding schedule, sleep pattern and play;
- establish the dietary ratio, which includes the growth ratio as well;
- following the measurements and vaccinations;
- proper training of mothers regarding these objectives.

Newborn's alimentation at home: Hand disinfection with water and soap is extremely important before and after handling the newborn, and also before preparing the infant's food. Mother's own milk is the ideal aliment, the most bespoke for a newborn's needs, providing good growth and development rates and protecting against infection and allergies. Breastfeeding gives the mother the best opportunity for bonding and caring for her baby. Breastfeeding takes place at demand (without a schedule, how much he wants). Formula is administered only at the

recommendation of a physician, only if the mother's milk is insufficient or whether (rarely) breastfeeding is not permitted.

Going out: The infant can be taken out for the first time between 10 days and 2 weeks of life, depending on the weather. At first, it is recommended to be about 15 to 20 minutes, and as the days go by, it can be up to 30, 60 or even more minutes if the weather is agreeable. Direct exposure to wind and excessive humidity is strictly forbidden. Optimal temperature moments of the day will be chosen for sunlight exposure (summer- mornings; winter- lunch time).

Bathing: Bathing is not adjourned until the umbilical cord stump is falling off, but until that moment a certain caution regarding excessive soaking is necessary. Proper bathing water temperature is around 37°C, and room temperature around 24-25°C. Bathing time should be at first from 3 to 5 minutes. After it is done, the newborn is gently wiped with a clean towel, carefully around the pits. Inguinal pits, the perineum and buttocks are covered with a protective ointment.

The umbilical stump is gently wiped with a sterile pad containing rubbing alcohol, then it is covered with a dry sterile pad. This procedure can be done 2-3 times a day, until the stump falls off, and after that the wound will still be looked after for a couple of days. Face cleaning (nose, eyes, ears) will be done after the bathing is over.

Ear auricle and the external auditory canal are wiped with long and curled pads, and the eyes are gently cleaned from the outside corner to the inside corner using a sterile pad with physiological saline solution; each eye is cleaned using a different pad. The nose is cleaned using physiological saline solution or a nasal spray and then by inserting a qtip. Frequent nose suction should be avoided. Nails should be cut daily if necessary.

Sleep: For sleeping, lateral positioning is ideal for preventing aspiration in case of vomiting. Each infant has its own sleeping schedule, the numbers of hours slept per day being relative: 18-20 hours/day for the first 3 months.

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CHAPTER II

THE CLASSIFICATION OF NEWBORN INFANTS

The classification of newborn infants is made after birth weight and gestational age.

- The normal **birth weight** varies between 2500 and 4000 grams (a smaller interval being between 2900 and 3200 grams).
- The normal **length** of a term newborn is between 48 and 52 cm, the sitting height (vertex-buttocks) at birth being 70% of the total length.
- On admission to the nursery, **head** and **chest circumference** will be measured (head perimeter), with values among 33-38 cm for the head and 31-32 for the chest.

Exact evaluation of the **gestational age** is extremely important for both the obstetrician and the neonatologist for a better approach of the therapeutic plan and assessment of the fetal and neonatal prognosis. The gestational age is being calculated by the obstetrician using clinical and echography characteristics.

- *Clinical criteria* include the first day of last period, positivity of the immunological tests, fecundity contact date, first perception of the fetal movement by the mother, uterine size measurement.
- *Echography criteria* in the first trimester can measure the gestational sac and the crown-rump length of the embryo, and after 12 weeks the fetal biometry (biparietal diameter, mean femoral length, abdominal circumference, head circumference) and the fetal morphology criteria (bone formation, bowels).

After birth, the obstetrical data regarding gestational age can be confirmed or completed by the neonatologist, on the basis of morphological and neuromuscular maturity of the newborn, established only by neonatal examination. The most accurate appreciation of the newborn maturity, with an error of ± 2 weeks is done using a score described by Dubowitz, which sums up physical and neurological criteria graded from 0 to 5 in relation to maturity level.

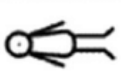
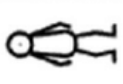
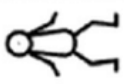
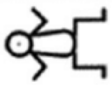
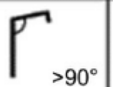
Gestational age is obtained using a graphic which on the abscissa has the total score of physical and neurological traits and on the ordinate the correspondent gestational age (in weeks) or using a formula (where x = the sum of the morphologic and neurologic scores).

$$GA= (0,2642 \times X) + 24,595$$

On a large scale, the Ballard score is used (Table 1,2), which is a modified variation of the Dubowitz score in which some criteria have been eliminated for making it easier and so that it could be used for newborn with clinical distress due to prematurity or different morbid states (asphyxia, anesthesia, sepsis, respiratory distress syndrome).

Table 1. Maturity level of a newborn

Neuromuscular Maturity

Score	-1	0	1	2	3	4	5
Posture							
Square window (wrist)	 >90°	 90°	 60°	 45°	 30°	 0°	
Arm recoil		 180°	 140°–180°	 110°–140°	 90°–110°	 <90°	
Popliteal angle	 180°	 160°	 140°	 120°	 100°	 90°	 <90°
Scarf sign							
Heel to ear							

Physical Maturity

Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink; visible veins	Superficial peeling and/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 <40 mm: –2	>50 mm, no crease	Faint red marks	Anterior transverse crease only	Creases anterior ⅔	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola, no bud	Stippled 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	Clitoris prominent, small labia minora	Clitoris prominent, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	

Maturity Rating

Score	Weeks
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

Fig. 1. Ballard score. Skin

Fig. 2. Ballard score. Lanugo

Premature newborn

28 weeks GA

Premature newborn

33 weeks GA

Term newborn

Fig. 3. Ballard score. Plantar creases

Fig. 4. Ballard score. Areola

Fig. 5. Ballard score. Pinna

Fig. 6. Ballard score. Genitals (male/female)

Fig. 7. Ballard score. Posture

Fig. 8. Arm recoil

Fig. 9. Ballard score. Arm recoil

Fig. 10. Ballard score. Popliteal angle

Fig. 11. Ballard score. Scarf sign

Fig. 12. Ballard score. Heel to ear

Table 3. Rapid assessment of the gestational age using morphology features (after Gomella TL: Neonatology On call problems)

	Plantar creases	**Mammary gland (areola dimensions)**
GA < 36 weeks	1 or 2 transverse creases, no creases on the posterior 3/4 of the plantar surface	2 mm
GA = 37-38 weeks	Multiple creases on the anterior 2/3 of the plantar surface, heel with no creases	3-4 mm
GA > 39 weeks	The whole plantar surface with creases	7 mm and above

The evaluation of the neonatal maturity is a theoretical concept and it is accounted for the process of growth and differentiation by temporal chronological criteria. Mature for gestational age means accomplishing a certain somatic and functional development based on the accepted standards of a certain gestational age, meaning certain standard values obtained from groups of babies with known gestational age, similar geographic and socio-economical conditions.

Between the somatic development estimated by anthropometric data (weight, length, head circumference) and the chronological development is a correlation expressed by intrauterine growth charts (Fig. 13). On these charts, newborns with development appropriate to the gestational age are placed between the 10^{th} and the 90^{th} percentile ($\pm$ 2 standard deviations). Those large for gestational age are above the 90^{th} percentile, and those small for gestational age are below the 10^{th} percentile (those with intrauterine growth restriction).

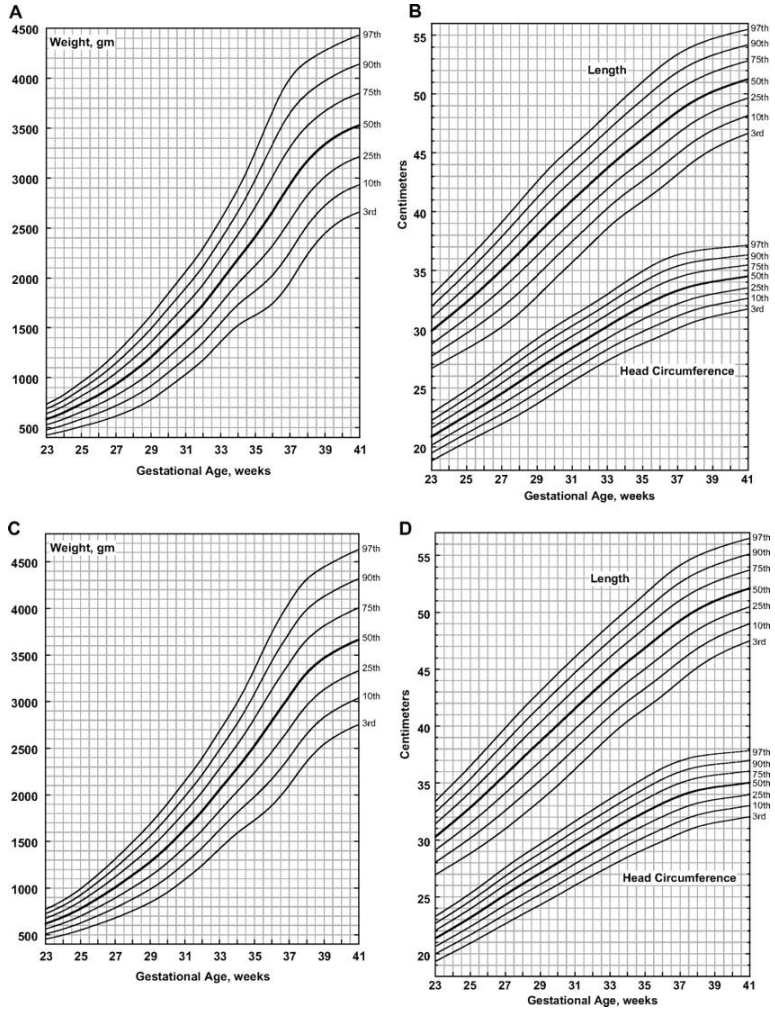


Fig. 13. Intrauterine growth charts (after Lubchenco)

Based on gestational age, newborns can be classified as term (gestational age between 37-42 weeks), preterm (<37 weeks) and postterm (>42 weeks). Each newborn can have an appropriate for gestational age weight (AGA), a small for gestational age (SGA) one or a large for gestational age (LGA) one.

For the correct assessment, the newborn is going to be added to one of the mentioned categories (Tab. 4) by calculating the ponderal index (PI) using the following formula:

$$PI = \frac{\text{Weight (g)}}{\text{Length}^3\,\text{(cm)}} \times 100$$

Table 4 Classification of newborns by ponderal index

Term newborn	AGA	PI= 2,3-3
	SGA	PI<2,3
	LGA	PI>3
Preterm	AGA	PI=2-2,3
	SGA	PI<2
	LGA	PI>2,3
Postterm	AGA	PI=2,3-3
	SGA	PI<2,3
	LGA	PI>3

Using the birthweight, newborns can be classified as follows:

- macrosomic baby- weight over 4000 grams;
- with normal birth weight (NBW)- between 2500 and 4000 grams;
- low birth weight (LBW)- under 2500 grams. This category can divide into: preterm babies appropriate for gestational age (AGA), preterm babies small for gestational age (SGA) and babies born at term but small for gestational age (term SGA);
- very low birth weight (VLBW)- under 1500 grams;
- extremely low birth weight (ELBW)- under 1000 grams.

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CHAPTER III

CLINICAL AND ANTHROPOMETRICAL TRAITS OF A TERM NEWBORN

The gestational age of a term baby is between 38 and 42 weeks.

Normal birthweight is between: -2500-4000 g (extended interval)

-2900-3200 g (smaller interval)

Other important parameters are:

- normal length is between 48-52 cm;
- head circumference is between 34-36 cm;
- chest circumference between 33-34 cm;
- abdominal circumference between 31-32 cm.

The clinical examination of a term newborn must follow all the anthropometrical parameters (weight, length, head, chest and abdominal circumference) along with the complete physical examination (chapter VIII).

The skin is pinkish-red (erythema neonatorum), due to vasodilation; from the second day of life the erythema fades, the skin becomes dry and starts to peel (lamellar or furfuraceous desquamation).

At birth we can observe that the skin is covered in a waxy or cheese-like white substance, named vernix caseosa.

- during the intrauterine life this substance protects the skin against the amniotic fluid,
- during labor it has a lubrication role
- in the first hours after birth it protects against cold and against bacteria.

Vernix is usually covering the pits, the dorsal region and shoulders (fig. 1,2).


Fig. 1,2

On the face and nose "facial milia" is remarked (miliaria sebaceous), represented by numerous sebaceous glands of gray-white color (fig. 3).

Fig. 3

On the skin, soft hair, named *lanugo* can be observed, usually on the forehead, shoulders, back.

Upon skin examination certain nevi can be seen as well:

The capillary hemangioma can be seen at birth, usually on the eyelids, base of the nose and the occipital area.

The prominent vascular hemangioma - can be present at birth, it's continuously growing for a few month and later spontaneously regressing after the age of 1 or 2.

Cavernous hemangiomas - don't have a spontaneously regressing evolution and can easily complicate with thrombosis, ulceration and consumption coagulopathy.

Pigmented nevi - frequently covered in hair, are placed on the back and in the gluteal region. A variation is represented by a blue area situated on the skin, named "mongoloid spot", specific for the hyperpigmented race.

Petechiae - can show up on the scalp or face, after a difficult delivery.

The head is voluminous and it's 1/4 of the newborn's length

The anterior fontanelle: - rhomboidal shape, diameters of 2,5/3,5 cm, closes at 14-16 months;

The posterior fontanelle: - triangular shape,

- is present at 25% of newborns, diameters of 1,5/1 cm,
- closes in the first 4-8 weeks of life.

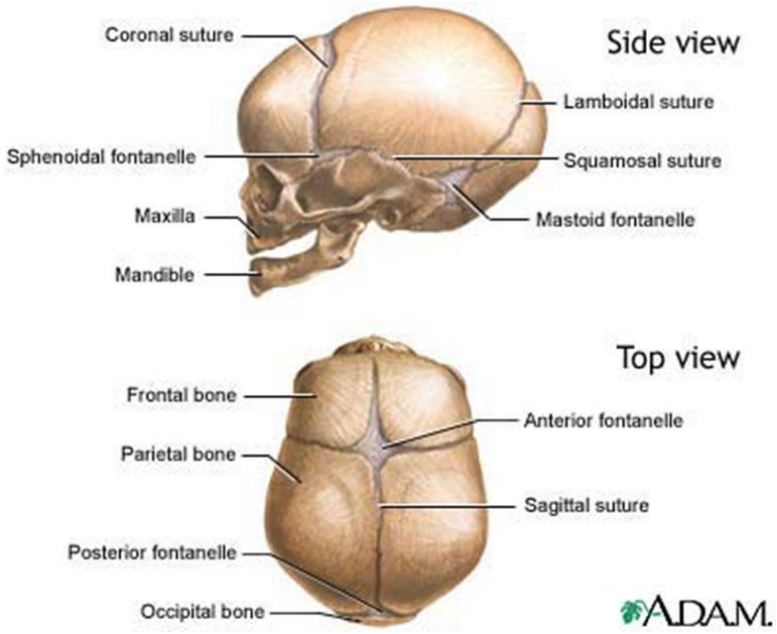


Fig. 4. Anterior and posterior fontanelle

Head deformations can be present, due to edema, intrauterine position or difficult delivery (the skull regains its shape after the first week of life).

- the presence of a serosanguinous fluid collection (caput succedaneum) caused by a hemorrhagic edema of the scalp, usually situated in the occipital region; it does not adhere to suture border and is rapidly absorbed;
- the cephalhematoma, caused by periosteal hemorrhage, is well delimited by the cranial sutures; it can persist for several months, having a tendency of calcification. (fig. 5)

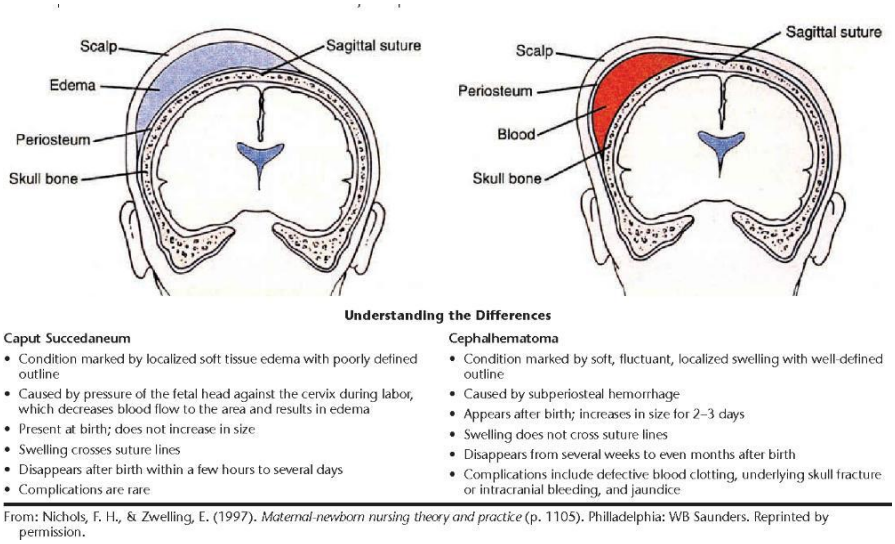


Fig. 6. Caput succedaneum and the cephalhematoma

(*Maternal - newborn nursing theory and practice* - Nichols, F.H., & Zwelling, E., 1997)

The eyes

We can notice:

- palpebral edema and bulbar subconjunctival haemorrhage, without pathological meaning. (fig. 7,8)
- the lacrimal glands start their secretion 3 weeks after birth.

Fig. 7, 8. Palpebral edema, subconjunctival haemorrhage

Visual acuity is evaluated by the photomotor, corneal and pupillary reflexes, which are present at birth. Central vision progresses from birth, when the newborn perceives only light, until the age of 6, when he reaches the adult's level.

Visual tracking and fixation is progressively developing:

- at 2-4 weeks he can fixate a certain object placed in his visual field for a few seconds;
- by 6 weeks he can track an object placed in his visual field;
- by 3 months, the infant has convergent eye movements and starts to distinguish the shapes and colors of different objects.

The mouth

The hard and the soft palate must be examined for identifying the complete cleft palate or if just the soft palate is affected.

Fig. 9. Complete cleft palate

There is no drooling in the first 3 weeks of life. The presence of saliva in high quantity in a newborn can suggest the existence of a tracheoesophageal fistula. The tongue seems big, the lingual frenulum is usually short, but its incision is rarely necessary.

The nose

Nasal permeability can be easily checked using a tube.

Complete obstruction can be seen in bilateral choanal atresia, which can be a cause for respiratory insufficiency.

The ears

The pinnas are plicated and cartilaginous; (fig. 10)

Ear examination must establish the existence of the auditory canal.

The presence of preauricular tumors can guide the physician to a renal malformation.

In the first days of life, hearing is tested with extreme difficulty. From 2 weeks, the cochleopalpebral reflex can be tested, which consists of a flinch and a wink of the eyelids as a response to unexpected sounds.

Ear loss screening using special tools is more accurate.

Fig. 10. Aspect of the pinna at a term newborn

The neck - seems relatively short

For identifying fractures both clavicles must be palpated. (fig. 11)

Fig. 11. Clavicle fracture

The thorax is cylindrical and the abdomen seems large.

Neonatal breast enlargement is met quite often, and sometimes due to a genital crisis (influenced by maternal estrogenic level), lactation can be present.

Asymmetry, erythema, tenderness and high sensibility suggest a breast abscess.

The vertebral column is rectilineal.

The column should be checked to see if there are any major defects. (fig. 12)

The areas covered with pilosity from the lumbosacral region can raise suspicions of an anomaly like spina bifida occulta or tumors.

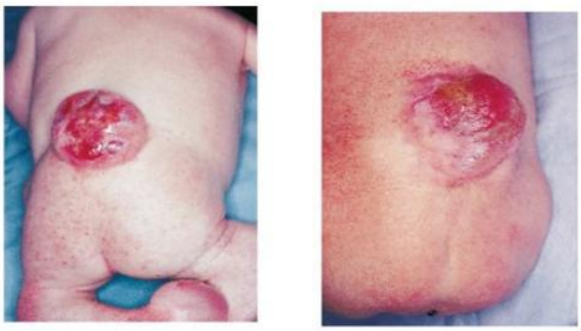


Fig. 12. Myelomeningocele

The hands and feet: probable anomalies will be noticed: polydactyly, syndactyly, abnormal dermatoglyphics like the simian crease.

The nails have little longitudinal ridges, their length is to the curve of the toes and over the curve of the fingers.

External genital organs show signs of maturation like:

- boys: testicles descend in the scrotum; the scrotum has skin folds all over its surface
- girls: labia majora covers the labia minora and the clitoris.

Frequently, a white or sanguinolent vaginal discharge is observed due to secondary transplacental hyperestrogenism.

The anus - its permeability and position will be verified.

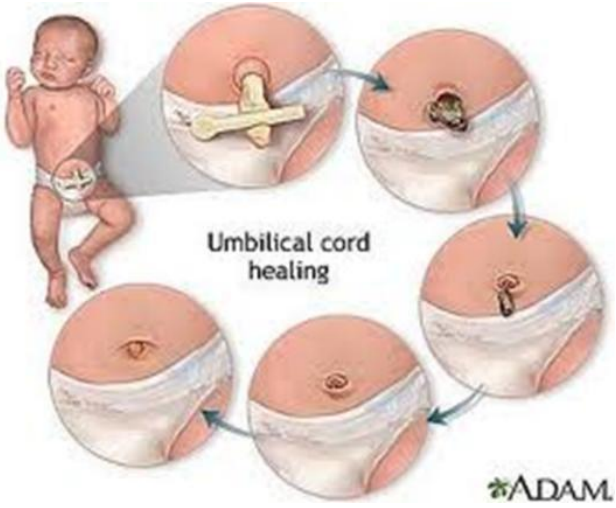
The subcutaneous tissue is noticed on the face (Bichat's fat pad), it is poorly represented on the thorax and the members and absent on the abdomen.

The umbilical cord is formed from one vein and 2 arteries, included in mucous connective tissue (Wharton's jelly).

After it is sectioned and ligatured, it goes through 3 stages:

- mummification;
- umbilical stump delimitation line at the amnio cutaneous border
- the separation of the stump in the 5-7th day of life

The umbilical wound is gradually epithelializing from the periphery to the centre and healing; by the retraction of the umbilical vessels, the scar is clogging. (fig. 13)



Fig, 13. Umbilical cord healing process

Clinical and anthropometrical traits of the preterm newborn

The definition of the preterm newborn consists of two major criterias, gestational age and birth weight.

Gestational period < 37 weeks

Birth weight < 2500g.

Classification of preterm newborns is made by weight and gestational age:

- ELBW (extremely low birth weight) - newborns with weight < 1000g;
- VLBW (very low birth weight) - newborns with weight < 1500g;
- LBW (low birth weight) - newborns with weight < 2500g.

Clinical traits

The head is 1/3 of the length, the head circumference < 33cm, cranial sutures often dehiscent, with open fontanelles.

The face is usually small, with triangular aspect, sharp chin, the ears less pointed out with poor development of the cartilaginous tissue. (fig. 14)

Fig. 14. Preterm baby- pinna

Fig. 15. Measurement of the thoracic circumference

The thorax is often observed as pectus excavatum, easily depressed (the ribs are cartilaginous), thoracic circumference is about 31 cm, intercostal muscles poorly developed which favours the retraction. (fig. 15)

The abdomen is voluminous because of the abdominal muscle hypotonia and high liver volume; diastasis recti is frequent, inguinal and umbilical hernia. **The umbilical cord** insertion is closer to the pubic symphysis.

The skin is thin, with visible vascular pattern, it covers a larger surface compared to the body volume; lanugo is abundant on the face, members and posterior thorax. (fig. 16)

Fig. 16. Lanugo

The lamellar desquamation is abundant and prolonged.

The skin appendages are soft; the nails do not exceed the curve of the finger.

The subcutaneous tissue is reduced or absent. Bichat's fat pad is underdeveloped in grade III, IV preterm newborns; their face has an old look.

The muscular system is reduced and with hypotonia, the skeletal system is insufficiently mineralized; the ossification nuclei Beclard and Tappon are missing.

The genitals are insufficiently developed. In boys the testicles are not always descended and in girls the labia majora does not cover the labia minora and the clitoris. The genital crisis is of low intensity.

Clinical and anthropometrical traits of the intrauterine growth restricted newborn (IUGR)

Definition:

IUGR means that the newborn's weight is below the 10^{th} percentile on the standard growth charts based on gestational age, the clinical aspect shows "in utero" signs of malnutrition.

After WHO, IUGR is the newborn with a birth weight < 2500g and a gestational age >37 weeks.

Clinical traits:

The clinical aspect is that of a thin and tall newborn, with an apparent bulky skull, small triangular face, creased forehead.

The subcutaneous tissue is diminished, sometimes absent, the skin is thin, wider, creased, with a persistent skin fold.

In general, the length is normal for gestational age, except for the severe types of malnutrition.

Compared to the preterm, SGA is lively, with a brisk look, exaggerated archaic reflexes, hypertonia and good appetite.

In terms of anthropometric factors, Prader (1983) describes 2 forms of IUGR:

1. Asymmetric or disharmonic IUGR:

- weight is small compared to the length, and the length is small compared to the head (W<L<HC);

- newborn shows different stages of growth failure, dimished subcutaneous tissue, of the muscular tissue, dry skin;

- it begins by the end of gestation;

- postnatal recovery is good;

This form is due to intrauterine malnutrition, which can be confirmed by a restricted nutritional intake, a placentary insufficiency or a twin pregnancy.

It is seen in 2/3 of the IUGR births.

2. Symmetric or harmonic IUGR:

- weight, length and head circumference are proportional (W=L=HC), the newborn has an aspect of a "perfect miniature";

- it begins in the initial stages of pregnancy;

- postnatal recovery is difficult;

This form is due to primarily abnormalities of the fetus which interests the brain development. It is due to genetic causes, embryopathy, fetopathy, dysmorphic disorders.

It is seen in 1/3 of the IUGR births.

Clinical traits of a postterm newborn

Definition:

Newborn with >42 weeks gestational age, no matter the birth weight.

Clinical traits:

- the absence of lanugo;
- pale skin, parchment-like and with fisures;
- the absence of vernix;
- long nails;
- abundant hair;
- lively face, eyes wide open;
- desquamation (fig. 17)
- large skin folds;
- hands and feet with skin folds; (fig. 18)
- meconium impregnated skin (even on the umbilical cord) (fig. 19);

- reduced subcutaneous tissue - resemblance to fetal malnutrition;
- usually smaller weight compared to the length and head circumference.

Fig. 17, 18. Postterm newborn

Fig. 19. Umbilical cord meconium impregnated

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CHAPTER IV

POSTNATAL GROWTH AND DEVELOPMENT

Measurement of weight, length and head circumference

For growth and development correct evaluation, *the most used parameters* are:

1. Weight

Birth weight (BW) is between 2900 - 3200 g or 2500 - 4000 g (extended interval).

The initial weight loss starts in the first 3-5 days of life and is about 7-10% of the total weight.

Growth resuming starts after the 10^{th} day, when birth weight is regained.

The medium rhythm for growth in the first 2 years of life is as follows:

- 0 - 4 months - 750 g/month
- 5 - 8 months - 500 g/month
- 9 - 12 months - 250 g/month
- 1 - 2 years - 250 g/month
- > 2 years, the weight gaining rate is about 2 kg/year, rhythm kept till puberty.

- after 12 years of age, due to puberty a sudden weight gain is realized, with variable values.

Weight:

- doubles at 4 months,
- triples at 1 year,
- quadruples at 2 years
- is 6 times the birth weight at 5 years,
- is 7 times the birth weight at 7 years,
- is 10 times the birth weight at 10 years.

- till adult life, BW multiplies 20 - 25 times.

In the first 2 years of life boys have a plus of 0,5 kg to the girls.

It is the most fit index for measuring a child's growth and nutrition.

Factors influencing weight are: genetics, gestational age, maternal malnutrition, alcoholism, tabacism, substance addiction, intrauterine infection, placental insufficiency, multiple pregnancies, diabetes.

For calculating an infant's weight several formulas are used for different ages.

a) **Finklestein's formula -** for the 1st year of life:

MW = BW + A x 600 (700)

MW= mean weight (g)

BW= birth weight (g)

A= age in months

600= for infants >6 months

700= for infants <6 months

b) **Herman's formula -** after the 1st year of life:

MW = 9+ 2A

MW= mean weight (kg)

A= age in years

9= mean weight at 1 year of life

2= mean weight gain/year

Estimating the infant's and child's weight is done by weighing (fig. 1). The rhythm of weighing is recommended as follows:

- ✓ newborn - daily
- ✓ infant - once per week in the first 6 months
  - once per 2 weeks between 6 - 12 months
- ✓ between 1 - 2 years - once a month
- ✓ between 2 - 3 years - 3-4 times per year
- ✓ after 3 years - once a year
- ✓ anytime a pathological state influences this parameter.

In the first months of life, weighing is done preferably at the same hour, before bathing and feeding, using the same scale.

The normal weight for age (fig. 2a, 2b, fig. 3a, 3b) characterizes a state of eutrophy and is called ideal weight.

Deviations from the ideal weight characterize either dystrophy (malnutrition), or obesity and represent pathological states.

The infant's normal diet, as well as the infant's therapeutical one, the diet and drug dosage have to be calculated and evaluated depending on the weight. For calculating the diet, the ideal weight will be used, no matter the actual weight.

Fig. 1. Estimating the infant's weight

2. Length or height

At birth the normal length is 50 ± 2 cm

- the height increase and its dynamics is a stable parameter, and more important than weight

- it happens due to an elongation of the inferior members and vertebral bodies.

The minimal increment of height increase in the first year of life is this:

- first months = 4 cm
- months 2 and 3 = 3 cm/month = 6 cm
- 4^{th} month = 2 cm
- months 5 to 12 = 1 cm/month
- 1 - 2 years = 1 cm/month (12 cm/year)
- 2 - 5 years = 6 - 8 cm/year
- 5 - 10 (12) years = 5,5-6,5 cm/year.

At 1-year-old, it is 50% higher than the one at birth.

In the first 2 years of life boys are higher by 0,5 cm.

Height:

- doubles by the age of 4
- triples by the age of 13

- a sudden spurt takes place:

- between 10 - 12 years in girls

- between 12 - 14 years in boys

- followed by a slow down of the growth rhythm, which precedes the ending of it by:

- 17 - 19 years in girls

- 20 - 22 years in boys

For height, it is used the following formula:

a) Geldrich's formula - after 2 years of age:

H= 80 + 5A

H = height (cm) 80 (cm) = mean height at 2 years

A = age (years) 5 (cm) = mean stature growth rhythm /year after the age of 2

Accelerated growth of the inferior members can induce several dynamical changes which involve the body's proportions:

- at birth, the sitting height (vertex - buttocks) = 70% of the total height
- by 3 years, the sitting height = 57% of the total height
- at puberty, the sitting height = 52% of the total height
- in adult life, the sitting height = 50% of the total height

Until the age of 2,5 - 3 years, the measurement of the length is recommended to be done in dorsal decubitus, using a measuring board (fig. 4). After this age, height is measured standing up.

The rhythm of the measurements for determining the length/height is:

- ✓ monthly - in the first 4 months
- ✓ every 3 months - after this age
- ✓ anytime a pathological state influences this parameter.

The normal stature (height appropriate for age) (fig. 2a, 2b, fig. 3a, 3b) must be differentiated by the deviations from dwarfism and gigantism, which are pathological states.

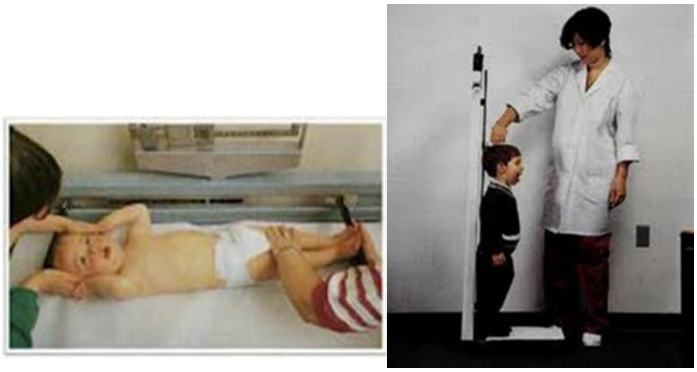

Fig. 4. Measuring height

3. Head circumference (HC)

- is the biggest value of the perimeter (measured using a measuring tape) from the most prominent part of the frontal bone to the widest part of the occipital bone. (fig. 5)

- head circumference growth is possible due to the existence of the cranial sutures and fontanelles.

The dynamics of the HC growth are as follows:

- at birth = 34 - 36 cm
- by 6 months = 42 cm
- by 12 months = 45 - 47 cm
- by 20 years = 55 cm

The monthly growth pattern of HC in the first year of life is:

- 1,5 cm in the first 4 months
- 1 cm between 5 to 8 months
- 0,5 cm between 9 to 12 months
- 1 - 17 years 10 cm

At puberty, the head circumference grows using the help of the bone tissue and the soft tissues.

Measurement of the head circumference is important by the age of 2 - 3 years old.

Dynamic estimation of the HC allows its including within the normal ranges (normocephaly) (fig. 6a, 6b, fig. 7a, 7b) or pathological ones (microcephaly, macrocephaly).

Macro- and microcephaly can also be familial traits.

HC values illustrate indirectly de development of the brain mass, meaning the brain volume, which:

- by 6 months - it is 50% of its definitive value
- by 1 year - it is 60% of its definitive value
- by 2 years - it is 75 - 80% of its definitive value.

Fig. 5. Measurement of the head circumference

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

Placing the newborn and infant on the growth charts

The estimation of growth and development can be done by comparing the physical parameters of one child with those of other healthy children, of the same age, sex and from the same geographical region (considerable individual variability makes this estimation relative).

The charts (values) of reference used are the resultant of longitudinal studies (measurements of a child at different ages) or that of transversal studies (measurement of large groups of children of the same age), the last mentioned being faster and cheaper.

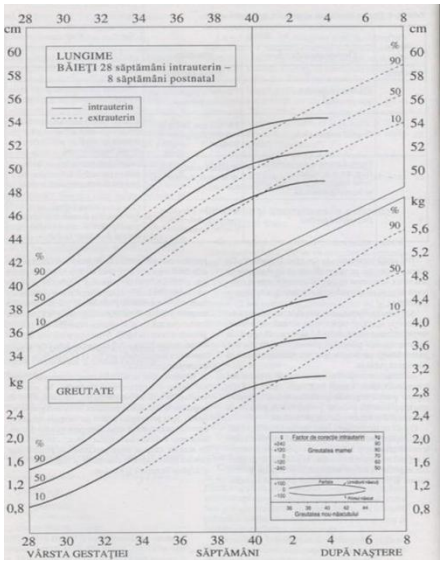

Fig. 2a. Weight and length chart - boys

28 weeks gestational age- 8 weeks postnatal age

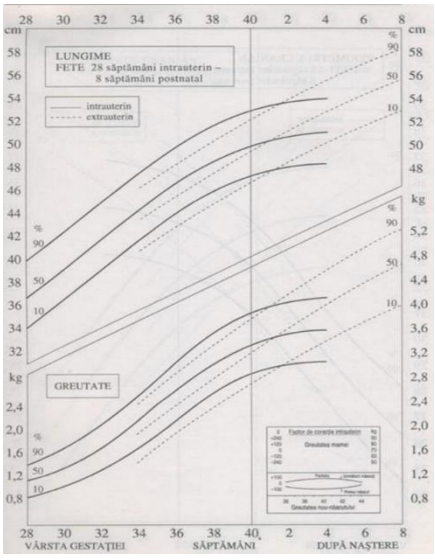

Fig. 2b Weight and length chart - girls

28 weeks gestational age- 8 weeks postnatal age

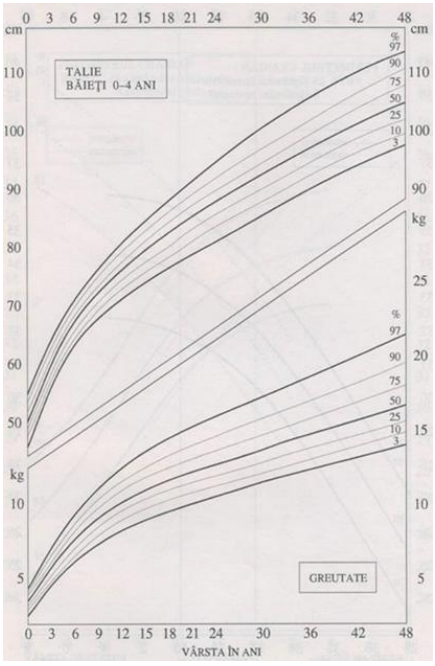

Fig. 3a. Weight and height chart 0-4 years - boys

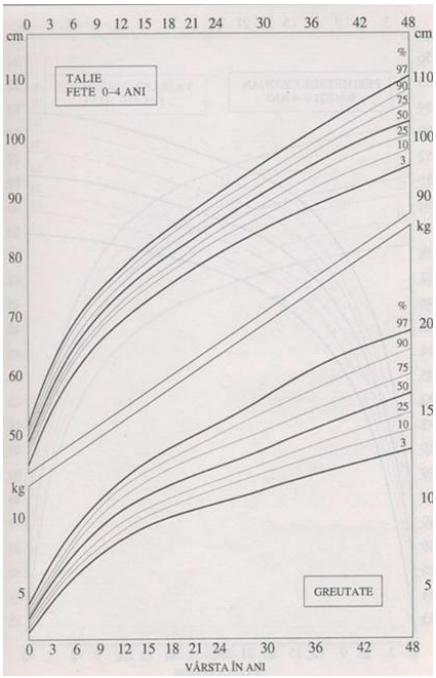

Fig. 3b. Weight and height chart 0-4 years - girls

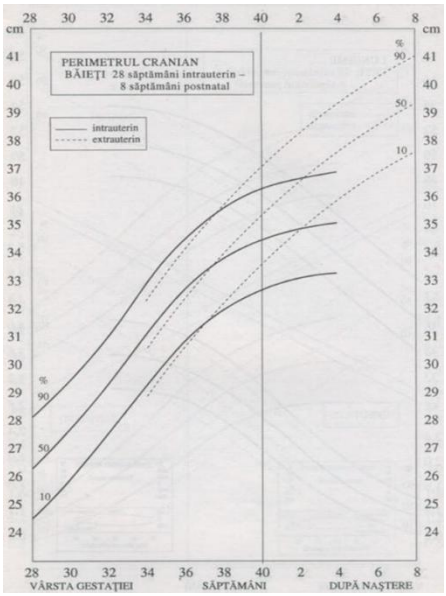

Fig. 6a. Head circumference chart - boys 28 weeks gestational age - 8 weeks postnatal age

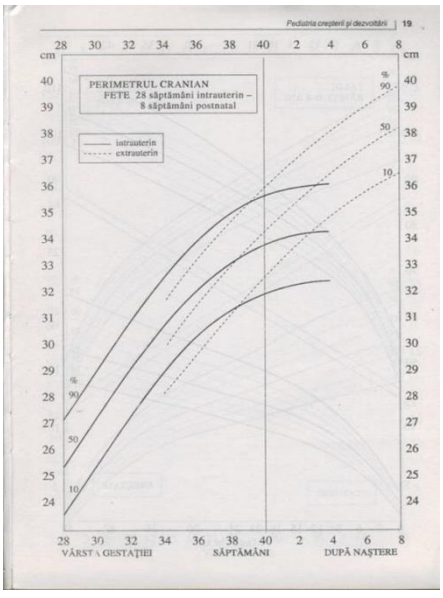

Fig. 6b. Head circumference chart - girls 28 weeks gestational age - 8 weeks postnatal age

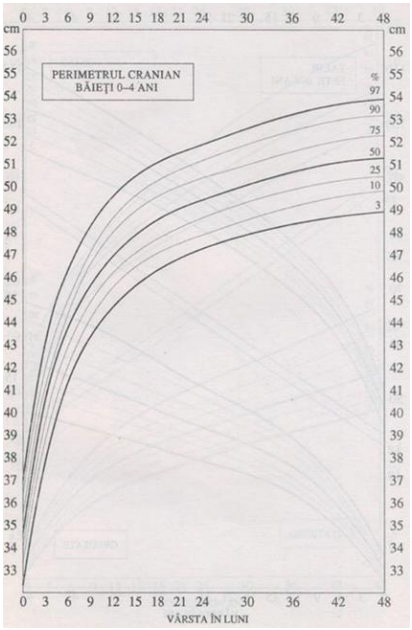

Fig. 3a. Head circumference chart 0 - 4 years - boys

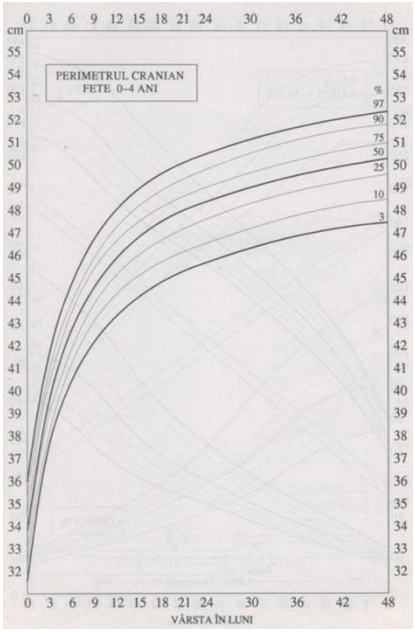

Fig. 3b. Head circumference chart 0 - 4years - girls

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Dentition - dynamic appreciation

Dentition is an important childhood parameter and allows its division into 3 periods:

- early childhood (toddlerhood), which ends by the time the first milk teeth arrive (0 - 3 years);

- middle childhood (pre-school age), which ends by the time permanent dentition starts to erupt (3 - 6 years);

- late childhood (school age), which includes the evolution of permanent dentition and ends at puberty.

The dynamic of the eruption, shedding and calcification of the temporary dentition, as well as the eruption and the calcification of the permanent one are shown in tables no. 1 and 2.

Table 1. Primary dentition or temporary

	Calcification		**Eruption**		**Shedding**	
	Start:	**End:**	**Maxilla**	**Mandible**	**Maxilla**	**Mandible**
Central incisors	In the 5th month of pregnancy	18 - 24 months	6 - 8 months	5 - 7 months	7 - 8 years	6 - 7 years
Lateral incisors	In the 5th month of pregnancy	18 - 24 months	8 - 11 months	7 - 10 months	8 - 9 years	7 - 8 years
Canine teeth	In the 6th month of pregnancy	30 - 36 months	16 - 20 months	16 - 20 months	11 - 12 years	9 - 11 years
First molars	In the 5th month of pregnancy	24 - 30 months	10 - 16 months	10 - 16 months	10 - 11 years	10 - 12 years
Second molars	In the 6th month of pregnancy	36 months	30 - 36 months	20 - 30 months	10 - 12 years	11 - 13 years

Table 2. Secondary dentition or permanent

	Calcification		**Eruption**	
	Start:	**End:**	**Maxilla**	**Mandible**
Central incisors	3 - 4 months	9 - 10 years	7 - 8 years	6 -7 years
Lateral incisors	maxilla 10 - 12 months; mandible 3 - 4 months	10 - 11 years	8 - 9 years	7 - 8 years
Canine teeth	4 - 5 months	12 - 15 years	11 - 12 years	9 - 10 years
First premolar	18 - 21 months	12 - 13 years	10 - 11 years	9 - 10 years
Second premolar	24 - 30 months	12 - 14 years	10 - 12 years	11 - 13 years
First molar	at birth	9 - 10 years	6 - 7 years	6 - 7 years
Second molar	30 - 36 months	14 - 16 years	12 - 13 years	12 - 13 years
Third molar	maxilla 7 - 9 years; mandible 8 - 10 years	18 - 25 years	17 - 22 years	17 - 22 years

The first permanent molars stabilize the archwire and contribute to the final form of the maxilla and the appropriate arrangement of the teeth.

Nutritional disorders, trenant diseases or abusive use of drugs (tetracycline) in children can interfere with calcification of the temporary or permanent dentition. If this affects the temporary dentition, it can leave defects in the tooth enamel (from small cavities in the teeth to large enamel hypoplasia lines).

Cavities or other defects need proper prompt intervention. An important role in their apparition is the abusive consumption of sweets (especially the ones that are adherent and hard: candies, toffees) and poor hygiene. Resistance to cavities is high when the diet and/or water have enough fluorine; when this element is missing, supplementation and good dental hygiene are recommended.

Dynamic appreciation of the bone age

Bone maturation

It's the most loyal indicator of growth. Bone age has to be concordant to the chronological age.

The ossification process starts in the 5th month of pregnancy, ends with adolescence and starts at the ossification nuclei. The term newborn has 3 - 4 ossification nuclei:

- *Beclard nucleus* - situated on the distal femoral epiphysis
- *Tappon nucleus* - situated on the proximal epiphysis of the tibia
- *Cuboid bone nucleus*
- *Humeral head nucleus* (inconsistent)

The evaluation of the ossification is done by echographic examination: under the age of 1 at the inferior member, after the age of 1 at the left superior member, at the radiocarpal joint level. In the first year 10 ossification nuclei appear, for one hemiskeleton.

Establishing the bone age is based on:

- number and dimension of the nuclei;

- their form and density;

- delimitation of the bone extremities edges, the distance which splits the epiphyseal centres.

Bone age is finalized around 12 years for girls and around 13 years for boys. Bone maturation is estimated also with studying the number of the bone sutures which appear between 13 and 18 years.

Fig. 1. Establishing the bone age

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CHAPTER V

NEUROLOGICAL AND PSYCHICAL DEVELOPMENT OF THE NEWNBORN, INFANT AND CHILD

The newborn period is characterized by a series of morphofunctional particularities of the nervous system (NS), related to the incomplete maturation of the brain.

In the neonatal practise, the complete neurological examination has 2 major targets:

a) establishing the brain's condition after expulsion, the brain damage being the resultant of various pathological processes:

- congenital anomalies;
- fetopathies;
- chronic brain injury during pregnancy;
- acute brain injury during labour;
- changes in the ionic homeostasis after expulsion;
- neurogenic infections acquired after birth.

b) establishing the gestational age, which is important for the prognosis.

The neurological examination of the newborn includes:

- head inspection and palpation; (fig. 1, 2)
- head circumference determination;
- posture, passive and active tone examination;
- primitive reflexes (archaic) determination;
- paraclinical examination and complementary lab tests in the presence of neurological signs of disease.

Fig. 1, 2. Head inspection and palpation

For appreciating the normal state, as well as the pathological deviations, examination of the posture, tone and primitive reflexes of the newborn are of great importance (these being transitory).

Posture. Passive tone. Active tone

- **Posture.** The newborn is examined without clothes, when awake, placed in dorsal decubitus on the examination table. The normal position of a newborn - the expression of normal tone - is that of flexion of the extremities, with the head and vertebral column in contact with the examination table.

Fig. 3. Posture (https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

- **Passive tone.**

  Is examined by analysing the musculotendinous extensibility.

  For appreciating the passive tone, the following manoeuvres are made:

  - ✓ *Heel to ear test*

The newborn is placed in dorsal decubitus.

The examiner places both inferior extremities in extension, within the trunk's axis, and then flexes the haunch upon the pelvis, which must be fixed on the examination plane.

It is estimated that the area between the inferior extremities from the examination board to the final position is normally between 80 - 100°.

Fig. 4. Heel to ear test

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

✓ *Popliteal angle test*

The newborn is placed in dorsal decubitus.

The examiner initially fixes the knees to one side and the other of the abdomen, then leaves the calves to fall freely on the haunches.

The angle between the posterior area of the calf and the haunch is estimated (normally between 80 - 100°).

Fig. 5. Popliteal angle

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

✓ *Dorsiflexion angle of the foot*

The calf is in the extension position and the foot is passively flexed on the calf.

The angle between the foot and the calf is estimated. (normally 90°).

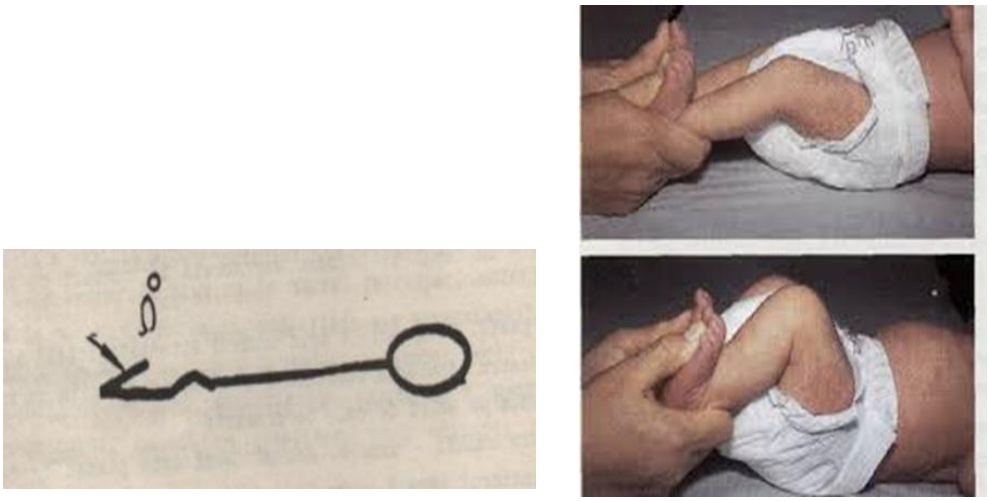

Fig. 6. Dorsiflexion angle of the foot

✓ *The scarf sign*

The newborn is placed in the semi-sitting position, its cephalic extremity being sustained by the left hand of the examiner.

Each hand of the newborn is then moved toward the opposite shoulder (as much possible).

The ampleness of the movement is appreciated by each elbow position.

Normally, the elbow does not reach the middle line and an intense resistance in the scapulohumeral muscles is remarked.

Fig. 7. Scarf sign

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

- ✓ *Arm recoil test*

If the newborn's forearms are in normal position (of flexion) on the arm, the return in the flexing position after trying to move the forearms away from the arms, can be examined.

Normally, the return is quick and uninhibited on a term newborn.

Fig. 8. The forearm flexing return test

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

- **Active tone.**

It is observed by inducing an active reaction to the newborn and following the traits of its response.

It is estimated by the following tests:

✓ *Adjustment of the lower extremities and the trunk*

The observer places the newborn in a vertical position, by sustaining its trunk at the axillary level and maintaining the head a little inclined to the front. As soon as the forefeet meet the examining table, a strong contraction of the extended lower extremities and the trunk takes place.

Fig. 8. Adjustment of the lower extremities and the trunk

✓ *Active contraction of the neck flexor muscles for head adjustment*

The newborn is placed in dorsal decubitus. The examiner holds the infant's shoulders, with the upper arms tightly held to the body, and lifts the newborn in the sitting position. Before the trunk reaches the vertical position, an active movement of rising the head to the front is induced by the movement of the trunk. The term newborn can hold its head the whole time the head is moved in the trunk's axis.

Along with this manoeuvre, the observer can evaluate:

- hypotonia (the head is balancing);
- hypertonia of the neck muscles (the head is in hyperextension the whole time the test is taken).

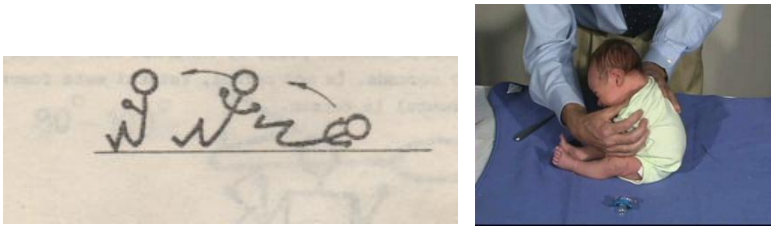

Fig. 9. Active contraction of the neck flexor muscles for head adjustment (https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

✓ *Active contraction of the neck extensors at front to back movement of the body*

From the position reached at the previous test (newborn in the sitting position), the movement is continued to the front. The head is flexed toward the thorax. Then, the trunk is moved to the back,

which tends to bring it vertically. The response is induced by this movement is a retropulsion of the head.

On a term newborn, the head follows the trunk movements constantly throughout the test.

Anomalies found with this test:

- the head falls back, passively = hypotonia (fig. 11)
- the head does not flex on the thorax at the beginning of the test and is immediately retropulsed from the beginning = hypertonia of the neck extensors.

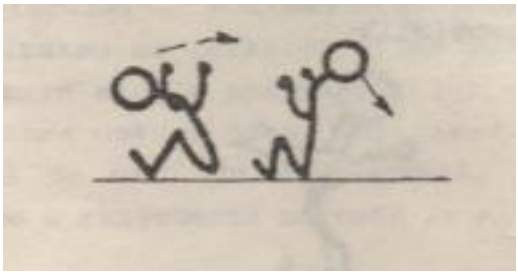

Fig. 10. Active contraction of the neck extensors at front to back movement of the body

Fig. 11. Hypotonia

✓ *Head's response to the trunk swinging movement*

The balance between the flexion and extension muscles can be checked by swinging the trunk around vertical position and by observing the head's response and symmetry of the movement.

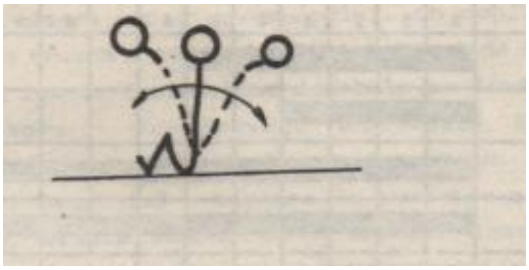

Fig. 12. Head's response to the trunk swinging movement

PRIMITIVE REFLEXES (ARCHAIC)

These are characteristic and reflect the immaturity of the cerebral cortex, as well as the diminished degree of inhibition of the areas located at the base of the brain.

In the process of morphofunctional development of the central nervous system, a series of reactions characteristic to a certain stage take place; these specific transitory reflexes appear only at a certain age, so the lack of their appearance, as well as their persistence for a longer than usual period of time defines a pathological state.

In case of lesions at the central nervous system level, some specific transitory reflexes can appear even in older children or even in adults.

The newborn is a subcortical being because it is organically unmatured by the lack of cellular differentiation and the lack of myelinisation, and functionally there appear irradiations of the nervous excitations, which are stereotypical reactions.

The newborn's posture is that of hypertonia, with flexor muscles predominance, an exaggerated muscular hypertonia, which is emphasized when the newborn cries, along with the appearance of short-term clonical movement of the mandible and extremities (which will be different from seizures).

The deep tendon reflexes due to incomplete myelinisation of the pyramidal fascicle are ample, and the presence of the cutaneous plantar Babinski reflex even if it's positive, has no pathological meaning.

The spontaneous motor activity consists of anarchical, uncoordinated moves.

1. The rooting reflex

Is examined by gently touching the infant's cheek with a soft object; the response consists of mouth opening and turning the chin toward the stimulus.

In the first month of life, the response consists of repeated turns of the infant's head, with lateral oscillations which decrease as amplitude and which end by touching the stimulus with the lips. After a month, the head turns with one movement toward the stimulus source.

This reflex disappears by the end of the first year of life.

2. The sucking reflex

Is shown by gently touching the newborn's lips or cheek; the response consists of opening of the mouth and rhythmical sucking movements.

It is present at birth and disappears at the end of the first year of life.

3. The swallow reflex

Usually follows the sucking reflex. Through sucking, saliva accumulates in the reflexogenous zone of the pharynx. This induces the swallow reflex, which is shown by the ascension of the hyoid bone.

The disorders of the sucking and/or swallow reflexes are frequent manifestations of severe cerebral injury, consequences of hypoxia or obstetrical trauma. The persistence of the swallow reflex after the age of 1 usually indicates a cortical dysfunction.

4. Cardinal points reflex

If a finger is moved across a labial commissure, gently touching it, the lower lip is descending and the tongue is oriented towards the finger. Sucking movement is also present and even a slight rotation of the head. If the finger movement stops, the finger is placed upon the lips and sucked. If the finger is progressively withdrawn, a head flexion is observed.

Fig. 13. Cardinal points reflex

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

5. The support reflex (Static attitude test)

Holding an infant below the armpits, with the dorsal foot in direct contact with the table's edge, he will respond by characteristically rising the foot and placing it on the examination table.

It is present until the end of the first year of life.

6. The stepping reflex (Automatic walking reflex)

It is similar to the support reflex and consists of a series of stepping moves, if the infant is held below the armpits and if the feet are in direct contact with a flat surface.

It appears at birth and disappears generally after the 6^{th} - 7^{th} month.

Fig. 14. The stepping reflex (Automatic walking reflex)
(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

7. Ventral suspension reflex

It is observed by the infant's suspension in a vertical position, with the head upwards. Until he reaches 4 months of age, the infant flexes the lower extremities. Crossing the two lower extremities suggests Little disease.

8. The parachute reflex

The infant is held in the air, vertically, held by the trunk; if we make him descend abruptly, his arms will extend and his fingers will spread.

9. Moro-Freudemberg reflex

A sudden stimulus (abdominal percussion, an intense noise, a sudden blow on the infant's face, suddenly pulling the diaper from underneath him) determines an abduction and extension movement of all the four extremities, usually followed by a slower reverse movement.

This reflex is present at birth, fades by 4 months, but can also persist until 6 months of age. If so, it can be the proof of a chronic cerebral injury. The asymmetrical movements of the upper extremities can suggest a brachial plexus palsy or a clavicle fracture.

Fig. 15. Moro-Freudemberg reflex
(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

10. Landau reflex

The newborn is held horizontally, with the face downwards.

If the head extends, the trunk and the lower extremities will extend, realizing a quadrant with inferior convexity. If the head is flexed, the trunk and the lower extremities are also going to flex, realizing a quadrant with superior convexity. This reflex is useful for detecting hypo- or hypertonia.

In case of no response, or of an exaggerated one, cerebral disorders, of the vertebral column or myopathic ones can be suspected. It is not present at birth, appears after 3 months of life, it is very well noticed between 6 and 10 months and fades after the second year of life.

11. Tonic labyrinthine neck reflexes

Changes in the head positioning in relation to the trunk lead to movements or tonic variations of the infant's extremities. A sudden head spin in one way will determine the extremities which face the front of the body to extend, and those who face the back of the body to flex.

They are present at birth, more clear at the upper extremities level than the lower ones; sometimes they are only adumbrated and they fade after the 6^{th} or 7^{th} month of life.

Asymmetrical responses, with stronger reactivity on the left or the right part, can be the consequence of neurological disorders, with cerebral origin.

The persistence of these reflexes can suggest a brain injury, while their absence can indicate a spine disorder.

Fig. 16. Tonic labyrinthine neck reflexes

12. Peiper's tonic reflex

If a strong light is projected against the eyes of a newborn, its head will be thrown backwards, in the opistotonus posture.

Fig. 17. Peiper's tonic reflex

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

13. The grasping reflex

From birth, until 3 to 4 months, the infant strongly clenches his fists around an object which is placed on the skin of the palm. Any attempt to take the object will intensify the grasp. The grasping reflex starts to fade from the 3rd-4th month, being replaced by the same movement but while the infant sees the object or exteroceptive stimuli are present. If the object is taken from the infant's hand, the magnet reaction can be observed, which consists of chasing the object with the upper extremity.

The absence of this reflex at birth can be the consequence of a peripheral motor neuron damage (brachial palsy, if the absence is unilateral) or severe central motor neuron damage. Its presence after 4 months reflects the release of cerebral tonigenic mechanism, as observed in hydrocephaly, or striate nuclei damage.

Fig. 18. The grasping reflex

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

14. The Babinski reflex

It is evaluated by applying a strong enough pressure on the sole of the foot. The thumb will extend and the rest of the toes will spread, and sometimes a certain flexing can be observed. It is present at birth and fades by 5 to 6 months.

Fig. 19. Babinski reflex

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

15. The Galant reflex

The infant is placed in ventral decubitus and gentle strokes will be applied on one side of the vertebral column and the other, at a small distance from it. The newborn will move its lower extremity to the stimulus. It fades by 6 months of age.

Fig. 20. The Galant reflex

(https://library.med.utah.edu/pedineurologicexam/html/newborn_n.html#28)

Psychomotor development

The assessment of the neuro-psychomotor development is an important *criterion* in the *growth and development of a child*. The examination methods consist of *triggering certain reactions or responses of the infant,* which appeal for different functional psychical, psycho-sensorial and psychomotor levels which reflect the possibilities of adaption to the cognition, emotional-affective and psycho-social activities.

Below is described the graphic of the *normal psychomotor development of a child* in its first 6 years of life, when the development of the nervous system is faster.

The differences from the normal state permit to reveal both the retardation and the early development.

By 1 month:

- ✓ in ventral decubitus position hold its head for several seconds;
- ✓ holds the fingers tight, in fists;
- ✓ flinches at a strong noise;
- ✓ cries of hunger and discomfort;
- ✓ for a moment stares at a toy in front of him;
- ✓ smiles.

By 2 months:

- ✓ in ventral decubitus position holds its head up for 1 to 2 minutes;
- ✓ holds the fingers a little deflected;
- ✓ follows a coloured object which moves in front of him;
- ✓ starts making sounds;
- ✓ turns its head to the noise's direction.

By 3 months:

- ✓ in ventral decubitus position holds its head up for several minutes;
- ✓ actively flexes the last 2 fingers of each hand;
- ✓ is able to recognize his mother;
- ✓ is excited to see food;
- ✓ examines its hand, brings into his visual field;
- ✓ watches closely his toy;
- ✓ babbles.

By 4 months:

- ✓ turns from dorsal decubitus position to the ventral one;
- ✓ holds objects between his palm and the 4^{th} and 5^{th} fingers;
- ✓ reaches for a toy with his hand;
- ✓ looks for the sound source;
- ✓ babbles as a response to stimulation;
- ✓ has a guffaw laughter.

By 5 months:

- ✓ can lean on its soles for a little period of time, if held;
- ✓ actively flexes and deflects its last 2 fingers on each hand;

- ✓ sits if supported;
- ✓ reaches for his favourite toy with both hands;
- ✓ hold his hands on the bottle when fed;
- ✓ makes bunches of sounds;
- ✓ is able to manifest his joy loudly;
- ✓ distinguishes family from strange people.

By 6 months:

- ✓ sits for a longer period of time;
- ✓ holds his feet with his hands;
- ✓ hold the objects using all the fingers;
- ✓ reaches with his hand for the toy and moves it to the other hand;
- ✓ enunciates syllables;
- ✓ can imitate the happy/sad mimic of the people around him.

By 7 months:

- ✓ rises to the sitting position
- ✓ grabs objects using fingers 2 and 3 and the palm of the hand;
- ✓ can lift an overturned cup;
- ✓ looks for a lost toy;
- ✓ sporadically makes syllable sounds;
- ✓ is scared of unknown people or animals;
- ✓ reaches for known persons.

By 8 months:

- ✓ sits on his feet, leaning on the bed;
- ✓ if held by the armpits, he can step;
- ✓ holds his bottle with both hands, lifts it if fallen;
- ✓ can recognize his name, reacts to its enunciation;
- ✓ can clearly pronounce isolated or repeated syllables: ma, ma-ma;
- ✓ cries when he's being quarrelled, is happy when people talk nicely to him.

By 9 months:

- ✓ walks if held with both hands;
- ✓ grabs objects with the tips of the first 3 fingers;

- ✓ can rise to his feet on his own;
- ✓ examines a toy using his finger;
- ✓ pronounces 1 or 2 two syllable words;
- ✓ participates happily in a game with adults: hide and seek;
- ✓ manifests his needs.

By 10 months:

- ✓ crawls;
- ✓ understands interdiction;
- ✓ attracts the attention of the adults by shout or gestures;
- ✓ opposes if his toy is taken away;
- ✓ clearly pronounces two syllable words;
- ✓ understands the words frequently repeated by the people around him.

By 11 months:

- ✓ is walking held by the hand;
- ✓ sits on his feet for a few moments;
- ✓ from the seated position turns laterally;
- ✓ gives objects to the persons who ask for them;
- ✓ pronounces 1 - 2 words.

By 1 year:

- ✓ takes steps without support;
- ✓ from vertical position leans forward and lifts the toy;
- ✓ indicates the body parts (if asked);
- ✓ learns simple games imitatively**;**
- ✓ pronounces 3 - 4 words.

By 1 year and 3 months:

- ✓ is walking confidently;
- ✓ climbs the stairs using his hands;
- ✓ sits on and gets up from the floor without help;
- ✓ watches closely the pictures from a book;
- ✓ can build a tower using 2 blocks;
- ✓ opens and closes the drawers;

- ✓ indicates what he wants (using his hands);
- ✓ cooperates when he's being dressed;
- ✓ is happy when dressed nicely;
- ✓ eats on his own using a spoon.

By 1 year and 6 months:

- ✓ climbs up the stairs, step by step;
- ✓ runs without flexing the knees;
- ✓ throws the ball using both hands;
- ✓ builds a tower using 3 blocks;
- ✓ draws lines with a pencil;
- ✓ browses through a book;
- ✓ forms simple phrases; uses verbs;
- ✓ asks for the potty;
- ✓ takes his hat, gloves, socks off on his own.

By 2 years:

- ✓ climbs the stairs alternating the feet;
- ✓ runs with the knees flexed;
- ✓ leans forward and rises without falling;
- ✓ catches the ball;
- ✓ fulfils and order involving 2 actions;
- ✓ uses the pronoun, adjective;
- ✓ asks for food and drink;
- ✓ differentiates personal objects of each member of the family;
- ✓ fulfils different easy chores around the house (opens the radio).

By 2 years and 6 months:

- ✓ jumps on his two feet;
- ✓ tip-toes;
- ✓ throws and catches the ball;
- ✓ distinguishes the vehicles;
- ✓ hold the pencil correctly and draws;
- ✓ can say his name, age, sex;
- ✓ when talking, can use the past tense;

- ✓ eats on his own, washes his hands, undresses.

By 3 years:

- ✓ climbs up and down the stairs alternating his feet;
- ✓ can stand on one leg;
- ✓ can sort different objects by shape, size and colour;
- ✓ knows the spatial positions: up, down, front, back;
- ✓ buttons and unbuttons clothes;
- ✓ asks questions;
- ✓ forms phrases;
- ✓ can recite poems and tell situations of his life;
- ✓ wants to be with other children;
- ✓ manifests opposition.

By 4 years:

- ✓ skips on one leg;
- ✓ compares the weight of 2 objects;
- ✓ can recognise drawn elements;
- ✓ can fold a paper as shown;
- ✓ uses plural correctly;
- ✓ can easily recite poems and with interest;
- ✓ can take his boots on;
- ✓ can draw a square;
- ✓ shows initiative in fulfilling easy house chores.

By 5 years:

- ✓ identifies 4 - 5 spatial positions;
- ✓ can distinguish day from night;
- ✓ can explain the utility of 4 - 5 objects;
- ✓ uses 2 time adverbs (today, tomorrow);
- ✓ games are made by rules which he understands and accepts.

By 6 years:

- ✓ lifts and tidies his things**;**
- ✓ can indicate and name 6 - 7 colours and shades;

- ✓ distinguishes 3 main moments of the day;
- ✓ knows and can tell the seasons;
- ✓ lists the days of the week;
- ✓ defines 4 objects or beings;
- ✓ draws a rhombus by model;
- ✓ recognizes 2 - 3 letters;
- ✓ communicates easily with strange people.

Early detection of motor, sensorial or speech incapacities is necessary for their correction and recovery.

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CHAPTER VI

CLINICAL EXAM OF A TERM NEWBORN

The neonatal period is the newborn's adjustment period to the extrauterine life and it is characterized by the organs which start to function but also start to involute. Newborn's maturation depends on the gestational age, reaching the threshold of a certain somatic and functional development in relation to the accepted standards for a given gestational age.

The complete clinical exam requires knowing the family history and how the gestation period unfolded.

The first examination has the following targets:

- To determine the gestational age;
- To verify the good adjustment to the extrauterine life;
- To detect the eventual pathological states of the newborn;
- To detect congenital anomalies;
- To define the nutritional status: eutrophy, hypotrophy, hypertrophy.

In the delivery room:

- appreciation of the viability using the Apgar score;
- palpation of the peripheral pulse and the cardiac auscultation;
- SaO2 monitoring;
- palate examination (posterior slit);
- esophageal, choanal and anus permeability using a Nelaton tube;
- if the urine or meconium are present.

The conditions necessary for examining a newborn:

- room temperature between 24 - 26°C;
- the examination will be held on the radiant warmer or in an incubator, the newborn must be dry;
- examined at daylight or day lamps;
- the hands of the examiner must be washed, disinfected, dry and warm;
- the optimal moment for examination - in between feedings (usually 30 minutes after feeding).

After gestational age, the newborn is catalogued between 38 - 42 weeks, and after the birth weight between:

- 2500 - 4000g or more (extended interval)
- 2900 - 3200g (small interval)

Other important parameters which characterize the term newborn are:

- **length**, with values between 48 - 52 cm;
- **head circumference**, with values between 34 - 36 cm;
- **chest circumference**, with values between 33 - 34 cm;
- **abdominal circumference**, with values between 31 - 32 cm.

The gestational age of a newborn can be appreciated using the neurological and morphological criterias (Ballard score, Dubowitz). Morphological particularities are done after birth, but the neurological ones can be repeated 48 hours after birth.

The physical examination:

1. Evaluation of the general state

- ✓ satisfactory
- ✓ average
- ✓ influenced
- ✓ severe
- ✓ extremely severe.

2. Conscience level

- ✓ deep sleep
- ✓ superficial sleep
- ✓ awake, but calm
- ✓ awake, active, does not cry
- ✓ awake, cries.

3. Spontaneous activity

- ✓ attitude
- ✓ active movement
- ✓ grimace, sucking movements

4. Skin

- ✓ on the first day, the skin is red (physiological erythema), due to vasodilation, but after the second day the erythema fades, the skin becomes drier and exfoliates; the skin peeling is either furfuraceous or lamellar;
- ✓ acrocianosis - the cianosis of the extremities is physiological in the first 2 to 7 days;
- ✓ the skin with green tendencies is present when meconium impregnation happens, frequently at newborns with gestational age > 42 weeks;
- ✓ at birth, the skin is covered with a white-grey substance, named vernix caseosa. During intrauterine life, this covering protects the skin against the amniotic fluid's action, during labour has a lubricant role, and in the first few hours after birth - bactericidal role and protective one against the cold;
- ✓ in the first 3 - 4 days of life, some newborns have a benign rash (maculopapular-vesicular rash), named allergic erythema, which fades by the end of the first week of life. It appears as a consequence of the microbial invasion of the gastro intestinal tract, which starts after birth and leads to the formation of the intestinal biocoenosis;
- ✓ in the first week of life some newborns have a benign edema located in the prepubic region, palpebral region, on the dorsal part of the hands and legs (hydroelectrolytic transitory immaturity balance);
- ✓ on the skin, a soft, silky hair is remarked, named lanugo (the first hair produced by the follicles), present on the forehead, sometimes on the back, but not on the palms, soles; it goes away after a few days;
- ✓ physiological jaundice appears in the 2^{nr} - 3^{rd} day of life; it can be observed on the skin once the indirect bilirubin level is above 5 mg/ml;
- ✓ the mongoloid spot is a hyperpigmentation zone, of bluish-grey colour, located at the lumbar level, buttocks, trunk, arms; it fades until the age of 7; it is usually present at the african, asian and romani population;
- ✓ milium, represented by numerous sebaceous glands of whitish-grey colour, situated on the nose;
- ✓ plain capillary angiomas (red spots), situated on the eyelids, forehead and occipital region, fade away in the first year of life; the occipital one can persist.

After the inspection of the skin, several traits will be noted:

- ✓ colour
  - pink/ pink with acrocyanosis
  - plethoric
  - cyanotic
  - jaundice
  - pallor
  - mottled
- ✓ bruises
- ✓ edemas

5. Neurocranium

- ✓ head circumference (normal values: 33 - 38 cm with a mean of 35 cm)
- ✓ the head is big and represents 1/4 of the total body length
- ✓ fontanelles = unossified zones situated at the junction between the wide cranial bones

- **Anterior fontanelle** (bregmatic) has a rhomboidal shape, with the diagnonal between 1 - 5 cm (frequently 3-4/2-3cm). Sometimes this can be extended by the dehiscent sutures, with whom it is in contact.
- **Posterior fontanelle** (lambdoid) has a triangular shape, is situated between the parietal and occipital bones, has small dimensions (1/1,5cm) and is present only at 15 - 20% of the newborns; it closes after the first weeks of life.

  - ➢ Large AF:
    - achondroplasia
    - congenital rubella
    - hydrocephaly
    - osteogenesis imperfecta
    - 13, 18, 21 trisomy
  - ➢ Small AF:
    - craniosynostosis
    - congenital hyperthyroidism
    - microcephaly
  - ➢ Bulging FA:

- intracranial hypertension
- hydrocephaly
- meningitis.

NB! The bulging of the fontanelle during crying must not be characterized as pathological.

➢ Sunken FA:
- dehydration

- Craniotabes = depressible zone which interests the parietal bones, is considered physiological and disappears in the first weeks (8 - 12)
- Aplasia cutis
- *caput succedaneum* = **edematous** and **haemorrhagic** tumefaction of the **subcutaneous cellular tissue** usually located in the occipital region; it disappears rapidly.
- *cephalohematoma* = haemorrhagic collection located **between the bone** and the **periosteum** which *is well defined by the sutures of the skull bones*; it is frequently located at the parietal bone level and disappears in a few weeks or months, often having a tendency to calcify.

6. Viscerocranium

✓ Neck
- congenital torticollis
- asynclitism
- cysts, teratomas, hemangiomas

✓ Extra skin folds
✓ Short neck
✓ Clavicle palpation

7. Face

✓ Shape
✓ Aspect of the nose, mouth, chin
✓ Asymmetry
✓ Face expression - quiet, dissatisfied, painful, hypo- and non-mimical, frightened.

Fig. 1. Aspect of the face: micrognathia

8. Ears

The pinna is cartilaginous, folded. The following will be examined.

- ✓ Shape
- ✓ Insertion
- ✓ Significant anomalies
- ✓ The absence of the pinna
- ✓ Auditory acuity

  - some authors recommend testing for all newborns

  - others recommend testing for: birth weight <1500 g, APGAR score under 5 at 5 minutes, TB: over 20mg%, infection.

- ✓ The reaction to auditory stimuli. Normally, from 27 - 28 weeks of gestation, the baby responds to the auditory stimuli with the cochleo palpebral reflex, flinch, movements of the extremities, slow down of breathing and cardiac beats.

9. Eyes

- ✓ The shape, position
- ✓ Symmetry of the palpebral fissure
- ✓ Stares from the second week of life
- ✓ The light reflex appears in the first 10 days of life
- ✓ At the eye-level can be observed:

  - palpebral edema

  - subconjunctival haemorrhage (benign, due to a prolonged and dystocic labour)

  - nasolacrimal canal impermeability (watery eye with continuous lacrimal secretion)

  - ptosis

  - vertical and rotatory nystagmus

- stable horizontal nystagmus

- physiological strabismus

- congenital cataract (can be present in congenital rubella or in family hereditary diseases)

- "setting-sun" eyes

- doll eyes phenomenon

- miosis

- mydriasis

- anisocoria

10. Nose

- ✓ nasal fossa permeability
- ✓ mucous or serosanguineous rhinorrhea
- ✓ flattened or smooth philtrum

11. Oral cavity

In a healthy newborn, the mucosa is pink, and well-vascularised.

- ✓ it will be observed:

- hard and soft palate integrity

- Ebstein, Ranula cysts, Bohn nodules

- teeth

- abundant saliva

- oral candidiasis

- ankyloglossia

- micro- and macroglossia

- relative macroglossia from Pierre- Robin syndrome (the underdevelopment of the mandible takes place - micrognathia)

- ogival palate

- cheiloschisis (cleft lip)

- palatoschisis (cleft palate)

12. Thorax

- ✓ Normally, the newborn's thoracic cavity has a conical, symmetrical shape.
- ✓ Inspection:
    - symmetry

- respiration (frequency, amplitude, effort)
- hypertrophy of the mammary glands
- high internipple distance

✓ Pathological states:

- asymmetry of the thoracic cavity
- funnel chest
- pectus excavatum/carinatum

✓ Thorax palpation:

- rigidity in pneumonia, pneumopathy, diaphragmatic hernia
- rib fractures can be observed - as a result to resuscitation

✓ Percution - determines the heart limits (and its deviations in hemo-, pneumothorax, diaphragmatic hernia)

✓ Auscultation of the thorax

a) The respiratory system

- chest circumference between 33 - 34cm
- thoracic symmetry, pulmonary sonority, crackles presence, vesicular murmur type
- moist rales can appear immediately after birth
- the thoracic asymmetry is characteristic to pneumothorax, meconium aspiration, etc
- the intrauterine lung is full of liquid which will eliminate through: thoracic compression and sanguine and lymphatic drainage within the first breath.
- respiratory frequency is between 40 - 60 breaths/minute
- the respiration type is diaphragmatic - abdominal respiration
- in a healthy newborn puerile breath sounds are present (the inspiration is longer than the expiration), symmetrically transmitted to both hemithoraces
- for preterm newborns, a decreased respiration is characteristic, being strictly related to the physiological presence of pulmonary atelectasis.

b) Cardiovascular system

- heart rate: high 120 - 140 beats/minute - labile, it can go up to 200 beats/min during cries
- difficult auscultation because of the high heart rate and possible functional transitory murmur
- clear, rhythmical heart sounds
- apexian shock - left parasternal
- pulse (right brachial artery/femoral artery)

- intensity
- rhythm
- synchronism
- pre- and postductal differences

- BP (right arm/right foot)
- pulse pressure (SBP-DBP)
  - 25 - 30 mmHg- term newborn
  - 15 - 20 mmHg- preterm newborn
- slow peripheral circulation - cold extremities
- cardio - thoracic index less or equal to 0,55
- right sided ECG, QRS axis of 120 degrees
- *During the first few days, atrial extrasystoles and murmurs can be present, without pathological significance*

13. Abdomen

✓ Digestive system

- initially, uncoordinated deglutition and esophageal peristalsis can be present, which corroborated with the relaxation of the lower esophageal sphincter, predisposes to regurgitation;

- the sucking mechanism has 2 acts: one of fixation on the nipple and aspiration, and the second one of nipple compression and the effusion of the breast milk in the newborn's mouth (the mouth has a pump role, and the tongue has a piston role);

- the first stool named meconium is eliminated in the first 2 - 3 days, has a dark green colour, sludge consistency and is formed from: digestive epithelial cells, bile, cholesterol and digestive system secretions.

In a healthy newborn, the abdomen has a regularly round shape, participates actively to the act of breathing and the subcutaneous tissue is well developed.

✓ Abdominal distension can be caused by:

- overfeeding
- meteorism
- lower intestinal obstruction
- meconium ileus
- Hirschprung disease

- peritonitis
- perforation
- sepsis
- necrotising enterocolytis
- abdominal tumors
- anasarca

✓ Abdominal excavation:
- dehydration
- upper untestinal obstruction

✓ Abdominal asymmetry:
- diaphragmatic hernia (supple on the hernial part)

✓ Skin colour change:
- blaze pink colour, shiny which is present in peritonitis, necrotising enterocolytis

✓ Abdominal palpation - hardening of the anterior abdominal wall in case of:
- preterm delivery
- abdominal inflammatory process
- scleroderma
- kidney developmental anomalies

✓ Liver
- normally can be at 1 - 2 cm below the costal margin
- high dimensions in: intrauterine infection, perinatal asphyxia, hereditary metabolic diseases, hemolytic disease of the newborn and other types of jaundice

✓ Spleen
- normally placed at the costal margin
- high dimensions in: intrauterine infection, hemolytic diseases of the newborn, hereditary spherocytosis

✓ Kidneys
- normally, only the right kidney can be palpated

- the palpation of both kidneys or their rugged surface leads to developmental anomalies

- ✓ The umbilical cord is formed from a vein and 2 arteries in a mucous connective tissue (Wharton's jelly), which after ligature and section has 3 phases:
  - mummification
  - umbilical stump delimitation line at the amnio cutaneous border
  - detachment in the 5^{th} - 7^{th} day of life

The umbilical stump is epithelising slowly, from the periphery to the centre and heals; through the retraction of the umbilical vessels, the umbilical scar gouges.

Alterations of the umbilical cord are as follows: short, true umbilical cord knot, congestion, edema, secretion, meconium impregnation.

14. Urogenital and anorectal system

- urine passing appears in the first 6 - 12 days
- the presence of a vesical globe suggests urethral obstruction
- meconium passing
- the absence of meconium can suggest an occlusion
- the position and the permeability of the rectum will be checked
- for boys:
  - the scrotum is plicatured and the testes are descended
  - **hydrocele** can be seen, which is physiological until 6 months of age, or even **ectopy**
  - **phimosis,** normal for this age
- for girls:
  - labia majora covers the labia minora and the clitoris completely
  - hormonal genital crisis (mucous or sanguinolent vaginal discharge)

15. The osteoarticular system

- the number of the fingers, toes, their shape and movement will be evaluated
- palmar fold
- clubfoot (varus equin, thalus valgus)
- vertebral column is evaluated for observing a certain myelomeningocele

- coxofemural articulation is evaluated (through the Ortolani method and the Barlow technique, for identifying a congenital hip dislocation)

16. The nervous system

- ✓ The newborn is a *subcortical being*; this means an *exaggerated muscular hypertonia, along with a flexion position,* which is more noticeable during cries.
- ✓ In the first hours of life, the newborn is in a silent state (rehabilitation after the delivery stress), then the spontaneous motility becomes explosive, the cry is maintained and vigorous.

- *In a newborn*
  - evaluation of the cry, mimics, tone (passive, active)
- *In an infant*
  - examination of the motricity, tone, osteotendinous reflexes
  - examination of a spasticity (hypertonia, hyperreflexivity, clonus of the foot and knee cap)

- ✓ Newborn's cry - the *intensity* (strong, weak, absent), *duration* (short, for a long time), *modulation* (cephalic, aphonic, nasal, high pitched), *emotionality* (the emotional cry appears at the appliance of the stimulus and ends shortly after it is interrupted) traits will be evaluated.
- ✓ The *deep tendon reflexes* due to incomplete myelinisation of the pyramidal fascicle are ample, and the presence of the *cutaneous plantar Babinski reflex is positive*. The spontaneous motor activity consists of anarchical, uncoordinated moves.
  - The deep tendon reflexes:

  - biceps reflex
  - patellar reflex
  - achilles reflex
- ✓ There is a certain *hypertonia o the flexing muscles*, which is *normal* for a newborn.
- ✓ The primitive neonatal reflexes (archaic) are characteristic and indicate the immaturity of the cerebral cortex, as well as the diminished degree of the inhibition zones from the base of the brain, these being:
  - the rooting reflex
  - the sucking reflex

- the swallowing reflex
- the cardinal points reflex
- the support reflex (static attitude test)
- the stepping reflex (automatic walking reflex)
- ventral suspension reflex
- the parachute reflex
- Moro-Freudemberg reflex
- Landau reflex
- tonic labyrinthine neck reflexes
- Peiper's tonic reflex
- the grasping reflex
- the Babinski reflex
- the Galant reflex (chapter V)

During the course of morphofunctional development of the nervous system, there are a series of characteristic reactions to a certain step; these transitory specific reflexes appear only at a certain age, and the lack of their appearance, as well as their persistence for a longer period of time is pathological. In case of certain lesions, some transitory specific reflexes can appear again in older children or even in adults.

- Neurological disorder signs:
  - signs of intracranial hypertension
  - hypo- /hypertonia
  - weak sucking, diminished swallowing reflex
  - irritability, hyperexcitability
  - superficial, irregular breaths, or even apnoea
  - apathy, fixed look
  - typical/atypical seizures
  - absent/exacerbated reflexes
  - asymmetrical reflexes.

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CHAPTER VII

THE PEDIATRIC PHYSICAL EXAMINATION

The physical examination is represented by a sum of standardized techniques which have a role of detection of the past and present patient's condition in the hopes of establishing a diagnosis, prognosis and therapeutic scheme; it is realized by: anamnesis, inspection, palpation, percussion and auscultation.

The clinical examination will take place with the patient in the supine position, orthostatism and in motion, by inspection, palpation, percussion, auscultation; it will be realized systematically.

The examination of the pediatric patient presumes:

- physician's good professional training
- patience and good cooperation with the suffering patient
- optimal contact with the child: the little ones must be encouraged, pupils treated like adults
- the examination must always be with good care and conscience
- the child will be undressed for each segment, in the supine position
- in the presence of parents or of close relatives - shyness

The way in which the examination takes place depends on:

- the child's general state
- the character of the signs and symptoms
- the child's adaptation to the examination surrounding
- the doctor's, parent's or next of kin's patience
- the communicating skills of the medical personnel

➢ General examination

1) The child's general state: good, influenced, severe, extremely severe

2) Child's cooperation to the examiner: lucid, cooperant

3) The child's position: normal or hypotonic, sitting or lying down position, deformity of a body part, obvious asymmetry, congenital malformations

4) The child's somatic development or it's nutritional status: underweight, short stature or high stature, overweight, proportionate or disproportionate child.

- *Clinical examination on systems:*

1. Cephalic extremity

- microcephaly
- macrocephaly
- hydrocephaly
- meningocele
- encephalocele

2. Face

- face asymmetry
- craniofacial dysmorphism
- eyes: exophtalmos, enophtalmos, strabismus, eyelid paralysis, nystagmus, ptosis, edemas
- nose: shape, size, nasal fossa permeability, characteristics of the secretion, epistaxis
- ear: position and morphology of the pinna, existence or non-existence of ear discharge
- oral cavity - inspection of the lips, teeth, oral mucous, gum, tongue, salivary glands, soft and hard palate
- neck: position, the existence of localized tumefaction, pterygium colli (cutaneous fold in the lateral-cervical region), short neck

3. Skin

- pigmentation - normal or emphasised - pale, with facial erythema, cyanotic, icteric, greyish
- with or without exanthema (rash which appears on the skin in case of contagious diseases, as measles, scarlet fever, etc.)
- depigmented or hyperpigmented skin, nevi, hemangiomas, different types of cutaneous hemorrhages, purulent or non-purulent cutaneous infections, cutaneous nodules, scars, cutaneous hypertrichosis, squama, micro- and macrolamelar desquamative process.

4. Lymphatic node system

- if the lymphatic nodes are palpated, it is necessary to write down the following: position, number, consistency, adherence, sensibility and their dimension.

5. Respiratory system

- *Inspection:*

- Breathing: rhythmical, respiratory frequency 22/min, the nasal wings don't participate in breathing, the voice is normal

- The quality of the breathing and of the circulation: intercostal and subcostal retraction, compromised circulation - radial and femoral arterial pulse, jugular stasis, cold skin, etc.

- Thoracic cavity: symmetrical, bone deformities, intercostal retraction

- Both hemithoraces uniformly participate in the act of breathing.

- *Palpation:* elasticity - preserved, vocal vibration - transmitted on the whole pulmonary area.
- *Percussion:* clear sound on the whole pulmonary area
- *Auscultation:* vesicular breath sounds appear on the whole pulmonary area, present or absent pulmonary rales.

6. Cardiovascular system

- *Inspection:*

- pathological pulsation of the carotid arteries, jugular vein turgescence, swelling of the precordium region - absent.

- *Palpation:* of the apex beat in the V^{th} intercostal gap, on the left midclavicular line, 1 cm dimension, cardiogenic shock - absent. The pulse of both radial arteries is 52 beats/minute.
- *Percussion:* the limits of the absolute and relative dullness
- *Auscultation*:

- important stage, will be realized cm by cm listening carefully, as well as collaborating with the patient

- characterising the cardiac sounds (sonority, tonality, frequency, dedublation, rhythm; the characteristics of the systolic and dyastolic murmurs - the tone quality, intensity, more clear auscultatory focus, radiation, their modifying character once the body's position and physical effort are completed).

7. Digestive system

- *Inspection:*

- topographical alignment of the abdomen and the thorax

- abdominal shape

- venous circulation

- the abdomen does not participate in the breathing act; rectus abdominis diastasis - does not appear

- in an infant will be noted: umbilical stump state, congenital malformations, inflammatory processes of the abdominal wall

- *Palpation:*

- is one of the most difficult steps of the examination; it will always be done in supine position and the examiner must have a warm hand

- in the presence of pain, examination is done first in the contralateral part and downwards - upwards, gently and step by step

✓ *Superficial palpation of the abdomen*:

- the abdomen is soft, or painful in the epigastric or in the right hypochondrium

✓ *Deep palpation of the abdomen:*

- the sigmoid colon, cecum, final part of the ileum, ascending and descending colon, transverse colon - cylindrical, soft, painless during palpation

- the palpation of the liver - its lower limit is round, soft, painless, smooth liver surface

- the palpation of the stomach is painless, the spleen is not palpable beneath the lower left costal margin

- the mesenteric lymphatic nodes are not palpable; the pancreas is not palpable

- *Percussion:*

- the liver is at 1 cm beneath the costal margin

- the organs containing air have specific sonority

- free abdominal fluid collection - in dorsal decubitus it is symmetrical

- encysted collections (cysts, tumours) remain topographically unchanged at the change of the body's position

- *Auscultation:*

- intestinal peristalsis

- the bowel sounds can be heard by ear

- if a supraumbilical systolic murmur is percepted (on the median line), an aortic stenosis can be suspected

- silent abdomen: atresia, paralytic ileus etc.

8. Oral cavity - the last one examined

- inspection of the lips: smooth, with no visible exterior lesions
- tongue surface: smooth, with prominences, crenated, coated tongue, dimensions
- teeth: number, chronological order, shape, cavities, pathologic traits
- gums: normal or not, with or without visible breaches, tumefaction
- palate: symmetry, surface, quality of the covering tissue
- posterior pharyngeal wall: granulation state, secretion quality, if it is visible on the posterior wall

9. Reno-urinary tract

- *Inspection:*
  - the presence of paleness, periorbital, facial, lumbar edema
- *Palpation:*
  - kidneys, bladder, ureters
- *Percussion:*
  - Giordano - Pasternațki sign - will be used only after the age of 6, before this age it cannot be appreciated
  - upper limit of the bladder
- *Auscultation:*
  - pathological murmurs of the renal arteries - should not be detected
  - painless urination

The aspect and frequency of the urine will be noted.

10. External genital organs

- observing an eventual sexual ambiguity
- evaluation of the puberty stage of development
- determining the cryptorchidism, and the different topographical forms
- evaluating different hernias: inguinal, femoral - using the tip of the finger
- differentiate the hydrocele by inguinal hernia
- attention to the rectovaginal fistula (girls)
- observing phimosis, balanitis, hypo- epispadias
- vaginal or urethral discharge

11. Dorsal region

- gluteal dermatosis
- rectal prolapse, anal fissure
- rectal examination using the little finger (incomplete ano-rectal imperforation, the expansion level due to fecal waste storage)

12. Nervous system

During the neurological examination, the following will be attended to:

- general state
- facial expression
- general body posture
- motor disorder such as: limp, waddle walk, uncoordinated moves, tics, fascicular tremor, myoclonia, seizures, speech impairment, movement or extremity asymmetry

- *Infant*
  - motricity, tone, root reflexes examination
  - evaluating a certain spasticity (hypertonia, hyperreflexia, foot or patella clonus)

- *Child*
  - muscular tone: muscular consistency during palpation
  - sensibility using the passive mobility of segments for detecting hypo- or hypertonia
  - muscular force: upper and lower extremities
  - reflexes: root and cutaneous
  - coordination: global (walk, mantaining the vertcal position), segmentary (finger-to-nose test, etc)

In case of pathologic deviations (occipital muscles rigidity, bulging anterior fontanelle, Kernig, Bridzinski positive signs) the dates are indicated for all age groups.

Also, the following will be noted:

- temporospacial orientation
- emotive reaction
- memory and sleep disorders
- decrease in visual acuity

- meningeal signs

- elongation signs

- superficial and deep sensibility

- nervous vegetative system

- vasomotor disorders

- trophic and secretory disorders

- mobility of the eyes - pathology present or not, nystagmus - absent, pupillary reflex - present

- examination of the cranial nerves - without particularities

13. Endocrine system:

- size anomalies (dwarfism, gigantism, short stature)

- fat tissue uniformly distributed

- palpation of the thyroid gland: normal dimensions, elastic, painless, deglutition is normal.

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CHAPTER VIII

THE OBSERVATION FORM

I. INTRODUCTION:

Granting medical assistance in the specialty stationary - HOSPITAL (realized by admission) structures patient data from the admission moment to the release, gradually, based on symptomatology, techniques applied and therapy administered - in a typified file, elaborated by the Minister of Health and named the OBSERVATION FORM.

In neonatology, compared to adults, there are some physiological variations of systems' development, by age, and the short-term evolution is rapidly modified. For this, the observation form used in neonatology has certain particularities which must be known.

II. STRUCTURE

- It is a **medico-legal document** which accompanies the patient admitted to a clinic.
- **Value:**

- **medical** - contains information which contributes to the establishment of a diagnosis and justifies the therapy

- **juridical** - attests and justifies the quality of the medical act before the habilitated authorities and helps with the work capacity expertise

- **scientific** - used in scientific prospective studies

- All the information in the observation form are strictly confidential and can be used only if the respective authorities requisition it.

The observation form contains:

- data identification of both the patient and family

- date and hour of admission

- type of admission into hospital (emergency or not, brought by the ambulance service or not, sent by a physician or not, transferred from other clinic - mentioning the reason, etc)

The family medical history, which specifies the familial pathologies:

- physiologic and pathologic personal history could justify the evolution of the disease
- history of illness
- patient general state
- clinical examination, biological and paraclinical investigations done on the admission period
- daily and hourly evolution until the discharge moment

The final diagnosis has different stages:

- on the admission moment (along with specifying the disease codification from the Minister of Health's lists)
- revised diagnosis after 72 hours (with the help of biological and paraclinical investigations)
- discharge diagnosis (along with specifying the disease codification)
- in case of unfavorable evolution there is also the death diagnosis (which holds all the morbid states which can explain the appearance of the lethal process, structural aspects established by the ABC evaluation)

Since 2003, a new admissions monitoring system has been established, which withholds the old "Observation form in Neonatology" with "General observation form". Even so, the one used in Neonatology is different from the one used for adults, because it has certain informations about the patient (newborn) which hold specific development particularities, and about the patient's relatives (parents, brothers, sisters).

The observation form has 9 mandatory pages; the evolution form is added; the temperature form and the one which holds all the investigations (in some clinics, this form is replaced with separate investigations papers, which are attached to the observation form). Most Neonatology services prefer the integrated investigation form.

1. The first page of the observation form contains:

- a special rubric where the admitted patient's institution data are written
- form registration number (from the big/small register)
- patient's personal identification number
- the name of the physician which completed the observation form, by applying the medical stamp and signature

The redaction of an observation form implies:

- picking up complete, precise and objective information
- a systematic and well conducted clinical examination
- semiologic clinical data systematisation, which permits:

- discussing the diagnosis
- requesting complementary examinations

- therapy prescription and, if necessary, preventive measures

The redaction of a pediatric observation form leads specifically to:

- gathering information regarding the child and his environment (familiarly, scholarly)
- knowing the semiologic specific child data (developing) and their comparison to the correspondent age norms (for example: weight, height, head circumference, heart rate, blood pressure)
- picking up the data will take into consideration the family's anxiety

CLINICAL GENERAL OBSERVATION FORM written in capital letters; in the upper part of the page the form is separated into two regions: patient's identification data and admission/discharge chronology.

1.1. Child's identification data includes: name, surname, sex, date of birth (day, month, year), written in capital letters, written clearly and completely for not generating confusions.

The legal residence (county, city, street) is taken from the mother's identification documents (of the child's if he is 14 years old and has an ID). The number and series of the next of kin's ID must be specified (usually the mother's), if the child attends a nursery, kindergarten, school, mother's name, her school life, marital status, occupation and work place, father's name, occupation and work place.

1.2. Chronological data regarding the admission

This king of data is written in the right upper part of the observation form, where the following will be written: admission date, discharge date, the number of days the patient was admitted, and if the case presents, the number of days the mother received medical leave.

Underneath is included the patient's information regarding the Health Insurance Fund, specificating which Fund he is attributed to (which county).

In the center of the page are mentioned the type of admission and the correspondant code:

- emergency - 1
- sent by the general practitioner - 2
- sent by a specialized physician from the ambulatory - 3
- inter-hospital transfer - 4
- on demand - 5
- other - 6

1.3. Diagnostic referral will be mentioned in the referral, specificating the name and status of the doctor who sent the patient (specialty, rank). At the right margin of the page, near the diagnostic referral there is a field with 4 spaces for writing down the code of the diagnostic.

1.4. 72 hours diagnostic. This is elaborated in the first 72 hours after admission after: the admission reasons, initial state, results of the biological and paraclinical investigations, evolution and response to the therapy administered for 3 days. If the patient leaves the hospital (for different reasons) before 72 hours, this field is not completed.

1.5. Discharge diagnostic is based on the major diagnostic (which is encoded) and secondary diagnostics (complications/comorbidities), all having special encoding fields.

2. The second page of the observational form. This page contains aspects about the surgery interventions. In the lower part of the page, there is a table for the cases which need transfer between the hospital's departments (the department's name from which the patient is transferred, and the one he's being transferred to; the date of admission, of discharge and the hours of the transfer, the total number of days of hospitalization).

Under the table, there is specified the patient's state at discharge (cured - 1, improved - 2, stationary - 3, aggravated - 4, deceased - 5) and the type of discharge (discharged - 1, discharged by demand - 2, transfer - 3).

3. The third page. Has two different chapters.

The upper half is completed only if the patient dies within the hospital, mentioning the evolutive aspects, chronologically, the main causes of the death process and the anatomopathological findings.

It will be specified:

- the day, month, year the death happened, specificating the direct, immediate causes that led to the patient's death

- the anatomopathological micro and macroscopical diagnosis
- morphological code in case of neoplasm

In the lower part of the page there are mentioned:

- the functional explorations (ECG, EEG, EMG, ECHO, with the specific codes)
- interventional maneuvres (otoscopy, tympanotomy, bronchoscopy, gastroscopy, catetherism, etc, and each code) and imagistic investigations, with the respective code, type and number.

4. The fourth page. In order, the following will be completed:

- reasons for admission
- family history data
- personal, physiological, pathological personal history
- psycho-motor development
- alimentation
- vaccinations and vitaminization
- history of the disease

4.1. In the *reasons for admission* section there will be noted the main reason and all the symptoms that led to the admission, in their chronological order.

4.2. In the *family history data* section will be noted the following (including allergies):

- actual age of the mother and father, profession, ethnicity
- personal history (the main pathological history)
- consanguinity
- brothers/sisters, their date of birth, neonatal and pathology history
- particular pathology of the grandparents
- Koch bacillus contact within the family (mentioning the relationship of the child with the respective infected person)

The pathology found in the family history must be found out by asking straight questions, and by making sure the patient's family fully understands the content of the questions asked.

4.3. *Personal physiological history*

a) *The pre-, peri- and neonatal period*

- the mother's number of pregnancies
- gestational age at which the birth took place (preterm babies are associated with specific pathologies)
- the place where the child was born (hospital, birth houses, dispensary, home)
- if qualified personnel attended the birth or not
- weight and length at birth, the presentation (normal- cephalic, or dystocia - pelvic, podalic, facial)
- labor circumstances (spontaneous, induction, cesarean section - what were the reasons, were special maneuvres necessary - forceps, vacuum)
- the presence of injury signs at birth, trauma (with topographic specification: cranium, clavicle), cord around the neck (simple, double, triple) - with hypoxia risk, umbilical cord prolapse - asphyxia risk, prolonged apnea signs (blue asphyxia, or white - more severe)
- APGAR score at 1 and 5 minutes of birth, represents a synthesis of the general state at birth because it evaluates the skin, central pulse, rhythm and frequency of breaths, soft stimuli reaction, tone and extremities position.
- age and weight at discharge (from maternity)
- presence, duration and intensity of neonatal jaundice
- circumstances of growth, height and weight chart, pathology of the first month of life

It is noted if *the pregnancy has the following pathologic events:*

- maternal infections which lead to fetal infection: rubella, measles, epidemic parotiditis, acute viral hepatitis, flu, lues, tuberculosis, AIDS, toxoplasmosis, cytomegalic inclusion body disease, urinary tract infections, etc.
- maternal trauma
- imminent abortion (circumstances, traumatic or not, at what gestational age, unique event or repetitive), previous uterine interventions or concomitant to the present pregnancy - which was the cause, etc.
- pregnancy evolution, normal or toxic pregnancy, hypertension or edemas.

b) *Vaccino-prophylaxis*

- BCG, DTP polio, MMR; dates of the vaccination and of the booster doses administration
- Tuberculin testing: dates and results

c) *Vitamin D supplementation*

- when the prophylaxis was started, the duration and total dose

d) *Alimentation and breastfeeding*

- breastfeeding: duration and ways of feeding
- the moment the cow milk was introduced
- formula: type, name, preparation
- farinaceous dishes: when it was introduced (mentioning if it is gluten free or not)
- the moment of diversification: chronology, with what product (meat, vegetables, fruit)

Actual diet:

- the number of meals and the hourly schedule; meal volume; type; way; greedy child or with a low appetite; is he "forced" to eat?
- supplementation with: vitamin D (type, doses, ways of administration); multivitamins
- food refusal: vomiting, number and aspect of stools, abdominal pain

It is necessary to indicate in the observation form the child's alimentation at the moment of admission, and, if needed, the correction is mandatory.

e) *Physical and neropsychical development:*

- the dynamics of the body index and height gain, monthly
- stage of neuropsychical development
- child's age when he begins pre-school, school
- conclusions regarding the child's physical and neuropsychical development

4.4 Personal pathological history

- Medical:
  - contagious diseases (measles, chicken pox, mumps, rubella, scarlet fever, etc.); we are interested in the moment the disease appeared, the duration and the severity
  - upper and lower respiratory tract conditions (nasopharyngitis, angina, ear infection, bronchitis, pneumonitis)
  - digestive disorders (gastro-esophageal reflux, vomiting, diarrhoea)
  - seizures
- Surgical:
  - adenoidectomy
  - tonsillectomy
  - appendectomy

f) *History of the present disease:*

- will be made with clarity and strictness
- the date and way of the debut will be noted
- associated signs/symptoms will be sought:
  - which can lead to the etiology (cough, rhinorrhoea, vomiting, fever)
  - which indicate severity signs (impaired consciousness, cyanosis crisis)
- evolution from the start (regression or worsening, new signs, impact on nutrition and hydration, already done laboratory tests)
- diagnosis and treatment already carried out

5. The fifth page is the most comprehensive; here will be detailed all the clinical information gathered, on systems, along with the general physical examination which pleads for the pathology which determined the admission.

6. The sixth page is intended for *laboratory findings and interdisciplinary consults results.* In many hospitals, a separate paper can be added which mentions the investigations after a special order (pneumology, hematology, nephrology, etc.).

7. The seventh page holds data regarding the eventual surgical investigations (surgical protocol- detailed) and the anatomopathological examinations.

8. The eighth page has two parts.

The upper part of the page is destined to supporting the diagnosis and the treatment, based on the clinical arguments, laboratory findings and paraclinical explorations.

The lower part of the page is destined to the discharge summary, where the conclusions of the admission reasons, history of present disease, investigations which sustain the diagnosis, the maneuvres necessary for its completion, the therapy used, the evolution are all written in this part. At the end, further indications are noted, specificating if necessary, the next medical check-up, indicating the place where this will be held (general practitioner, hospital, etc.).

9. The ninth page. The observation form has a temperature paper as an annex. Here will be specified:

- the ward, bed number
- patient's name and surname (if the admission is together with the mother)
- age and diagnosis
- number of the obervation form

On the first two rows the day of the disease will be noted, together with the date; underneath, in the little square zone the evolution graphic will be made (on admission days), of temperature, blood pressure, heart rate, respiratory frequency and weight. In the lower part, the urine quantity will be specified (in ml), the number of vomits, as well as the presence of stool as follows:

- normal |
- watery -
- mucous x
- meconium m
- semi-watery /
- rough-grained z
- with blood s

The height, chest circumference (cm), ponderal index (actual weight/ideal weight) will also be noted.

The infant alimentation is noted using the following colours:

- ✓ red= for breast milk,
- ✓ blue= cow milk,
- ✓ green= for acid milk products
- ✓ brown= floury,
- ✓ yellow= carrot soup. It is indicated to note the caloric value of the indicated aliments each day.

If the patient has a special diet, it will be specified, for example: low-sodium diet, liver disease diet, etc. For patients with nutritional diseases or metabolic ones, the alimentation will be specified with calories, the proteins, lipids, carbohydrates using gram weight, on a special paper, added to the observation form, or intensive care papers, with the hourly evolution and parameters linked to the efficiency of the assisted ventilation, water balance, neurologic and ventilation evaluation.

CHAPTER IX

VITAL SIGNS MONITORING IN NEONATOLOGY AND PEDIATRICS

ANTICIPATING SPECIFIC PATHOLOGIES

Vital signs monitoring is an important part of maintaining the newborn's and infant's health and is extremely important for early detection of the aggravation of the clinical status.

The vital signs monitor can register the vital parameters such as breathing rate, heart rate, blood pressure, temperature, and when they appear abnormal, the device will detect them and announce the medical staff.

The vital parameters include:

- breathing
- heart rate
- blood pressure
- temperature

Monitoring of this signs represents a necessary means for indicating health or disease, especially under these circumstances:

- when something changes in the general health state
- before and after invasive diagnosis procedures
- before and after surgeries
- before and after the administration of certain medication which has an effect upon the respiratory and cardiovasculary system
- patient admitted to the intensive care unit
- while the patient is transported

Normal values of the vital signs

A. Normal values of the respiratory frequency

Newborn	40 - 55 per minute
In the first 3 months	40 - 55 per minute
At the end of the 1st year	35 per minute
2 years	32 per minute
3 years	30 per minute
5 years	27 per minute
11 years	24 per minute
Adult	15 - 16 per minute

- **The type of breathing**
  - *Newborn:*

    - abdominal breathing

    - nasal breathing if the respiratory tract is not permeable

    - irregular rhythm
  - *Infant:*

    - progressively turns into toracoabdominal breathing

    - after 6 months can breathe through their mouth
  - *After 2 years old:*

    - similar to the adult breathing

B. Normal values of the heart rate

Age	**Minimal rate**	**Maximal rate**
Newborn	80	160
3 months	120	200
1 year	100	180
8 years	65	120
12 years	60	110

Newborn	140 - 150 beats per minute
6 months	130 beats per minute
1 year	125 beats per minute
2 years	120 beats per minute
4 years	100 beats per minute
8 years	90 beats per minute
12 years	85 beats per minute

C. Normal values of the blood pressure

AGE	**mmHg - MAX-MIN**
Infant	90 - 60
2 - 3 years	95 - 60
4 - 6 years	100 - 65
7 - 9 years	105 - 65
10 - 12 years	110 - 70
13 - 15 years	120 - 80

Mean blood pressure values for newborns depending on their birth weight [47]

	<1000 g	**1000 – 1500 g**	**>2500 g**
At birth (mmHg)	33 ± 15	39 ± 18	49 ± 19
1 week (mmHg)	41 ± 15	47 ± 18	60 ± 19
2 weeks (mmHg)	45 ± 15	50 ± 18	64 ± 19
4 weeks (mmHg)	48 ± 15	53 ± 18	68 ± 19

The optimal method for measuring the blood pressure has to be simple, non-invasive, painless and to offer continuous measurements, but unfortunately such a method was not discovered yet [5].

The most used method for measuring the blood pressure is the oscillometric one [9,54]. Using this method, the mean blood pressure is measured directly based on the oscillations of the arterial wall, and both the systolic and diastolic pressures are calculated afterwards, from the mean blood pressure, using an algorithm included in the device [52]. The method is fairly accurate to be routinely used in the clinical practice, if the right standard cuff, appropriate to age is used [26,42,58,59]. The oscillometric method has the advantage of being easily utilized and measures the heart rate as well.

D. Normal temperature values

- ✓ **Rectal temperature**

  - normal values: *35,5 - 37,5˚C*

  - is measured using a mercury thermometer, which is introduced in the rectum with an angle of 30˚, 3 cm at a term newborn, 2 cm at a preterm newborn

  - duration: 1 minute

  - is not used in NEC

- ✓ **Axillary temperature**

  - is measured in the axilla, for 3 minutes

  - normal value: *35,6 - 37,3˚C*

- ✓ **Abdominal cutaneous temperature (skin temperature)**

  - normal values:

    - term newborn: *35,5 - 36,5˚C*
    - preterm newborn: *36,2 - 37,2˚C*

  - is measured using a cutaneous sensor, placed on the abdominal skin (by avoiding the liver and the costal arch). The electrode can be fixed with adhesive.

- ✓ **Plantar temperature**

  - normal values: *34,5 - 35˚C*

- ➢ **Temperature monitoring:**

- ✓ *Continuous*

  - preterm <1500 g

  - term newborn with central temperature <34˚C, until it is normal

- severe asphyxia at birth
- septic shock
- meningo cerebral hemorrhage

✓ *Discontinuous (intermittent)*

- hourly, until the temperature is stable in the first 24 hours
- 4 to 4 hours, from the 2nd and 3rd day
- every 4 hours, from day 4 to day 7
- after day 8, every 12 hours

➢ **<u>Types of thermometers:</u>**

✓ *Standard mercury glass Benchmark thermometer*

- time of measuring more than 3 minutes
- risk of breaking and poisoning by the mercury evaporation
- is not used anymore in the neonatal units

✓ *Electronic thermometer* - most commonly used

- the thermic sensor can be thermistor or thermocouple
- temperature signal is processed and digitally displayed
- determination period under 45 seconds
- small dimensions, easily handled

✓ *Infrared electronic thermometer*

- has a sensible infrared sensor which detects the radiant energy from the tympanic membrane
- the sensor then converts the infrared electric signal which will be processed and shown on the digital screen as temperature
- under 2 second measuring time.

ANTICIPATING SPECIFIC PATHOLOGIES

- **Important clinical signs of the respiratory system**

- ✓ **Thoracic deformities**

- emphysematous thorax: asthma, bronchial chronic obstructive pulmonary diseases

- paralytic chest (phthisic): malnourished children or children with severe bronchopulmonary diseases

- infundibuliform chest: Marfan syndrome, Ehles Danlos

- rickets affected chest: in severe rickets

- kyphotic thorax: vertebral column deformation

- unilateral chest bulging: foreign body aspiration with ball-valve mechanism, pleurodesis, pneumothorax

- unilateral chest retraction: pulmonary atelectasis, unilateral pulmonary fibrosis

- ✓ **Coughing** - reflex act of protection, started by the stimulation of the irritation receptors within the respiratory tract. Extremely common, the mechanism is always the same no matter its cause.

Clinically, several aspects of coughing are distinguishable, which are extremely useful in the etiological diagnosis:

- *Dry irritating cough:* dry nocturnal throat, adenoid vegetations, respiratory infection debut
- *Dry, irritative, progressive cough*: inflammatory process of the pharynx, larynx, trachea, bronchi
- *Productive cough, with expectoration (older children)*: respiratory tract infection, bronchitis, pneumonia
- *Nocturnal cough, barking-like cough:* acute laryngitis, laryngotracheitis
- *Periodical, suffocating, dry cough:* foreign body
- *Paroxysmal, tormenting cough, with white mucus expectoration:* whooping cough, adenoviral infections (sometimes)
- *Cough with serious aphonia*: diphtheria
- *Metallic, loud cough:* psychiatric causes, tracheitis
- *Jerky, painful, contained cough*: dry pleurodesis
- *Weak, dry, pertussis-like cough*: interstitial pneumonia, mucoviscidosis

- *Weak, dry cough with aerated expectoration*: pulmonary edema, circulatory stasis
- *Paroxysmal, dry cough, with mucus expectoration*: obstructive bronchitis, asthma
- *Tormenting, dry cough with purulent expectoration:* bronchiectasis
- *Bitonal cough*: foreign body, trachea compression, bronchus compression
- *Hemoptoic cough:* the ORL area, tongue trauma, foreign bodies, pulmonary abscess, cavern, hemangiomas, arteriovenous disorders.

- ✓ **Stridor -** obstruction of the upper respiratory part, characterized by a rough sound made by the passing of the turbulent air flow through a partially obstructed segment.
    - Causes:

    - acute laryngitis, laryngotracheitis
    - allergic laryngitis (pseudocrup)
    - laryngeal edema (angioedema)
    - epiglottitis
    - foreign body aspiration in the upper respiratory tract
    - laryngeal malformations
    - supraglottic mass
    - adenoid vegetation hypertrophy, abscesses, periglottic tumors

- ✓ **Hemoptysis -** the elimination of blood coming from the inferior respiratory tract (laryngo-tracheo-bronchic or alveolar spaces) through coughing.
    - Causes:

    - infections in the bronchopulmonary respiratory system
    - staphylococcal, pneumococcal pneumonia (lobar pneumonia)
    - pulmonary destructions, pulmonary abscess, necrotising enterocolitis
    - pulmonary tuberculosis
    - foreign bodies in the respiratory tract
    - trauma of the thoracic organs

- ✓ **Tachypnea -** acceleration of breath
    - Causes:

    - respiratory insufficiency sign
    - pneumonia informative sign
    - chronic bronchopulmonary process exacerbation

- ✓ **Bradypnea -** slow breathing which can influence the inspiratory and expiratory times

- ✓ **Orthopnea** - dyspnea that doesn't allow the supine position and forces the child to sit on a chair or to stand up

- ✓ **Apnea** - the breathing stops for a longer or shorter period of time. If it is <10 seconds and with no bradycardia or cyanosis, it is considered physiological in a newborn.

- ✓ **Preterm apnea** - the interruption of breathing for more than 20 seconds or any respiratory break of a shorter period of time but associated with cyanosis, bradycardia or both. It is usually caused by a transitory disorder of the respiratory control (preterm apnea) or, rarely, by a severe state like: sepsis, hypoglycemia, intracranial hemorrhage, seizures or drug ingestion by the mother.

- ✓ **Groan -** expiratory sound heard due to the partial occlusion of the glottis, which maintains an intrathoracic pressure which opposes to the alveolar collapse. It represents a sign of struggle in case of a diminished compliance when acute newborn dyspnea happens.

- ✓ **Thoracic cage retraction -** the retraction of the thoracic cage, in its lower part
    - Causes

  - sign of severe respiratory insufficiency
  - sign of severe pneumonia
  - asthma attack
  - chronical pulmonary diseases

- ✓ **Dyspnea -** sensation of difficult breathing reported by the patient. Its etiology is polymorphic
    - Clinical types

  - inspiratory
  - expiratory
  - mixed

- Causes

- physiological - effort dyspnea of healthy children
- restrictive dyspnea from pulmonary fibrosis, thoracic cage deformities
- obstructive dyspnea- asthma, laryngitis, foreign body aspiration
- epiglottitis
- pulmonary parenchyma impairment - pneumonia
- ventilatory disorders in case of pneumothorax, pleural effusion
- upper respiratory tract congenital malformations
- pulmonary hypoplasia
- congenital cysts
- progressive congenital pulmonary emphysema
- hernia, relaxation, diaphragmatic paresis

✓ **Nasal flaring -** the nostrils widen with every breath. Due to the fact that nasal and pharyngeal resistance represents 50% of the newborn's respiratory tract resistance, the effort of breathing is probably decreased through the nostrils widening.

✓ **Wheezing -** high-pitched, whistling breathing conditioned by the bronchial obstruction (partial, localized, diffuse)

- Causes:

- recurrent wheezing, bronchial hyperresponsiveness, atopia, cutaneous allergic reactions
- effort induced asthma
- cough, suffocation during physical practice
- asthma
- broncho obstructive syndrome with anti-inflammatory treatment
- asthma bronchitis
- bronchial hyperresponsiveness, irritating cough when exposed to inhalatory allergens (tabacisn, smoke, exhaust gase, fog)
- viral infections (respiratory syncytial virus)
- atypical infections - chlamydiasis, mycoplasma infection
- bacterial infections

✓ **Cyanosis -** bluish colour of the skin and mucous membrane. Physiopathologically, cyanosis is an oxygen desaturation of the blood flowing through the cutaneous capillaries, appearing when the reduced hemoglobin concentration is above 5 grams/dl in the peripheral circulation.

- Cause:

- respiratory insufficiency
- oxygen transfer disorder through the alveolocapillary membrane
- low pulmonary perfusion or the pulmonary territories less or not ventilated at all
- amniotic fluid aspiration syndrome
- hyaline membrane disease
- pneumonias
- Mikity-Wilson syndrome
- bronchopulmonary dysplasia
- pulmonary arteriovenous shunt
- mechanical causes which interfere with the pulmonary ventilation: lobar emphysema, diaphragmatic hernia, pneumothorax, pneumomediastinum, thorax malformations, tracheoesophageal fistula, bronchogenic cyst, choanal atresia, mediastinum tumors

➢ **Clinical signs in heart rate changes**

✓ **Sinus bradycardia -** heart rate of 100 beats per minute and less

- tachy brady syndrome (sick sinus syndrome)
- atrioventricular block:
  - I^{st} degree
  - II^{nd} degree - Mobitz I
  - II^{nd} degree - Mobitz II
  - III^{rd} degree - congenital
  - III^{rd} degree - acquired

✓ **Sinus tachycardia -** heart rate of 180 beats per minute and more

- supraventricular tachycardia
- atrial flutter
- atrial fibrillation

- ectopic atrial tachycardia
- multifocal atrial tachycardia
- AV nodal reentrant tachycardia
- WPW syndrome
- accessory pathway entrant tachycardia

- ventricular tachycardia

- monomorphic ventricular tachycardia
- polymorphic ventricular tachycardia
- focal ventricular tachycardia
- torsade de pointes

✓ **Cardiac dyspnea**

- cardiac insufficiency
- can appear in case of paroxistic tachycardia
- in different pathological situations of cardiac decompensation

➢ **Blood pressure alterations**

✓ For a newborn, hypotension is determined by a combination of abnormal peripheral vascular adjustment, myocardic dysfunction and hypovolemia [5,29,18], usually having a multifactorial etiology.

- Causes:

- severe respiratory distress syndrome
- hypovolemia: placental abruption, placental haemorrhages, fetal-maternal haemorrhage, fetomaternal transfusion syndrome, birth trauma
- cardiogenic shock: asphyxia, arrhythmia, congenital heart defects (ductal-dependent heart defect and total anomalous pulmonary venous return), cardiomyopathy, myocarditis
- sepsis, septic shock
- drugs: prostaglandin E1

✓ High blood pressure is represented by the following signs:

- headache
- vertigo

- epistaxis
- apnea
- drowsiness

- **Temperature important clinical signs:**

✓ **Hypothermia** - body temperature under 36°C (rectal temperature)

- Causes:

- room temperature under 22°C
- cold scale or diaper
- unheated resuscitation source
- bathing before thermic stabilisation
- handling of a naked newborn in the incubator, in an unheated ward
- open/closed defect incubator
- alteration of the adjusting temperature mechanisms (nervous system malformations, meningocerebral hemorrhage, severe infections, etc.)

✓ **Clinical signs of hypothermia in a newborn:**

- **Skin and mucous membranes**
  - usually reddish and cold to the touch
  - can associate with central cyanosis or pallor, edemas or sceleredema on the face or extremities

- **Breathing**
  - bradypneic, irregular, superficial, associated with expiratory grunt
  - relapsing apnea, especially in the small gestational age preterm newborn

- **Heart**
  - bradycardia

- **Abdomen**
  - abdominal distension
  - vomiting

- **Kidneys**
  - oliguria

- **Behavioral changes**
    - alimentation refusal
    - weak cry
    - lethargic, with weak response to pain
    - tremors, rarely seen in a newborn
    - nervous system depression

- **Metabolic disorders**
    - hypoglicemia
    - metabolic acidosis
    - hyperkalemia
    - modified coagulation tests, which determines a general haemorrhagic disease, or frequently pulmonary haemorrhage, which is the main cause of death

- ✓ **Hyperthermia -** body temperature above 37,8°C (rectal temperature)
    - Causes

    - excessive clothing
    - when room temperature is above 36°C
    - incubator dysfunction, or of the radiant heater
    - local or systemic infection
    - dehydration
    - alteration of the central thermoregulation mechanisms, like severe neonatal asphyxia or malformations (hydranencephaly, holoprosencephaly, encephalocele)
    - hypermetabolism

- ✓ **Body's response to overheat**
    - vasodilation
    - tachycardia
    - hyperpnea
    - sweating

- ✓ **Clinical signs in overheat hyperthermia**
    - erythematous, warm skin (especially in the thoracic area and extremities)
    - fever, agitation, grunt, irritability + apnea (Perlstein, Belgaumkar)
    - diarrhoea, disseminated intravascular coagulation, hepatic and renal insufficiency (Bacon)
    - seizures -> lethargy -> coma
    - thermic shock death, with severe metabolic modifications

- ✓ **Clinical signs in septic fever**
    - pallor
    - pallor-cyanotic, cold extremities
    - central temperature higher than cutaneous temperature

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PART II

CHAPTER I

PRACTICAL CONCEPTS IN BREASTFEEDING

Breastfeeding represents the alimentation of a newborn and infant using breast milk for the first 6 months of life. It is the ideal aliment of all categories of newborns and infants because human milk is perfectly adapted to the nutritional needs of infants, it is an aliment with high biological value, including enzymes, antibodies, vitamins and minerals.

Breastfeeding advantages are multiple both for the infant and for the mother. For the infant, the most important advantages are:

- assuring a balanced nutritional diet;
- automatic adaptation to the infant's needs;
- offers protection against infection and allergies;
- protective role against necrotising enterocolitis;
- passive immunity transfer;
- best protection against: marasmus, obesity, tetany, infections, diabetes;
- has growth modulators (epidermal growth factor, nerve growth factor);
- the breastfed infant's intestinal flora has bacillus bifidus, which produces lactic and acetic acid, which diminishes the pH of stools and increases infection resistance.

Technique

Breastfeeding supposes:

- early initiation - in the first hours, even in the first 30 minutes if the clinical state of the newborn allows it

- breastfeeding on demand - 7 - 10 times per day, including the night

- 15 - 20 minutes for each breast

If the milk quantity is adequate - **efficient breastfeeding-** an optimal growth is provided, the ponderal growth curve is kept on the specific for age and sex curve spot.

Other signs of correct and efficient breastfeeding:

- the mother is capable to attach the child correctly to the breast, so that the nutritional process to unfold ideally

-the infant sucks with a regular and sustained rhythm (10 to 20 cycles of sucking during a feeding)

- after feeding, the infant is content - the growth curve is correspondent to the age
- the affective communication mother - infant is efficient
- the infant wants to eat
- evident satisfaction of the mother who breastfeeds

If the milk quantity is insufficient - **inefficient breastfeeding** - there can appear:

- insufficient weight gain, less than 100 - 200 g/week for the first 4 months
- infant's incapacity to latch correctly
- signs of milk ejection reflex are not observed
- rare concentrated and bad smelling urine
- jittery infant at the end of breastfeed, frequent cries, breast refusal
- very long period of breastfeed
- rare and green stools (hunger stool)
- persistence of nipple fissures after the first week of birth

Table 1. The LATCH Breastfeeding Assessment Tool

Assessment		0	1	2	Total scores
L	Latch on	Too sleepy or reluctant No sustained latch or suck achieved	Repeated attempts for sustained latch or suck Hold nipple in mouth Stimulate to suck	Grasps breast Tongue down Lips flanged Rhythmical sucking	
A	Audible swallowing	None	A few with stimulation	Spontaneous and intermittent/ frequent	
T	Type of nipple	Inverted	Flat	Averted	
C	Comfort	Engorged Cracked, bleed, large blisters or bruises Severe discomfort	Filling Reddened/small blisters or bruises	Soft Non tender	
H	Hold positioning	Full assist	Minimal assist	No assist	

Jenson D, Wallace S, Kelsay P (1994). LATCH : A Breastfeeding charting system and documentation tool. JOGNN, 23(1): 29.

Hypogalactia - insufficient milk secretion - can be caused by:

- modification of the newborn's general state
- scarce breastfeed technique, with mother-child synchronising difficulties, sucking incoordination, insufficient milk, use of bottle
- medical problems of the mother or child in the breastfeeding period

Alimentation and care of the mother that breastfeeds:

- supplementation of necessary fluid intake; consumption of at least 2 L of fluid per day
- supplementation of caloric intake with 500 - 600 kcal/day
- protein intake is estimated around 1,3g/kg/day in the breastfeeding period
- healthy, varied diet
- diets for losing weight should be avoided while breastfeeding
- supplementary intake of folic acid, iodine, iron and other micronutrients, depending on the regional specifics, in adequate dosage
- docosahexaenoic acid intake (at least 200mg/day) can be obtained by consuming 1-2 meals of fish per week, including fat fish
- avoiding alcohol and drugs, tobacco and limit the caffeine consumption

For the stimulation of the milk secretion, along with a balanced diet the following are necessary:

- breastfeeding on demand, frequent, with total emptying of the breast
- applying warm compresses to the breasts 5 minutes before feeds and during
- gently massaging the breasts before and during feeds
- stimulation of the nipple and the areola
- the mother should concentrate on the infant, on the breastfeeding process, and also on relaxing
- communication with the infant is important - nonverbal communication through soft touches, and verbal communication through affective, encouraging and loving words, songs
- cell phone, tablet or computer use during feeds is forbidden

Paraphysiological incidents of breastfeeding

Breast engorgement happens when the breast isn't completely emptied and it manifests by:

- febrile state
- local pain

- local signs: stretched, warm, reddish skin
- milk doesn't flow
- heavy breasts

As a conduct, it is recommended: complete emptying of the breasts during each feed, using a pump or manually; cold compresses after the feeds.

Nipple cracks and fissures

A frequent problem which appears during the first few days of breastfeeding is nipple pain. Often small lesions appear, named cracks. The main cause of their appearance consists of the incorrect positioning of the newborn. These appear at moms with sensitive skin, their newborns suck vigorously, greedily, and at those who hold the infant too long for breastfeeding.

Treatment consists of avoiding breastfeeding a few times, but feeding the infant with expressed milk; the use of silicone nipples, which apply on the breast for diminishing the pain during breastfeeding is permitted; applying cold compresses and special creams help with a faster healing;

If an infection is present, bacteriological exam is recommended, for identifying the pathogen involved and specific antibiotherapy should be administered.

Clogged galactophorous ducts

Represents the clogging of one or more breast ducts, which secrete milk. The possible causes are: large amount of time between breastfeeds, incorrect latching, faulty breastfeeding positions.

All these breastfeeding deficiencies lead to an incomplete emptying of the breast.

Another probable cause is completing breastfeeds with formula, which usually happens because the mother is afraid she does not have sufficient breast milk to feed her baby.

Symptoms consist of one of both breasts tumefaction, followed by pain most of the times, appearance of reddish spots on the breast, associated with the clogged duct, difficult milk expression, even though the breast seems full, but also the presence of fever and shivers. Untreated, clogged ducts can lead to mastitis.

Mastitis - is the inflammation of the mammary gland due to previous reasons. Most of the times, a pathogen is involved, usually Gram positive, that's why a culture test is necessary.

Breastfeeding contraindications are situations where both the mother and the infant are involved. Those mother related can be permanent or temporary:

Mother related permanent contraindications:

- ✓ septicemia, nephritis, eclampsia;
- ✓ active tuberculosis;
- ✓ HIV infection;
- ✓ malaria;
- ✓ heart, renal insufficiency;
- ✓ neoplastic disease, cachexia, psychiatric disorders;
- ✓ multiple sclerosis;
- ✓ pregnancy over 20 weeks;
- ✓ imbalanced maternal diabetes;
- ✓ thyrotoxicosis;
- ✓ oral birth control pills use;
- ✓ antineoplastics, diazepam, litium.

Mother related temporary contraindications:

- ✓ acute fever infection treated with antibiotics;
- ✓ bloody nipple fissures;
- ✓ mastitis;
- ✓ umbilicated nipples.

Infant related permanent contraindications:

- ✓ galactosemia;
- ✓ phenylketonuria;
- ✓ congenital lactose intolerance.

Infant related temporary contraindications (rare):

- ✓ hyperbilirubinemia due to inhibited conjugators: pregnane, 3-alpha, 20-beta-diol.

Establishing the food ration

In breastfeeding, there are no rules of establishment. The liberal schedules of alimentation are recommended more and more and the so-called on demand alimentation.

Breastfeeding must be initiated early, from the first 2 hours of life (preferably the first 30 minutes), as long as the newborn is active.

This early feeding has benefits for both the child and the mother, and most importantly the connection mother-child is established early, creating a special bond which is fundamental for the attachment of the two of them.

Mother's own milk is the ideal aliment for a newborn due to its nutritional, immunologic, endocrine, digestive and neurodevelopmental advantages.

For the low birth weight and very low birth weight child, the addition of milk fortifiers in human milk is necessary, in order to assure an optimal growth rate (preterm alimentation).

if the mother cannot decode the alimentation rhythm of her infant, or when the infant is ill, has a lack of appetite, or is admitted to a hospital, care unit, then an alimentation program will be established, at fixed hours.

In the first day of life, the newborn can be kept for 5 minutes at each breast and at each feed, the second day 10 minute; the feed duration increases gradually after the infant's needs, most of them feeding well for 15-20 minutes.

The number of feeds is - approximately:

7 - 10 per day in the first month;

6 - 7 per day in the months 2 - 3;

5 per day from the 4^{th} month.

If the newborn is fed with expressed milk, or if he is breastfed but the growth curve is stationary or decreasing in the first 10 days of life, the alimentation ration can be calculated using the following formula (Finklestein's):

L= (n-1) x 70 (80)

L= needed milk for 24 hours

n = days of life

70 - coefficient which applies if the newborn's birth weight is less than 3250 g

80 - coefficient which applies if the newborn's birth weight is more than 3250 g

BW= birth weight

Examples:

Newborn; 4 days; BW= 3000 g.

L/24h = 3 x 70 = 210 ml/24h

Number of feeds/day = 7

Quantity/feed = 210:7 = 30 ml of human milk

Schedule of feeds - approximately:

6:30 - 30 ml of human milk

9:30 - 30 ml of human milk

12:30 - 30 ml of human milk

15:30 - 30 ml of human milk

18:30 - 30 ml of human milk

21:30 - 30 ml of human milk

24:30 - 30 ml of human milk

Newborn; 6 days; BW= 4000 g.

L= 5 x 80 = 400 ml

Number of feeds/day= 7

Quantity per feed = 400:7 = 55 - 60 ml of human milk

After 10 days of life, establishing the alimentation ration in order to achieve an optimal growth for staying on the growth chart curves is realised by calculating the caloric and fluid requirement/kg/day.

Caloric and fluid requirement of the breastfed infant

Age (months)	**Caloric need (kcal/kg/day)**	**Hydric need (ml/kg/day)**
0 - 3	110	180 - 160
4 - 6	110 - 100	160 - 140
7 - 12	100 - 90	140 - 100

Examples:

Infant of 2 months; BW= 3000 g. Actual weight = 3000 + 2 x 750 = 4500 g (4,5kg)

Caloric requirement = 110 kcal/kg/day

Caloric requirement/day = 110 x 4,5 = 495 kcal

Fluid requirement= 180 ml/kg/day

Fluid requirement/day = 180 x 4,5 = 810 ml

Number of feeds/day = 6

Quantity/feed= 810:6 = 130 ml of human milk

Schedule of feeds - approximately:

6:00 - 130 ml of human milk

9:00 - 130 ml of human milk

12:00 - 130 ml of human milk

15:00 - 130 ml of human milk

18:00 - 130 ml of human milk

21:00 - 130 ml of human milk

4 months old infant; BW= 3500 g; actual weight = 3500 + 4 x 750 = 6500 g (6,5kg)

Caloric requirement = 110kcal/kg/day

Caloric requirement = 110 x 6,5 = 715 kcal

Fluid requirement = 160 ml/kg/day

Fluid requirement/day = 160 x 6,5 = 1040 ml

Number of feeds/day= 5

Quantity/feed = 1040:5 = 200 ml of human milk

Schedule of feeds - approximately:

6:00 - 200 ml of human milk

10:00 - 200 ml of human milk

14:00 - 200 ml of human milk

18:00 - 200 ml of human milk

22:00 - 200 ml of human milk

CHAPTER II

MIXED FEEDING - PRACTICAL CONCEPTS

If the mother's lactation does not meet the infant's growth requirements (hypogalactia), then mixed nutrition is imposed.

Covering the human milk deficiency is done using an industrial milk product, according to the infant's age, weight and tolerance.

Calculations of the ration are done by the rules and formulas of the artificial alimentation because in most cases, hypogalactia evolves rapidly into complete disappearance of the milk secretion (agalactia).

Hypogalactia - reduced secretion capacity of the mammary glands during lactation.

It can be primary or secondary.

Causes of primary hypogalactia:

- different primary neuroendocrine perturbations
- mammary gland hypoplasia
- unfounded hormonal therapy use
- birth control pills use

Causes of secondary hypogalactia, most frequently seen:

- late breastfeeding start
- rare breastfeeding
- incorrect positioning and latching
- negative psychoemotional factors, stress
- unfavourable socioeconomic factors
- extragenital pathologies, viral infections, severe kidney diseases, hepatic diseases, anemias, cardiovascular mother issues
- lactation suppression therapy: adrenaline, noradrenaline, cimetidine, ranitidine, famotidine, atropine, levodopa, progesterone, oral birth control pills, ergotamine, laxatives, phenobarbital, diuretics, etc.

Mixed nutrition has two practical possibilities of supplementation of the human milk deficiency:

A) Complementary

The milk requirement for one feed will be completed after each time the infant is breastfed; it is a more complicated method, because it involves weighing after each breastfeed. This method is recommended the most, being more physiological and contributing to the maintenance and further stimulation of the lactation.

B) Alternative

There will be administered alternately a breastfeed and a formula feed; with increasing the interval between breastfeeds, a sufficient quantity of milk will be secreted for the next feed. This method is less recommended, because large intervals between breastfeeds negatively impact lactation, progressively reducing the milk quantity produced by the mother.

2 months old infant; BW= 3000 g

Actual weight = 3000 + 2 x 750 = 4500 g (4,5kg)

CR = 120 kcal/kg/day

CR/day = 120 x 4,5 = 540 kcal

FR = 180 ml/kg/day

FR = 180 x 4,5 = 810 ml

Quantity per feed = 810:6 = 135 ml

We presume that the mother can offer 70 ml human milk/feed

Complementary method:

6:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

9:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

12:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

15:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

18:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

21:00 - 70 ml of human milk (breastfeed) + 65 ml formula (for term newborn)

Alternative method:

6:00 - 135 ml human milk (breastfeed)

9:00 - 135 ml formula

12:00 - 135 ml human milk

15:00 - 135 ml formula

18:00 - 135 ml human milk

21:00 - 135 ml formula

CHAPTER III

PRACTICAL CONCEPTS IN ARTIFICIAL FEEDING

Artificial feeding represents the infant's nutrition for the *first 4-6 months* of life, using artificial milk formulas

✓ Because artificial milk is obtained from cow milk by quantity and quality modifications of the composition, all references to milk formulas report to the cow milk composition

✓ Differences between mother's own milk and cow milk are numerous and extremely important; the unmodified cow milk is not recommended for an infant's normal growth and development. As presented in the course, the major difference between the cow milk composition is the higher protein value - 3,4g/100 ml, 3 times more than human milk, of mineral salts - 3 times more (7,5g/l) than human milk, which leads to a higher osmotic concentration, managing to exceed the infant's renal excretion capacity.

✓ The carbohydrates are in a smaller quantity than in human milk, with a smaller caloric value, and lipids are qualitatively inferior due to the high saturated fatty acid content (70 - 75% from the total of fatty acids)

The infant's artificial feeding uses many types of formulas, based on age, weight, digestive tolerance:

- start formulas - 0 to 4 moths for the term newborn
- continuation formula - 4 to 6 months
- special formulas for preterm babies
- dietary formulas, named "medication alimentation"

Establishing ration in the artificial and mixed feeding

General rules:

- the newborn fed with formula has a plus of 10kcal/kg/day in his caloric requirement and a plus of 10ml/kg/day in his fluid requirement compared to the breastfed newborn; caloric and fluid supplementation is necessary because the nutritive value of the formula is not equal to the human milk one;

- for preventing the appearance of infantile obesity it is recommended, if possible and if the growth curve is within limits for age and sex, not to exceed the limit of 700 - 800 ml of milk/24 hours in the first year of life, no matter the infant's age and weight;

- the fluid daily requirement/kg will be complied, without exceeding 1000 ml/day in the first year of life, no matter the infant's age and weight;

- formula concentrations will be respected depending on the infant's age;

- for avoiding overfeeding and its consequences: abdominal cramps, regurgitations, vomiting, psychomotor agitation, constipation or diarrhoea, it is recommended to respect a number of feeds per day, the quantity/feed and the hourly interval between feeds;

- it the infant tolerates the quantity of milk recommended for him, is clinically healthy and the formula used is adapted to the age, a vitamin supplementation is not necessary, only for vitamin D used for bone and dental maturation and rickets prophylaxis.

Number of feeds in artificial feeding:

6 - 7 feeds/day in the first month of life

6 feeds/day until 3 months of age and weight > 5000 g

5 feeds/day after 3 months of age and weight > 5000 g

Hygiene rules in artificial feeds:

Preparing, storing and manipulation of infant formula.

The milk formula is not a sterile product, it can contain several pathogenic agents, therefore can lead to extremely severe infections, especially in the first 2 months of life.

At home, milk formula has to be freshly prepared for every meal, each time the baby is fed.

For hospitals and nurseries protocols are set regarding preparing, storing and manipulation of these formulas.

If the formula has to be prepared in advance, it has to be prepared daily and stored at 4°C or less for a period which does not exceed 30 hours. The following are contraindicated: keeping the formula at the room temperature, in the thermostat, thermos and heating it in the microwave. Using different sources of heat can lead to composition modifications and rises the risk of accidents like burns.

Using a sterile liquid form of formula is recommended for healthy newborns in maternities.

Other strict rules used for formula manipulation are:

- the person that administers the milk will wear clean clothes
- before feeds will wash his/her hands
- the infant will be changed in clean diapers
- in the sterile bottle, the necessary quantity of milk will be introduced
- the teat is adapted and the milk is heated to the bodily temperature (thermostat or using steam)

Artificial feeding technique

- the infant is positioned in the oblique position, with the head on the angle formed by the mother's upper and lower arm
- the bottle's position will be oblique, so that the bottle neck to be completely full of milk and so the infant won't swallow air
- the duration of one feed must be around 10 - 15 minutes
- after finishing the meal, the infant will be held vertically for a few minutes
- he will be lightly tapped on the back to favour eructation (elimination of the swallowed air); with this method regurgitation and/or vomiting, as well as milk aspiration risks are avoided
- the infant will then be placed on left lateral decubitus for 15 - 20 minutes, then right lateral decubitus until the next meal, favouring gastric evacuation.

Caloric and fluid requirements

Life trimester	Caloric requirement (kcal/kg/day)	Fluid requirement (ml/kg/day)	Proteins (g/kg/day)	Lipids (g/kg/day)	Carbohydrates (g/kg/day)
I	120 - 110	200 - 180	3,5	5,5	12
II	110 - 100	160 - 130	3,5 - 3	5 - 4,5	12 - 10
III	100	140 - 110	3	5 - 4	12 - 10
IV	100	120 - 100	3 - 2,5	5 - 4	12 - 10

Example

Infant, 2 months old, BW= 3000 g

Actual weight: 3000 + 2 x 750 = 4500 g (4,5kg)

CR= 120 kcal/kg/day

CR/day = 120 x 4,5 = 540 kcal

FR = 180 ml/kg/day

FR/day = 180 x 4,5 = 810 ml

Number of feeds/day = 6

Quantity/feed = 810:6 = 135 ml

The infant will be given 6 x 135 ml start formula

Infant, 4 months old, BW= 3800 g

Actual weight: 3800 + 4 x 750 = 6800g (6,8kg)

CR= 110 kcal/kg/day

CR/day = 110 x 6,8 = 748 kcal

FR = 160 ml/kg/day

FR/day = 160 x 6,8 = 1088 ml

Number of feeds/day = 5

Quantity/feed = 1088:5 = 200 ml

The infant will be given 5 x 200 ml start formula

CHAPTER IV

NUTRITION OF A LOW BIRTH WEIGHT NEWBORN (PRETERM, DYSMATURE)

Even though parenteral nutrition is routinely used for this group of newborns, it is necessary to try enteral feeds as early as possible, as long as the intestinal system is functional.

Advantages of early enteral feeds are as follows:

a. intestinal mucous physiological stimulation and kept integrity

b. growth of the mucous thickness and stimulation of the intestinal vilosities development

c. reducing the signs of digestive intolerance

d. reducing the complications caused by parenteral nutrition (cholestasis risk reduction, associated with parenteral nutrition)

e. reducing preterm baby osteopenia

f. reducing the number of days required to reach full enteral feeds

g. reducing hospitalization duration

h. low costs

Conditions for enteral feed initiation:

The newborn must accomplish the following:

- hemodynamically stable, normal BP
- regularly breathing, no distress syndrome signs, RF<80/min
- after the first stool elimination
- absence of abdominal distension
- the absence of blood in the stool
- 12 hours interval since the administration of surfactant or indomethacin, <2 simple desaturations at FiO2<80% in 1 hour interval.

For preterm nutrition the following are used:

Human milk

Special preterm formula

Human milk fortifiers

Preterm milk formulas

Are specially adapted to the infant's growth needs.

The calories intake is around 20 - 24 kcal/30 ml.

Higher protein content: 1,8 - 2,4 g/100 ml.

Proteins: whey proteins, supplemented with taurine, well tolerated and which realise a plasma aminoacid profile superior to the ones in which casein is predominant.

Carbohydrates: represent 50% lactose and 50% glucose polymers, for compensating the partial lactose intolerance of the preterm baby.

Lipids: 50% medium-chain triglycerides for compensating the limited pancreatic lipase secretion and low quantity of bile acids.

Polyunsaturated fatty acids can lead to hemolytic anemia, due to vitamin E deficiency (antiperoxidative effect on the erythrocyte membrane polyunsaturated fatty acids). That is why the ratio vitamin E/PUFAs is two times greater than the ones from the term infant formulas.

High concentration of minerals, vitamins and proteins.

Have a decisive role in ensuring an accelerated growth rate of a body with limited absorbtion capacity and with limitations regarding the tolerance of high volumes of liquid.

Phosphorus content is high, proportional with the preterm's high needs.

Human milk fortifiers

Are products that are added to human milk destined for preterm newborns breastfed exclusively and have a birthweight less than 1800g.

They have a high caloric value.

HMFs are used to promote an optimal growth rate and a better bone mineralisation.

Due to their high content of calcium and vitamin D, these products could lead to hypercalcemia.

They will be administered with precautions to preterm babies which receive over 160 ml milk/kg.

HMFs can be associated with other formulas (not just human milk) if the formulas are not adapted to the preterm newborn.

Weekly calcium monitoring is necessary.

Quantity of milk for the first day and growth rate

Start - 24-48 hours

Day 1: 10 - 20 ml/kg/day

Constant quantity for 7 - 10 days

Days 8 - 11: adding 5 - 10 ml/kg/day

Suggestions

Preterm < 1500g

Enteral feeding is initiated (if not contraindicated) form day 1 with:

10 ml/kg/day if W<1000g

20 ml/kg/day if W>1000g

using 1hour gavage, then pause for 1 - 2 hours, and a constant quantity is kept for 7 - 10 days. If respiratory problems appear or clear residue: continuous gastric infusion is necessary for as long as it takes.

Day 8 - 11: add 10 - 15 ml/kg/day

After reaching the complete oral ration, bolus gavage is introduced.

Contraindications

Certain risk of NEC: do not feed early!!!

IUGR

Absent diastolic flux/reversed in the umbilical artery in utero

Severe neonatal asphyxia: APGAR <= 3 at 5 minutes

Persistent hypotension

Persistent hypoxemia (PaO2<45 mmHg due to aggressive ventilation with 100% FiO2)

Ways of feeding the preterm newborn

GAVAGE

Definition: nasopharyngeal or oropharyngeal gastric tube insertion for permitting direct gastric feeds.

For all infants with GA < 33 weeks, enteral feeds are realized using the gavage method; switching to bottle feeds will be realized after 33 - 34 weeks GA because at this age we can discuss of a better coordination between the deglutition, sucking and breathing mechanisms.

For those with GA= 29 - 32 weeks, in the first day parenteral nutrition will be initiated and if the clinical state permits it, enteral nutrition will be initiated as well.

Preterm infants with GA < 29 weeks can receive parenteral nutrition support until hemodynamic balancing, switching to enteral feeds will be done slowly, using small amounts of milk, and using the continuous gavage method.

Techniques of gavage

1. continuous

2. intermittent

CONTINUOUS GASTRIC GAVAGE

It consists of pump administering of the whole quantity of milk/24 hours, distributed in 4 - 8 syringes.

It is initiated to those with a high degree of prematurity, due to the limited gastric volume.

The rhythm is constant (0,5 - 1 ml/h for a preterm with weight <1000g)

It is indicated in:

a) intermittent gastric gavage intolerance

b) severe respiratory distress syndrome

c) gastroesophageal reflux

d) persistent gastric residue

Technique

- syringe - tube connection is made using an infusion tube which must be changed every 8 - 12 hours

- gastric residue must be checked every 3 - 4 hours

Attention: the risk of pulmonary aspiration can rise if the tube positioning is not verified periodically!

INTERMITTENT GAVAGE (fig. 1)

8 - 10 meals/day are recommended, based on: weight, gestational age, clinical state.

Administration techniques

- the syringe connected to the feeding tube is positioned with the opening upward, and the pump above the newborn's level, which leads to a better gastric evacuation

- pushing a small quantity of milk using a piston

The feeding can take up to 30 - 45 minutes (how much a normal breastfeed would take)

Fig 1. Intermittent gavage

GAVAGE TECHNIQUE

1. measuring and marking the ear to nose to the lower part of the sternum + 1 cm

2. gently flexing the head and introducing the tube, without force

3. controlling the correct positioning by the presence of gastric content after aspiration or introducing 1 - 2 ml of air using a syringe and listening the epigastrium using a stethoscope

4. fixating the tube at the nose (mouth) level, for maintaining a better positioning for further tractions.

The number of feeds per day depends of the prematurity degree:

a. 12 - 10 feeds/day - prematurity grade IV

b. 10 - 8 feeds/day - prematurity grade III-II

c. 8 - 10 feeds/day - prematurity grade I

Digestive tolerance monitoring

The monitorization of the digestive intolerance are mandatory, some signs can represent minor complications and can respond to care modifications and other can be major signs and need medical treatment.

Gastric residue

Measurement of the gastric residue before feeds is mandatory.

A gastric residue of 2ml/kg is considered normal and is reintroduced in the stomach.

A gastric residue of 25% from the previous meal can be a sign of digestive intolerance and can require reducing the milk quantity/feed.

If the gastric residue equals the volume calculated for one meal, a new quantity of milk will not be administered.

The presence of bile or blood in the gastric residue supposes detailed investigations or taking into consideration NEC.

Vomiting

Causes:

exaggerated gastric distension

gastroesophageal reflux

gastric irritation from medication administered orally

infection

obstruction

overfeeds

Abdominal distension

Intestinal palpation can be a sign of delayed gastric evacuation, ileus, constipation, aerocolia.

If abdominal distension is persistent, it can be a clinical obstruction sign or infection and requires further investigations.

Severity signs

bile gastric residue
blood in stools or gastric content
hard abdomen, with distension
abdominal wall erythema
abdominal distension >2 cm from the previous feed
green gastric residue
decrease in intestinal sounds
blood in stools
interruption of the alimentation is necessary until the aetiology is established

Accidents and complications

apnoea and/or bradycardia
vagal reflex due to the tube irritation
the tube is introduced the wrong way: introducing it in the trachea
pulmonary aspiration
hypoxia
abdominal distension
necrotising enterocolitis
nasal wings/nostrils lesions
esophageal/pharyngeal perforation

Gavage feeding is gradually replaced with oral feeding:

-if there is suck-swallow coordination

-if the preterm newborn does not show any skin alterations (pallor, cyanosis) or fatigue during feeds

-if the newborn receives the whole ration per feed

-breastfeeding will be done gradually, by exploration, for variable weights (2200 - 2500 g)

- the correct nutritional purpose is to assure an optimal development, both for statural, ponderal growth as well as for neurologic development

- there is no universal recipe for feeding a preterm newborn, this varies with gestational age, birth weight and pathologies.

Caloric requirements:

a. 60 - 70 kcal/kg/day in the first week of life
b. 80 - 90 kcal/kg/day from the second week of life
c. 120 - 130 kcal/kg/day after the third week of life

Protein requirement: 2,5 - 4 g/kg/day
Lipid requirement: 2 - 3 g/kg/day
Carbohydrates requirement: 12 - 14 g/kg/day

Fluid requirements:

a. 80 - 90 ml/kg/day during the first week
b. 100 - 120 ml/kg/day from the second week
c. 130 - 140 ml/kg/day from the third week
d. 160 - 200 ml/kg/day from the fourth week

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Special composition milk formulas

These are addressed to a certain group of newborns, infants and children with signs or special pathologic symptoms. They represent a non homogenous group of formulas, of particular composition and structure for assuring optimal nutrient digestion and absorption.

ANTI-REFLUX FORMULA

Indicated in gastroesophageal reflux and regurgitations because:

- it permits a homogenous milk thickening in contact with the gastric pH;
- lipids rich in medium chain triglycerides contribute to the gastric evacuation;
- they include starch and carob powder;

Are recommended for:

- children with regurgitation from birth
- gluten, fructose and sucrose intolerance

ANTI-COLIC FORMULA (for the digestive comfort)

The characteristics are:

- lactose represents 30% of the carbohydrates;
- galacto - oligosaccharides/fructo - oligosaccharides lead to consistence decline and an increase in the frequency of stools

Are recommended for infants artificially fed which have frequent colic problems.

HYPOALLERGENIC FORMULA

These formulas have a little under 1% immunoreactive proteins from the total nitrogen source formula, obtained by protein hydrolysis.

They have the following characteristics:

- dietetic products profoundly *structurally modified,* easy to digest and absorb
- have an optimal quantity partially hydrolysed protein content
- *the protein source is enzymatically hydrolysed casein*
- the carbohydrate source is represented by the *glucose polymers*
- *lipid source - medium chain triglycerides (50I),* having as source corn oil, soy oil or coconut oil
- reduce the risk of cow milk protein allergies

- have in composition pre- or probiotics
- contain LC-PUFAs which have an immunomodulation role

Indications:

- infants which come from families with a history of allergic diseases
- atopic terrain infants
- allergies to the cow milk protein

DELACTOSED FORMULA

This category of milk formula has a content enriched with maltodextrin, glucose, fructose and other carbohydrates. They do not have lactose in their composition, but do have an *adequate content of minerals and vitamins* and can be used for a long time without leading to alimentary deficiencies or badly influence the growth rate.

Indications:

- infants with secondary lactose intolerance
- in and after states of acute diarrhoea
- after bowel surgery

SOY FORMULA

Soy is a protein with a smaller biological value than cow milk proteins, with a decreased digesting degree and biodisponibility.

The composition characteristics are:

- soy protein content in place of cow milk protein
- content enriched by methionine, taurine, carnitine, starch and sucrose
- carbohydrates are represented by *glucose polymers or dextrin maltose*
- have an enriched content of vitamins and oligoelements

These formulas are usually *avoided in the treatment of preterm babies, in cystic fibrosis and atopic terrain* (develops cow milk protein allergies and soy milk allergies).

For the preterm baby, a high content of phytic acid disposes to hypophosphatemia, slowing the growth rate rhythm; determines urea retention, and the quantity of vitamins is insufficient for this category of infants.

Indications:

- mild diarrhoea
- realimentation after a moderate or severe diarrhoea
- cow milk protein intolerance
- lactose, fructose, saccharose intolerance
- madigestion, malabsorption, malnutrition
- celiac disease
- chronic inflammatory bowel disease
- vegetarian alimentation.

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Nutrition of a sick infant or child - general rules

This kind of nutrition represents an extended chapter of pediatrics, which often needs an interdisciplinary approach between the neonatologist, nutritionist, pediatrician and dietician. Each condition form the neonatal or pediatric pathology starts with hygiene and diet plan, that is why we will present several nutritional general rules on groups of conditions.

1. Nutritional rules for newborns and infants with respiratory conditions

For this category the following are recommended:

- parenteral nutrition in the severe forms of acute respiratory insufficiency
- fluid restriction
- enteral feeds using continuous or intermittent gavage, and then using a bottle

The ventilated newborn may have special nutritional needs.

Enteral nutrition helps to maintain the trophicity of the intestinal tract and stimulates its maturation, the secretion of intestinal hormones and bile secretion.

Cardio- respiratory stability, passing of meconium, the lack of gastric meteorism, presence of intestinal sounds are essential conditions for the administration of enteral nutrition.

A newborn who needs ventilatory support, like CPAP, as well as for the intubated one, minimal enteral nutrition using nasogastric/orogastric gavage is recommended, with periodical stomach aspiration at a 3-hour interval.

Gavage and periodical gastric aspiration reduce the risk of pulmonary aspiration of the gastric content.

Gavage nutrition reduces the energetic consumption of a newborn.

Intermittent gavage can lead to a drop in arterial oxygen saturation, which leads immediately to a decrease of the tidal volume and functional residual capacity, with highlighting hypoxia, in which case oro/nasogastric continuous gavage is recommended for the term, mechanically ventilated newborn.

2. Nutrition rules for newborns with severe perinatal asphyxia

Alimentary intolerance and NEC signs must be monitored for these patients.

Newborns with severe perinatal asphyxia have a high risk of digestive intolerance and NEC. The asphyxia determines circulation centralization phenomenon, meaning an increase in the cerebral, coronary, adrenal sanguine flux as well as a decrease of the renal and intestinal sanguine flux.

For the term babies, with moderate or severe perinatal asphyxia, enteral nutrition in the first few days of life is recommended to be avoided. These patients have an altered intestinal motility and high risk of NEC and ileus.

Gastric gavage alimentation is indicated to the term newborns which have feeding disorders (such as suck and swallow) and/or respiratory ones secondary to the perinatal asphyxia; gavage nutrition decreases the risk of complications due to parenteral nutrition.

Human milk and start formulas have a composition which provides the newborn's nutritional needs, and as a plus mother's own milk has anti-infective properties, leading to a decrease in gastrointestinal infections and in NEC risk.

Delactosed formulas can be administered in case of perinatal asphyxia.

Lactase secretion rises at the intestinal level through the end of pregnancy and continues to increase in the first days after birth, its efficiency being 98% in day 5 of life. Transitory deficit of lactase can be prolonged or emphasised by perinatal asphyxia, IUGR, infection, NEC, extended parenteral antibiotherapy, phototherapy dependent jaundice and acts upon the milk digestive tolerance.

3. Nutrition rules for newborns and infants with congenital heart disease

Malnutrition is constantly associated with congenital heart disease. The main determinant factors include:

- inadequately contribution
- inefficient absorption or use of nutrients
- high energetic needs

For a newborn/infant with congenital heart defect interventions for improving nutritive input will be adapted to each case and consist of fortifying the human milk, using high caloric density formulas, associating total/partial parenteral nutrition.

The nutritional plan must be early initiated for assuring a close to normal growth even in the period prior to surgery.

The targeted ponderal growth for healthy term newborns is 20 - 30g/day.

A ponderal growth of 10 - 20g/day is indicated to be assured via nutrition for a hemodynamically meaningful cyanogenic congenital heart disease newborn.

Fatigue during feeding, fluid retention and diuretics can lead to anorexia, decrease of the gastric fill, incresed time of evacuation, early repletion to a CCHD newborn, which lead to a slow ponderal gain.

For a hemodynamically meaningful CCHD term newborn a caloric input 50% higher than the healthy baby must be realized.

Energetic requirements of CCHD newborns is higher than the healthy newborn's due to the higher metabolic rate, insufficient input due to feeding difficulties, macro- and microelemental malabsorption, scarce growth secondary to the cellular and molecular alterations.

A caloric input of 130 - 150 kcal/kg/day is recommended.

This input assures a growth rate similar to the healthy newborn's, of 20 - 30 g/day.

So, the fortification of the human milk is recommended as well. This increases the caloric input in the limits of a balanced limited fluid input.

Caloric and protein content of human milk/usual formulas is frequently insufficient for sustaining the growth of a CCHD infant, especially those complicated with cardiac insufficiency.

The maximum fluid recommendations must not be exceeded (150 ml/kg/day); the hemodynamic status can be aggravated with excessive fluid input.

Early enteral feeding can be initiated for a healthy (after surgery) term (CCHD PGE1-dependent before surgery) newborn. There is no data to suggest parenteral nutrition use for a newborn in treatment with PGE for CCHD, nor data to demonstrate the eventual adverse effects of enteral nutrition to this population.

4. Nutrition rules for newborns and infants with digestive diseases

Acute diarrhoea due to intestinal dismicrobism

There are numerous factors which influence intestinal flora, but the most important ones are the way of birth, infant's diet and exposure to the environmental factors. "Normal" intestinal flora is a promoting factor of immunologic tolerance, intestinal homeostasis and healthy metabolism. Disbiosis (unbalanced intestinal flora) is a risk factor for certain immunological diseases (atopia, asthma, multiple sclerosis), intestinal diseases (NEC, inflammatory bowel disease, colon cancer) and metabolic diseases (obesity, diabetes type 1).

Cow's milk protein allergy (CMPA)

CMPA is one of the most frequent digestive allergic disorders starting with the neonatal period, due to one or several proteins found in cow's milk. Cow's milk contains approximately 3,3% proteins, casein (82%) and lactoserum proteins (18%). Beta-lactoglobulin and alpha-lactalbumin are the ones most involved in alimentary allergies. Casein is accountable for 86% of the allergies. The clinical manifestations determine immediate reactions or long-distance ones.

Cow's milk exclusion diet and its derived products is the primary therapeutic measure taken. For the artificially fed infants it is necessary to replace the old formula with a hypoallergenic one (Table 1)

For infants over 1 year extensive hydrolysed formulas are recommended or those based on soy. In case of refusal, exclusion of lactates is necessary and addition of calcium and nutritional supplements.

The duration of diet depends on the child's age, of the severity and types of clinical manifestations and the evolution of IgE specific antibodies value.

Table 1. Milk formulas used in the management of dietary allergies (*Recomandări nutriționale în practica pediatrică, Editura Universitară Carol Davila, București 2013*)

Milk formula	Characteristics and indications	Disadvantages
Partially hydrolyzed proteins based formula	Contain peptides with molecular weight of 3000-10.000 Da Indications: prophylaxis of allergic manifestations of atopic history newborn	Not indicated for the CMPA treatment
Extensively hydrolyzed proteins based formula	Contain peptides (small protein fragments with MW<3000 Da) Indications: treatment of CMPA for artificially fed infants	Not tolerated by 10 - 20% of the infants
Aminoacids based formulas	Contain aminoacids Indications: severe forms of CMPA, multiple alimentary allergies, extensively hydrolyzed protein formula intolerance	High costs High osmolarity
Soy based formulas	Indications: infants >6 months old which do not accept extensively hydrolyzed formulas, for pre-school children, as a substitute of cow's milk	For infants <6 months - high risk of soy allergy High amount of phytic acid - leads to decreased absorption of oligoelements and minerals High concentration of isoflavonoids (estrogen-like effects)

Short bowel syndrome

This category of newborns has to be rapidly switched to enteral nutrition, usually newborns with short bowel syndrome are fed via parenteral nutrition for a long period of time. It is recommended that at 7 to 10 days after post-surgery ileus resolution to be fed via enteral feeding; this stimulates the intestine's adaption the best after massive intestine resection.

Continuous oro/nasogastric gavage or gastrostoma is recommended for this category of patients, depending on the clinical state and tolerance:

- enteral feeding via oro/nasogastric continuous gavage is recommended if a short transition period to oral alimentation is expected

- rarely, via gastrostoma if a longer transition period is expected

Continuous enteral feeding permits complete saturation of the intestinal transporting molecules and an increased lipid, protein, calcium, zinc and copper absorption.

If the remaining intestine post-surgery is longer with 25% than its initial length, discontinuous enteral feeding orally or by gavage is recommended if the clinical state and tolerance permits it.

It is recommended to start the alimentation with diluted formulas (1/4 - 1/2) and gradually increase the formula's concentration.

Diluted formulas avoid osmotic intestinal overcharge.

In case of intolerance interruption of the oral feeding is recommended.

Signs of enteral intolerance are as follows: volume increase of the stools with more than 50% or a volume over 40 - 50 ml/kg/day, the presence of reducing substances in the stool, pH stool below 5,5.

The used formulas are chosen by the clinical state:

- extensively or partially hydrolyzed formulas for enteral feeding of the newborns with short bowel syndrome no matter the gestational age; these have a high digestibility and a rapidly utilization resulting in a reduced energetic consumption of hydrolyzed proteins compared to the integral protein

- start formulas enriched with probiotics have a significant prevention effect of the community-acquired acute infectious diarrheas (rotavirus especially), as well as for the watery diarrhea, and reduce significantly the duration of the diarrheic episodes.

Gastro-esophageal reflux in newborns

It increases the risk of pulmonary aspiration and can determine apnea and growth deficit. The physician and the nurse have to monitor the clinical state and the development of a term newborn with gastro-esophageal reflux.

For term newborns with gastro-esophageal reflux who present with vomiting episodes, but their growth rate is not influenced by this, do not need therapeutic intervention. Growth rate is an indicator of functional GERD, and it is non-pathological.

For newborns with pathologic GERD, therapeutic measures must be taken.

Vomiting associated with respiratory impairment and/or repeated apneas secondary to GERD can lead to growth failure and require therapeutic intervention.

The following positioning of the newborn is recommended: with the head and upper body raised to 30° in dorsal decubitus or right lateral decubitus, which decreases the risk of aspiration of the gastric content in the airways. What is more, alimentation is administered in small amounts and small intervals of time; bigger volumes determine gastric distension, slowing of the gastric evacuation and as a consequence exacerbation of GERD.

For the nutrition of a newborn with GERD, in the current medical practice are used special anti-regurgitation formulas.

5. Nutritional rules for patients with reno-urinary disorders

In the infant and small child period, the patient with reno-urinary disorder needs an increased energetic intake, for assuring an optimal statural and ponderal growth and an optimal psycho-somatic development.

In all renal conditions, especially chronic kidney disease, growth restriction is present, so caloric, fluid, electrolyte and vitamin supplementation is necessary, but not without respecting the restrictions imposed by etiology.

Enteral nutrition is recommended in actual nutritional therapies, for both the newborn and infant with renal conditions - use of the digestive tube as early as possible.

Table 2. Diet recommendations for a child with acute renal failure (Criterii reunite RIFLE si AKI - *Recomandari nutritionale in practica pediatrica, Editura Universitara Carol Davila, Bucuresti 2013)*

Volume	Dependent on the daily loses (urine and dialysate)
Energy	Higher energy intake for catabolism prevention
Salt	Small amount, except polyuric acute renal failure
Proteins	Small amount, for preventing high values of serum urea; exception: peritoneal dialysis which has a high protein requirement
Phosphate	Small amount, to prevent hyperphosphatemia

6. Nutrition rules for newborns with cleft lip and cleft palate/Pierre Robin sequence

For these patients, the diet must take into account the fact that these newborns can have sucking difficulties even if swallowing is normal, depending of the localization and the size of the defect.

Mother's conciliation is recommended regarding breastfeeding positions fit for this patient.

The alimentation must be done using special teats, if the newborn cannot be breastfed.

The use of special teats facilitates oral feeding, preventing the aspiration syndrome and its complications.

Gavage is not recommended as a routine for this kind of patient, because it does not encourage the sucking reflex development and coordination of the sucking and deglutition.

7. Nutrition rules for patients with neoplastic diseases

Assuring the right nutrition for a child with cancer is preferably done orally; the diet will be a high-protein, low carbohydrate and monolipidic one.

When oral feeding is not possible, enteral or parenteral feeds are prefered.

The advantages of a balanced diet are:

- good treatment tolerance
- reducing the adverse effects and infectious episodes without temporization
- assurance of a normal growth and development

8. Nutrition rules regarding the most frequent metabolic inborn errors

- **Phenylketonuria** - breastfeeding is recommended. On the long term, a limited intake of proteins is necessary, dependent of the phenylalanine dose (PHE); to this a special combination of amino acids is added, without phenylalanine, for covering the protein requirement.
- **Tyrosinemia -** tyrosine-free formulas (type I)
- **Maple syrup urine disease -** initial nutrition consists of exclusion diet: branched-chain amino acids, but with supplementation of isoleucine and valine.
- **Organic acidemias -** requires carnitine supplementation and moderate protein restriction
- **Homocystinuria** - restriction of methionine and cysteine supplementation
- **Urea cycle disorder -** high energetic intake, protein intake restriction
- **Galactosemia** - avoiding the intake of lactose/galactose
- **Glycogenosis type I -** frequent supplementation of glucose intake, without using galactose, fructose and proteins as glucose sources.
- **Hereditary fructose intolerance -** avoiding fructose, sucrose, sorbitol and honey intake.

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CHAPTER V

COMPLEMENTARY FEEDING

Complementary feeding refers to slowly replacing breast milk or formula with solid and semi-solid aliments, with the purpose of getting near to the adult alimentation. This is a progressive process, which takes several months and leads to caloric and quantity supplementation, in a moment when milk nutrition does not cover the energetic requirements anymore.

Currently, there is no consensus regarding the optimal age when a non-dairy alimentation should be introduced, they vary with the location, tradition, temperamental and nutritional infant's particularities, family and doctor's preferences.

The ESPHGAN established that the optimal interval for solid and semi-solid alimentation inclusion, other than milk, is at 4 - 6 months of age (17 - 26 weeks)[2].

WHO underlines the importance of exclusive breastfeeding in the first 6 months of life and continuation until the age of 2, along with complementary feeding.

Starting complementary feeding **before 4 months** of age can increase the risk of obesity in adult life and favors the apparition of food allergies, even at children who don't have genetic predisposition.

Early complementary feeding can solicit the immature digestive tract early and realizes a big osmotic charge for the functionally underdeveloped kidney. Not ultimately, infants smaller than 4 months do not know how to coordinate the necessary moves for swallowing, so there is a risk of aliment aspiration in the respiratory tract.

On the other hand, **adjourning** the process of complementary feeding over the age of 6 months can lead to slowing of the growth process (milk is not sufficient to sustain the rapid growth from the first year of life), so the whole process of complementary feeding introduction will be harder; the child will refuse new tastes.

However, for establishing the right moment to start complementary feeding, the following factors must be taken into account:

- biological and neuro-psycho-motor acquisitions, fundamental to the infant's developing process

- taste development and individual preference for certain tastes and textures

- functional maturation of the renal and gastrointestinal system

- success or failure to achieve quantity and quality nutritional requirements, consecutively to the milk diet

- the interaction between socio-economical, cultural factors and local and familial traditions.

General nutritional rules for complementary feeding

- the new aliment will be progressively added, meaning it will be added in small, increasing amounts and slowly reducing the milk quantity, until it is completely replaced

- the new aliment will be administered before milk, using a spoon

- there will not be introduced 2 or more new aliments at the same time; the recommendations are 1 aliment to be introduced at an interval of 3 to 4 days

- if the new aliment is not accepted by the infant, its administration will be interrupted and tried again after a few days

- choosing the first complementary feeding aliment will be done based on the infant's nutrition state: if he is eutrophic, complementary feeding will be initiated with vegetables soup or fruit purée, and if he is dystrophic, instant farinaceous products will be administered (gluten-free preferably) with milk

- domestic (autochthonous) and season products will be chosen to start complementary feeding

- fresh home-cooked or boiled meal is recommended

- choosing and introducing new aliments is done only for the healthy infant, with balanced digestive functions

- if intolerance signs regarding the new aliment appear (diarrhoea, vomiting, cutaneous allergies), the specific aliment will be temporarily stopped, and complementary feeding with other new aliments will be reinitiated a few days after recovery

- in the first few months of complementary feeding, the administered meals must be mashed and mushy, purée-like; after this, food granulation will be increased, and through the end of the first year of life, the infant must consume high consistency meals

- after 8 months, the infant will be offered soft bits of food, which he can take and put himself in his mouth, so that self-feeding is encouraged. By one year of life self-feeding using mug and spoon will be encouraged, the infant's clumsiness being precious moments from his development and autonomy

- accidental aspiration of aliments in the respiratory tract can endanger the infant, that's why careful supervision must be done, and parents will be instructed how to apply desobstruction and first aid

- the infant will not be forced to finish the whole quantity of food (there is a risk of oppositional anorexia)

- vitamin supplementation is not necessary in complementary feeding

- after protein or/and electrolyte rich meals, boiled then cooled water must be given

- **high allergic risk aliments** are recommended to be introduced before the age of 1 but not before 4 months of age, in small, progressively increased quantities (ESPGHAN 2016). Among these are egg-whites, fish, nuts (grinded under the age of 3!), peanuts (grinded under the age of 3!), strawberries, wild berries, kiwi, seafood, cow's milk

- aliments that should be avoided until the age of 1 are: honey (risk of infection with Clostridium botulinum), chocolate and cocoa (strong excitant effect on the nervous system), margarine, cold cuts, high-processed cheese, pork and lamb meat, excess of salt and sugar

- replacing the milk meals is done as follows:

  - vegetables meal with later addition of meat or egg-yolk at lunch
  - fruit meal at 9 - 10 o'clock in the morning, with biscuit or cow cheese addition
  - farinaceous dish at 6 o'clock in the evening
  - keeping a 500ml quantity in the infant's diet, because the protein and calcium requirement is covered by the administration of breast milk (breastfeeding on demand until the age of 2) or an age adapted formula (integral cow milk is contraindicated to the infant smaller than 1 year- 1 year and a half)

- the best criterion for appreciating the success of complementary feeding is following the individual curves of growth and development.

Depending on the child's history (term birth or preterm, ponderal gain in the first months of life, different acute/chronic conditions), each infant is given by the pediatrician a personalized complementary feeding diet.

Nutritive rules and aliments used in complementary feeding:

1. Proteins:

- meat can be administered mixed with the vegetable soup, and after 8 - 9 months, it can be given as meatballs. Poultry meat can be given from 5 months, and beef and white fish after 6 months
- poultry liver and beef liver is recommended after 6 months and can be replaced with meat during the days it should be administered
- egg-yolk is introduced by 6 months, well cooked, mixed with the vegetables purée, replacing the meat during the days of administration
- fresh cow cheese can be given from 5 months, in a mixture with mashed rice, vegetables or fruit purée; home-made cheese is preferred. Cottage cheese, as well as fresh cheese can be used from 8 - 9 months with pasta, under the form of puddings or cheese dumplings
- yogurt and kefir are recommended after 7 months
- instant cereal powders prepared with breast milk or with formula can be used in artificial alimentation and introduced in complementary feeding starting with the age of 4 months - if they are gluten-free (rice, starch, millet), and after 6 months' products with gluten can be used (wheat, barley, oat, rye)
- pseudocereals (quinoa, chia, amaranth, buckwheat) are gluten-free and require hydration +/- fermentation, so a more laborious preparation. Can be administered together with fruits, being for some days the desert from the child's over 1-year meal
- legumes (beans, green beans, pea, lentil, chickpea) are enjoyed by the children because of their sweetish taste and can be introduced in the alimentation from 9 - 10 months.

2. Lipids:

- vegetable oil is recommended by 4 - 5 months, 2 - 3 g% in the vegetable soup
- poultry, fish, beef meat has in its composition lipids with almost equal proportions between saturated and unsaturated fatty acids
- butter can be given from 5 months in the vegetable purée
- cream, 15 - 25 g/day is recommended starting with 7 - 8 months
- the use of high cholesterol aliments is not recommended, like: egg yolk (2 - 3/week by the end of the first year of life), butter, brain, entrails

3. Carbohydrates:

- cereals:
    - rice mucilage and rice decoction are used in the first months of life, rice cream from 3 months, rice flour from 4 - 5 months for soup thickening of for the farinaceous milk preparation, and rice grains from 8 months
    - starch from 4 - 5 months
    - wheat, barley, oat, rye flour is recommended for infants older than 6 months due to their gluten composition
    - instant industrial flours, simple or complex, are suspended in water or milk; they are flours which dissolve rapidly, and can be administered from 4 - 5 months; the used concentrations are dependent on the product composition and are specified by the producing firm

- fresh vegetables (carrot, potato, tomatoes, green beans, zucchini, salad) are used by 4 - 5 months as vegetable soup and then vegetables purée. Spinach and leek have laxative effects and can be introduced in the alimentation after 6 months. An identical dish, the carrot in the form of carrot soup 30 - 50% can be given after 1 month in diarrhea. Industrial vegetable products or vegetables with flour, meat or fish addition, can be given after 6 months, depending on their composition, due to the high contamination risk (agricultural or industrial); early introduction and extended use will be avoided.

- fruits: fruit juice, rich in minerals, oligoelements and vitamins, is recommended after 6 - 8 weeks, between meals, without being a complementary feeding element; its quantity is progressively increased until 30ml/day by the age of 3 months and then 50 - 60ml/day. From 4 - 5 months, fruits represent a complementary feed in the form of apple, peach, banana purée, and can be simply administered or together with cow cheese or biscuits. Raw fruits or compote, as a desert after lunch, can be given after 6 - 7 months. Industrial fruit products simple or with other ingredients added can be given after 6 months.

Establishing the ration in complementary feeding

Establishing the alimentary ration is done depending on the caloric and fluid requirements, respecting the rules of complementary feeding. Practically, a complementary fed infant can receive 5 meal of 200 ml or 6 meals of 160 (170) ml per day. These will be distributed as follows:

- 6:00 - 200 - 250 ml milk (human/formula)
- 10:00 - 200 ml fruit purée (apple/peach/banana/apricot) with cow cheese/biscuit

- 14:00 - 200 ml vegetable purée with mixed meat/egg-yolk/liver
- 18:00 - 150 - 200 ml yoghurt/cereal milk
- 22:00 - 200 - 250 ml milk (human/formula).

Complementary feeding has an important influence on alimentary preferences education and on later taste. Alimentary mistakes from the first year of life have repercussions on morbidity, both during childhood, as well as in the adult life. Important particular situations are in case of preterm babies' complementary feeding, where corrected age must be taken into account and in case of infants with familial history of atopia. Taking into account the actual adult alimentation trends, vegetarian diet, lacto-vegetarian diet and raw-vegan diet, it must be specified that for infants and small children these are not recommended, because they do not assure the protein (essential amino-acids) and iron requirements, indispensable for an optimal development of an organism with special growth and development needs[8].

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CHAPTER VI

THE NUTRITION OF TODDLER, PRESCHOOLER AND SCHOOL-AGE CHILD

General rules of a toddler's nutrition

After the age of one, the child's nutrition must take into account on one hand the morpho-functional particularities age-related, and on the other hand the different and specific physical and intellectual activities. For all age categories, a unique attitude must be adopted: a balanced alimentary ration, rich in nutrients, vitamins and natural fibers.

Starting on this grounds and the fact that between the age of 1 and 2 the nutritional and energetic needs are high because of the increased growth rate and motor activity, *the nutritional ration* is based on the following parameters:

caloric requirement: 90 kcal/kg/day

fluid requirement: 90 - 100 kcal/kg/day

protein requirement: 2 g/kg/day

lipid requirement: 4 – 5 g/kg/day

carbohydrate requirement: 12 g/kg/day.

The caloric ration will be proportionally distributed as follows:

15% proteins

35% lipids

50% carbohydrates.

Protein sources are: cow milk (500 ml/day), 30 – 50 g poultry meat, beef, fish, liver, brain, egg (2 - 3 per week) and plant protein.

Lipid sources are: vegetable oil, margarine (mostly polyunsaturated fatty acids), butter, cream

Carbohydrate sources: bread, pasta, biscuits, semolina, rice, polenta, fruits, vegetables and sucrose products.

Vegetables that can be used for this age are: potatoes, root vegetables, green beans, peas, cauliflower, zucchinis, spinach, tomatoes. They can be prepared in soups, purées, and after 2 years of age as sautés or salads. The vegetable quantity will be around 200 - 300g/day.

Fruits will be part of the daily alimentation, as: juices, purées, compotes or whole fruit.

Sweets can be offered at the end of the meal.

The child's alimentation has to be varied and esthetically presented, basic radicals should prevail over acid radicals. The menu will be made taking into account the developmental degree and the child's preferences.

After the age of 1, the child can differentiate and develops alimentary preferences. He can have periods when the interest is lost for certain aliments. In these cases, the presentation of the same aliment in other forms must be tried.

5 meals per day will be administered, 3 of which are principal and 2 snacks; the schedule must be respected, because secretory digestive reflexes must be formed. The meals will be prepared tasty, served as attractive as possible and within proper hygienic conditions.

The small child must be encouraged to self-feed and to drink from a mug. Those fed by parents who still use the bottle after the age of 1, can present nervous anorexia, oral and manual motor dysfunctions.

It is optimal that as many meals as possible should be served together with the family, because doing so, the appetite rises, and the parents' supervision will accustom the child with correct habits.

Preschooler's alimentation

At this age, the alimentation is similar to the adult one. The nutritional needs are increased, especially due to the intense motor activity.

The caloric requirement is 80 kcal/kg/day, of which *proteins* will assure *15 - 18%, lipids 25 - 30% and carbohydrates 55 - 60%*. Fluid requirement is of 80 ml/kg/day.

Protein requirement is *2 g/kg/day*, with a ratio of 2/3 animal protein and 1/3 plant protein. *Their sources* are: milk, 500 - 600 ml/day, which includes yoghurt and kefir, which are well tolerated, cow cheese, low sodium cheese; poultry meat, beef, fish, pork, lamb, mutton, cold cuts which can be administered around 75 g/day, minced; boiled egg, fried egg or omelette, or other way of cooking - puddings, soufflé can be administered as well.

Lipid requirement is of *2 - 3 g/kg/day* and can be administered as butter, cream, margarine and vegetable oils.

Carbohydrates requirements is of *10 g/kg/day* and can be administered as: bread and pastry, 150 g/day, pasta, cake, fruits, vegetables. Intermediary bread is recommended due to it's fiber content and vitamins of group B.

Vegetables are given as purées, puddings or green, as salad. *Fruits* are given raw, preferably, after they are washed.

At this age, the child will receive *3 main meals and 2 snacks*. A tight schedule, when his entourage is out playing, might diminish his appetite. *Water and sweets* are offered *at the end of the meal*, for not affecting the appetite. At least two meals must be served with the family.

The child will be taught to *wash his hands before each meal and to brush his teeth after the main meals.*

The conditioning of accepting a certain meal (for example while listening to stories) represents a mistake, as well as calming hunger with candy, biscuits, juices before meals.

School-child's alimentation

The energetic and nutritional needs of 6 - 12 year olds are destined to the physical, intellectual activity and sexual maturation in particular.

The energetic needs are between *50 - 60 kcal/kg/day,* of which *15% assured by proteins, 30% by lipids and 55% by carbohydrates.*

The fluid requirement is of *80 ml/kg/day.*

The protein requirement is of *2 g/kg/day*, of which 50 - 60% assured by animal origin proteins. *Protein sources* are: cow's milk 400 ml/day, meat 100-150 g/day, cheese 30 – 50 g/day, 1 egg every 2 days and plant origin protein.

The lipid ration is 1,5-2 g/kg/day will be assured by: oil, cream, butter, milk, eggs and some vegetables.

The carbohydrate requirements are of 8 g/kg/day, and will be assured by: bread, pasta, rice, potatoes, fruits, vegetables, pastry products and sweets.

The child will be given *3 main meals and 1 - 2 snacks per day*. It will be insisted upon breakfast.

The school snack will be prepared at home, for a better control on the child's alimentation.

Lunch will have 3 courses, in which raw vegetables and fruits will be present as salads and fruits as desert.

Dinner consists of 2 courses, one of animal protein and a desert.

The school child's alimentation will be supervised because in the absence of parents he tends to skip some of the meals, or grabs a quick bite, which leads to an unbalanced alimentation.

Disorders in child's alimentation

In current practice, we often come across situations where errors in child's alimentation are made, which are related to the child, but mostly to the whole family. If these errors are not recognized early and proper measures are not taken, they can lead to complications and can interfere with the child's health. Literature data mentions the following:

- 1 - 5% of the newborns and small children suffer from alimentation disorders, which in severe cases lead to growth restriction
- the most frequent cause of alimentation disorder is the inadequate attitude during meals. From this category these are mentioned:
  - prolonged meals
  - alimentation refusal which take place for more than a month
  - interrupted, stressful meals
  - lack of alimentary independence
  - night eating for newborns and small children
  - introducing distracting elements for increasing the ingested food quantity, including phone, tablets, television
  - prolonging breastfeeding or bottle feeding in case of newoborns and small children
  - complementary feeding fail
- the appearance of dysphagia and aspiration signs which are alarming signs and indicate the necessity of a diagnosis and rapid evaluation of oral alimentation.

On the other hand, parent's tendency of forcing children to eat over his energetic needs favors obesity, and monotonous alimentation, insufficiently tasty and unattractively presented favours inappetence. For pre-adolescent and adolescent psychic and vegetative lability, which accompany sexual maturation are present and determine alimentary behavioural changes.

Both *anorexia* and *bulimia* have a high incidence in pre-adolescents and adolescents.

Nervous anorexia, as a means of losing weight, can have multiple medical consequences, as: cardiovascular disorders.

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IMMUNIZATIONS DURING CHILDHOOD

The most effective way of preventing infectious diseases represents artificial immunization. Active artificial immunization is realized by administering microbial antigens into the human body, in the form of vaccines; it constitutes a specific method of collective or individual infectious diseases prevention.

Vaccines are biologic products with immunogenic properties, made from dead or alive microorganisms, from their components or their modified toxins. By being administered to the human or animal organism, the will induce an active artificial immunity (humoral, cellular and mixed) without producing noxious effects. Post-vaccinal immunity is slowly instaurating, after 15 - 20 days from the last inoculation, and lasts for a variable period of time (months - years - the whole life). Primary vaccination (basic) gives the human body an immunological memory. Revaccination (boosting) is done for stimulating a secondary immune response, more rapid and more intense. The qualities of an ideal vaccine are: highly immunogenic, with no secondary effects, easily available, stable, cheap, easy to administer, effective (to create a long lasting stable immunity).

Starting with 01.04.2015, the new immunization schedule is as follows:

RECOMMENDED AGE	IMMUNIZATION TYPE	COMMENTS
First 24 hours of life	Hepatitis B vaccine	Done in maternity
2 - 7 days	BCG vaccine	Done in maternity
2 months*)	Hexavalent vaccine (DTPa-VPI-Hib-HepB) Conjugated pneumococcal vaccine*)	Family doctor
4 months*)	Hexavalent vaccine (DTPa-VPI-Hib-HepB) Conjugated pneumococcal vaccine*)	Family doctor
11 months*)	Hexavalent vaccine (DTPa-VPI-Hib-HepB) Conjugated pneumococcal vaccine*)	Family doctor
12 months	Measles-mumps-rubella vaccine (MMR)	Family doctor
5 years**)	Measles-mumps-rubella vaccine (MMR**)	Family doctor
6 years***)	Tetravalent vaccine (DTPa-VPI) Inactivated polio vaccine***) (VPI***)	Family doctor
14 years	Diphtheria tetanus vaccine/Diphtheria tetanus pertussis acellular (dT/DTPa)	Family doctor

*) Conjugated pneumococcal vaccine - introduced in the immunization programme based on the existent funds

**) Will be administered for children who will be 7 years old in 2015 and for children who are 7 years old in 2016

***) Children of 6 years old:

- which have in their vaccinal history a dose of DTPa at 4 years will be vaccinated with VPI
- those who do not, will be vaccinated with DTPa-VPI
- those who are 8 years old and have a dose of DTPa made at 4 years, will be vaccinated with VPI in 2015 (those who are not in pre-school). It is applicable only for 2015.

- Hep B= hepatitis B vaccine
- BCG = Calmette-Guerrin vaccine (antituberculosis)
- DTPa = diphtheria, tetanus, pertussis acellular
- VPI = anti polio vaccine
- Hib = Haemophilus B vaccine
- MMR = measles, mumps, rubella vaccine
- dT = adult diphtheria tetanus vaccine

1. Hepatitis B vaccine

It is a highly purified vaccine, containing non-infectious particles from the surface antigen of hepatitis B virus (HBsAg), absorbed on aluminium salts as adjuvant and conserved with thimerosal.

Indications: immunization against infections caused by all known subtypes of the hepatitis B virus.

Administration route: it is administered only intramuscularly, 1 pediatric dose (for newborns and children under 15) is of 0,5 ml, containing 10g of HBsAg. 1 adult dose (over 15) is 1,0 ml, containing 20g HBsAG.

The children's immunization programme foresees the administration of a vaccine dose in the first 24 hours of life, followed by 3 other doses incorporated in the hexavalent vaccine administered at 2, 4 and 11 months. The alternative immunization programme foresees 1 injection/month for 3 months (0-1-2 months) and a revaccination after 12 months. This programme is recommended just in some cases: newborns with mothers infected with the hepatitis B virus, people exposed to the infectious risk, people who travel to high risk zones. Revaccination: in general, 1 dose every 5 years is sufficient.

General precautions. Administration of hepatitis B vaccine will be postponed if the patient has an acute febrile illness. In case of multiple sclerosis patients, any stimulation of the immune system can lead to an exacerbation of the symptoms, so the advantages and disadvantages of the vaccination must be considered. This vaccine has no effect on the people with subclinical or progressive stages of the disease. Like other injectable vaccines, it is necessary to establish an adequate medical treatment, for the prevention of an anaphylactic reaction immediately after administration.

The vaccine must be shaken before administration (it if formed from a white powder and a clear colourless supernatant, which can separate from each other on the storage period; it is shaken until a white, slightly opaque suspension is achieved). Hepatitis B vaccine will be administered to the newborn and infant in the anterolateral part of the thigh, and for adults in the deltoid muscle (it will not be administered in the gluteal area, nor intravenously).

Contraindications: This vaccine is contraindicated to those who present with high sensitivity to any of the vaccine's components or to those who had a hypersensitivity reaction after a previous administered dose.

Adverse effects:

Common - local reactions can appear, like: erythema, pain, tumefaction, mild fever; these symptoms disappear in 2 days.

Rare - hyperthermia (above 38,8°C)

Systemic reactions - nausea, asthenia, headache, vomiting, myalgia, arthritis; rashes and transient transaminases elevated levels.

Very rare - it has not been established a direct connection between the administration of vaccine and symptoms like: neuritis, optic neuritis, facial paralysis, aggravation of multiple sclerosis and Guillain-Barre syndrome.

2. BCG vaccine

Composition:

BCG lyophilized vaccine - *Mycobacterium bovis* BCG (Bacillus Calmette-Guerin)

Solvent for solution for injection - Sauton.

Therapeutic indications: This vaccine is used for the specific immunization against tuberculosis.

Contraindications: people known to be hypersensitive to any vaccine component; subjects that are feverish, or have general skin infections; underweight newborns (below 2500g); people who follow treatment with systemic corticosteroids or immunosuppressive therapy, including radiotherapy, people with malignant diseases (lymphoma, leukemia, Hodkin's disease or other reticuloendothelial's system tumors), people with primary or secondary immunodeficiencies, HIV infected people, including newborns from HIV positive mothers (the effect of BCG vaccination on these children can be exagerrated, a general BCG infection being possible).

Precautions: Even though the anaphylactic reactions are rare, there has to be adequate treatment for urgent intervention during vaccination. Positive to tuberculin patients (reaction >9 mm at 2 PPD units) do not require vaccination. The vaccine administration for these patients can result in a severe local reaction. Profound injection increases the risk of lymphadenitis and abscess formation.

Interactions: BCG vaccine can be administered with inactivated or live attenuated vaccine at the same time, including the measles, mumps, rubella vaccine. Other administered vaccines at the same time as the BCG vaccine must not be administered on the same arm. If they are not administered at the same time, then an interval of a month minimum has to be kept before giving a live attenuated vaccine. No other vaccination will be given on the same arm for three months after BCG vaccination, due to the risk of regional lymphadenitis.

Doses and route of administration: 1 dose = 0,1ml from the 2 ml suspension of BCG lyophilized vaccine**,** obtained after the content of a vial is dissolved into solvent (diluted Sauton). It is administered to newborns starting from the second day of life, until 2 months of age, as well as to children between 5 and 10 months who do not have post-vaccination scarring or have a

vaccination scarring under 3 mm, without previous tuberculin testing. The lyophilised BCG vaccine has to be a suspension so that it could be given to the patients. The vaccine vile is covered with a plastic foil, in the white marked zone, then the neck of the vial is broken by hand. After its opening, using a long needle syringe, 2 ml of the suspension liquid (diluted Sauton) are introduced in the vile; after that, the vile's content is mixed by aspirating and emptying of the syringe for 2 - 3 times. The resulting suspension is homogenous, slightly opalescent.

Administration technique: The vaccine is injected strictly intradermally, in the posterior external side of the left arm, in its 1/3 medial side. The injection is done using a 0,5 or 1 ml syringe, provided with a needle for intradermal inoculation. The injection place has to be clean and dry and decontaminated using antiseptic substances. 0,1 ml of vaccine suspention is injected strictly intradermally as follows:

- the skin is folded between the thumb and the finger
- the needle has to be almost parallel to the skin surface and is easily introduced for about 2 mm in the superficial derma.
- the needle has to be visible in the epidermis during its introduction
- the injection is slowly administered
- a papule (6 - 7 mm diameter for a newborn) in which the hair follicles are distinctly visible represent the sign of a correct injection. The papule disappears in approximately 30 seconds.
- the injection spot has to be left uncovered for facilitating the healing process.

Adverse effects: After BCG vaccination, *a normal reaction which represents a successful BCG vaccination,* is the induration in the administration spot, followed by a local lesion which can ulcerate for several weeks and which is spontaneously healing after a few months, leaving a depigmented scar and a slight depression compared to the surrounding tissue. In rare cases, after 1 - 3 months an axillary adenopathy can be seen. The lymph nodes are small (< 1 cm), hard, mobile, painless and are found only by systematic palpation. *The adverse effects* can include: *Very rare reactions:* disseminated BCG complications (osteitis, osteomyelitis), allergic reactions, festered lymphadenitis, abscess forming. *Rare adverse effects:* headache, fever, regional adenopathy (>1 cm); suppurated ulceration in the inoculation zone.

Overdosage takes place when it is administered more than 0,1 ml of suspension (0,1 mg of Calmette-Guerin bacillus) per dose; overdosing increases the risk of local/systemic adverse effects apparition. This can result in complications like axillary lymphadenitis with or without suppuration. Usually, it is healing spontaneously. If it persists, a physician must be consulted.

3. Hexavalent vaccine

Adsorbed anti-diphtheria, tetanus, pertussis vaccine (acellular), hepatitis B (rDNA), poliomyelitis (inactivated) and conjugated Haemophilus influenzae type b. The presentation form is a whitish muddy injection suspension, in a pre-filled 0,5ml syringe.

Dosage and administration route: The primary vaccination consists of 2 doses (within an interval of 8 weeks at least) at 2 and 4 months. The booster dose is administered after at least 6 months from the first dose from the primary immunization schedule (at 11 months). The immunization must be realized by intramuscular injection. The recommended injection places are the anterior-lateral-superior part of the thigh of the deltoid muscle for older children (after 15 months).

Contraindications:

- anaphylactic reactions history after a previous administration of hexavalent vaccine
- hypersensitivity to the active substances, or any of the excipients
- the administration is contraindicated if the patient had encephalopathy of unknown cause, 7 days after the previous vaccination with a pertussis antigen containing vaccine. Under these circumstances, the vaccination against pertussis must be interrupted, and the immunization schedule must be continued with the administration of vaccines against diphtheria, tetanus, hepatitis B, poliomyelitis and Hib. The vaccine against pertussis must not be given to patients with untreated neurologic diseases; it can be given only when the treatment for the disease has been established, the disease is stabilized and the benefits are above the risks.
- the immunization must be postponed for those with acute febrile illnesses from moderate to severe intensity; the presence of a minor infection of/and a low grade fever must not lead to a delay of the vaccination

Adverse effects:

- among clinical studies, the most frequently reported adverse effects include pain and erythema in the injection spot, fever, irritability, crying, anorexia and vomiting
- other frequent adverse effects: diarrhoea, induration in the injection spot
- rare adverse effects: anaphylactic reaction, seizures with or without fever, nodule in the injection spot, fever above 39,6°C, extended edema of the extremity used for vaccination, skin rash.

4. Pneumococcal conjugate vaccine - Prevenar 13

Polysaccharide pneumococcal conjugate vaccine (13-valent, adsorbed), injectable suspension, white, homogenous, in pre-filled 0,5 ml syringe.

Therapeutic indications:

- the active immunization for preventing invasive diseases, pneumonia and acute otitis media determined by Streptococcus pneumoniae in infants, children and adolescents with ages between 6 weeks and 17 years

- active immunization for preventing invasive diseases and pneumonia determined by Streptococcus pneumoniae in adults over 18 years old and the elderly.

Doses: If this vaccine is administered as part of a routine immunization programme for infants, then it can be given as an immunization schedule in 3 doses, each of 0,5 ml. The first dose can be given the earliest at 2 months and the second dose 2 months later. The administration of a third dose (boosting dose) is recommended between 11 and 15 months.

Administration route: The vaccine must be given by intramuscular injection. For infants, the best areas are anterior-lateral thigh (vastus lateralis muscle), and for children and adults the deltoid muscle, in the upper arm.

Contraindications: Hypersensitivity to the active substances, any of the excipients or the diphtheria toxoid. As any other vaccine, the administration must be postponed if the patient has severe acute febrile illness. On the other hand, the presence of a minor infection, for example a cold, is not a reason to postpone immunization.

Adverse effects:

- the most frequently reported for children between 6 weeks and 5 years are: reaction in the vaccination spot, fever, irritability, loss of appetite, increase or/and decrease of sleep duration

- other frequent effects: vomiting, diarrhoea, transient skin rashes, fever over 39°C, movement impairment in the injection zone (due to pain), erythema in the injection spot or induration/tumefaction of 2,5 - 7 cm.

- rare: hypotonic - hyporesponsive episode, hives or eruption hives-like, erythema in the vaccination spot, induration/tumefaction > 7 cm, crying, hypersensitivity reactions, including facial edema, dyspnea, bronchospasm.

5. Measles, mumps, rubella vaccine (Priorix)

The combined live attenuated vaccine, is a lyophilised form of pale white-pink colour, in a colourless glass vial and a vial or a pre-filled syringe which holds the solvent - a clear liquid,

colourless and sterile (water for injection) which adds to the vaccine preparation. After reconstitution, the vaccine may have a bright orange colour, even bright red.

Indications: Immunization against mumps, measles, rubella.

Contraindications: The vaccine cannot be administered to people who once had a severe allergic reaction to *Priorix* or any other combined or monophasic measles-mumps-rubella vaccine, to neomycin or any excipients included in the vaccine; the immunosuppressed patients, or those who follow treatments which weaken the immune system; pregnant women. The vaccination may be postponed is the patient has a high fever or an infection, if he received a blood, plasma or immunoglobulin transfusion in the last three months, if a cutaneous testing for tuberculosis must be done or if he has less than 12 months.

Administration route:

Children: Generally, the first dose is recommended to be given at 12 - 15 months. The second dose must be given before starting school (5 years old). Sometimes the vaccine is given to infants less than 12 months, when a high risk of infection with one of the diseases is present. If this happens, the second dose must be given at 12 or 15 months.

Adolescents and adults: The vaccine can also be administered to adolescents and adults if it is believed or known that they are not protected against any of the 3 diseases.

This vaccine is subcutaneously administered (or intramuscular, occasionally), normally in the upper arm. The physician or nurse can wipe the skin with alcohol or any other disinfectant, but will let the skin to dry before injection. Also, they will take care so the vaccine will not be injected in a blood vessel.

Adverse reactions: Severe allergic reactions can be seen rarely and usually appear soon after injection. These can be: difficulties breathing, tightening in the neck, skin rashes which extend rapidly, dizziness, loss of conscience due to hypotension and tachycardia. These reactions require urgent medical assistance. Also, very rarely can appear petechia, unexplained bruising or prolonged bleeding, diffuse or vesicular skin rashes, severe headache, febrile seizures.

The most frequent reactions are the local ones, in the injection spot (local erythema, pain, edema). Skin rashes and fever can also appear. The less frequent adverse effects are: enlargement of the parotid glands, adenopathies, nervousness, dysphagia, rhinorrhea, coughing, vomiting, diarrhoea, pulmonary infection, otitis and other viral infections. Very rarely neuritis can appear, possible followed by a stinging sensation or sensitivity and normal movement capacity loss.

Vaccination against rubella can be followed in some cases by symptoms which appear normal when infection with the rubella virus is present. These symptoms include: muscular and joint pain, rashes, lymph nodes inflammation, 2 - 4 weeks after injection. Older people are more susceptible of having joint pain than children.

6. Tetravalent vaccine (Tetraxim)

Indications: Diphtheria - tetanus - pertussis - inactivated poliomyelitis vaccine, adsorbed, indicated for protecting against diphtheria, tetanus, whooping cough and poliomyelitis. It is presented as a pre-filled syringe, of 0,5ml.

Administration route: It is recommended that a single tetravalent dose of 0,5 ml should be given at the age of 6, as a boosting dose of the hexavalent vaccine administered in the first year of life. This vaccine is given intramuscularly, preferably in the thigh for infants and in the deltoid muscle for children.

Contraindications:

- in case of an allergy to any of the active substances or other components of this vaccine, or if the child presented an allergic reaction after a previous vaccination with the same components
- if the child has an evolutive encephalopathy (brain lesions) or presented an encephalopathy 7 days after a previous vaccination with the pertussis component
- if is preferred to postpone the vaccination if the patient has a fever of a rapid installed illness (acute illness)

Possible adverse effects:

- severe allergic reactions, though very rare, can appear after vaccination: facial edema, angioedema, Quincke edema, rapid, severe installed malaise with hypotension, leading to nausea and conscience loss, high heart rate and respiratory distress (anaphylactic reaction).
- more frequent adverse effects: appetite loss, nervousness, irritability, abnormal cry, drowsiness, headache, vomiting, myalgia, edema, erythema and pain in the injecting spot, fever ≥38°C.
- frequent adverse effects: insomnia, sleep disorder, diarrhoea, induration in the injection spot
- less frequent adverse effects: incontrollable and prolonged crying, edema and erythema in the injection spot ≥5cm, fever ≥39°C.
- rare adverse effects: fever ≥40°C, seizures with or without fever, syncope, lymphadenopathy near the injection spot.

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APPENDIX 1

EXAMPLES OF DIET IN COMPLEMENTARY FEEDING

1. 5 months old infant, BW= 3000 g

AW= 3000+ 4x750 + 1x500 = 6500 g

CR/day= 100x6,5 = 650 kcal/day

FR/day= 140x6,5 = 1000 ml/day

Number of meals/day = 5

Quantity/meal = 200 ml

- 6:00 - 200 ml Humana 1
- 10:00 – 180 g of shaved apple + 20 g cow cheese or 20 g biscuits
- 14:00 - 120 ml vegetable soup + 5% vegetable oil + 5% rice flour
  - 40 - 50 g vegetable purée
  - 20 - 30 g mixed poultry meat (breast of leg)
- 18:00 - 200 ml Humana 1
- 22:00 - 200 ml Humana 1

2. 10 months old infant, BW= 3000G

AW= 3000 + 4x750 +4x500 + 2x250 = 8500 g

CR/day = 90x8,5 = 765 kcal/day

FR/day = 120x8,5 = 1200 ml/day

Number of meals/day = 5

Quantity/meal = 200 ml

- 6:00 - 200 ml Humana 2
- 10:00 – 180 g apple or banana purée +20 g biscuits
  - or 180 ml fruit compote + 20 g biscuits
  - or 150 g fruit purée + 40 – 50 g cow's cheese
- 14:00 - 120 ml meat soup + 5% semolina or bread crumbs
  - 50 g mashed potatoes + 5 g butter
  - 30 g mixed or minced meat (beef, poultry, white fish) or poultry liver or 1 egg yolk
- 18:00 - 200 ml Humana 2 + 5% semolina
  - or yoghurt + biscuits
  - or instant semolina with fruit and grain
- 22:00 – 200 ml Humana 2

APPENDIX 2

COMPLEMENTARY FEEDING DISHES

Vegetables soup

Ingredients: 1 - 2 carrots, 1 parsley root, 1 potato, 1/2 tomato, a little green beans, 1 small red pepper.

Preparation: All vegetables are pealed and washed thoroughly. Then, they are diced and well boiled in water or on steam. At the end of boiling (the last 10 - 15 minutes), 2 teaspoons of rice powder, a pinch of salt and a teaspoon of vegetable oil are added (olive or sunflower oil). The vegetables are then taken out from the pot and are well mixed, adding little by little from the obtained soup until the wanted purée

consistency is acquired.

After 5 months, boiled and mixed poultry meat will be added, and from 6 months, beef meat, poultry liver, egg yolk. After 8 - 9 months, the meat can be given as meatballs.

Fruits dish

The raw fruit, ripe and healthy looking, the seeds are removed, as well as the peel; it can be given shaved (on a plastic/glass grater), crushed or mashed. Apples, pears, peaches, apricots, grapes without seeds, bananas can be given. Strawberries, kiwi, berries can be given after the age of 1. The fruit meal is an aliment with a rich water content, cellulose, but poor in calories. For improving the carbohydrate balance and for enriching the caloric value, cow's cheese, minced biscuits or cereals are added. Until 6 months of age, the biscuits will be gluten-free.

Farinaceous or milk pudding

1. Breastfed infants can receive instant cereal powder, which will be prepared using expressed and heated (on steams) human milk. Products which require preparation with milk will be chosen.

Farinaceous dishes which require boiling will be boiled in water in advance, and the expressed human milk will be added after their boiling.

2. Artificially fed infants can receive instant cereal powders which contain formula milk from the same manufacturer.

Instant powders which are prepared with milk, will be prepared with a milk formula which the infant has consumed during the previous period.

Farinaceous dishes require boiling and will be boiled in advance in water, then the milk formula will be added after the boiling process is done.

"Petit-Beurre" home made biscuits

Ingredients: 1 cup melted butter, 1 cream cup, 1 cup of powdered sugar, a pinch of salt, 4 egg yolks, 1 sachet of baking powder, 1/4 lemon, 500g flour.

All of the above measurements weigh 250g. The same cup will be used to measure the ingredients.

Preparation: The butter is melted. Cream is added and mixed until it is homogenous. In another container, the egg yolks are mixed with sugar, with salt and baking powder with a drop of lemon. The mix is added to the butter and cream. Freshly sifted flour is added and the whole mixture is kneaded for a few minutes until a soft dough is obtained. The dough is spread into a 0,5 cm sheet. It is then diced and put in a big tray, which will be placed into the oven. The tray must be buttered. The biscuits are poked using a fork and then the tray is added into the preheated oven (120°C) for 20 minutes. When they become slightly golden, they can be taken out. The biscuits can be served as they are, or with adding butter, fruits, jam, compote.

Apple pudding

Ingredients: 3 - 4 big apples, 2 spoons of bread crumbs, 1 spoon of butter, 2 spoons of sugar, 1/2 teaspoon of baking powder, 1 pinch of salt, 1 egg.

Preparation: The apples are washed, pealed, shaved on a grater, then squeezed of juice. 1 spoon of butter and 2 spoons of sugar are mixed and after a few minutes the egg yolk is added. The resulting cream is put over the shaved apples and slightly homogenized. The baking powder is then added, the pinch of salt and a spoon of bread crumbs. The egg white is beaten using an egg whisk until a stiff cream is obtained. This is placed on top of the apple mixture, homogenized with a fork and then flipped into a shatterproof glass made container or in a cake shaped tray (greased with butter and bread crumbs). The container is placed in a big pot half-filled with water and cooked bain-marie. It is left to boil for half an hour at medium heat. The pudding is getting cold in the cake tray, then it is taken out, powdered with sugar and served warm or cold.

APPENDIX 3

THE PROTEIN CONTENT OF ANIMAL ORIGIN AND PLANT ORIGIN FOOD USED IN THE CHILD'S ALIMENTATION

FOOD	PROTEINS g/100g of product
Milk and milk products	
Cow milk	3,5
Sheep milk	6,0
Goat milk	3,5
Skim cow milk	3,2
Kefir	4,0
Yoghurt from the supermarket	3,2
High fat cow cheese	13
Low fat cow cheese	18
Kneaded cheese	27,4
Sheep cottage cheese	18,9
Cow cottage cheese	19,4
Dobrogea cheese	28,6
Cream cheese for children	17,7
Meat and meat products	
Low fat beef	20,4
Medium fat beef	17,0
Fat beef	20,4
Low fat pork	20,4
Medium fat pork	16,0
Fat pork	15,0
Mutton	17,0
Lamb	18,0
Hen	21,0
Chicken	20,1
Turkey	24,5
Beef liver	19,7
Beef heart	17,0
Beef brain	10,5
Ham	24,9
Liver paté	19

Sweet water fish	
Carp	18,9
Pike perch	19,4
Pike	19,1
Danube mackerel	14,2
Sea fish	
Turbot	17,0
Sturgeon	18,5
Horse mackerel	16,6
Oceanic fish	
Codfish	19,0
Herring	18,0
Mackerel	22,0
Eggs	
Chicken egg, with egg white	14,0
Chicken egg, egg yolk	16,0
Egg white	13,0
Fresh vegetables	
Pepper	1,1
New potatoes	1,7
Potatoes	2,0
Cucumbers	1,3
Spring onion	1,0
Mushrooms	5,0
Cauliflower	2,8
Zucchini	0,9
Green beans	2,0
Peas with pods	8,4
Carrots	1,5
Parsnip	1,4
Parsley root	1,1
Leek	2,3
Green salad	1,9
Red salad	1,3
Spinach	3,5
Tomatoes	1,1
Celery	1,4
Nettle	7,9

Garlic	7,2
White cabbage	0,2
Red cabbage	0,2
Legumes	
Beans	23,0
Lentil	25,0
Peas	21,5
Cereal derived products	
White wheat bread	7,5
Intermediate wheat bread	7,5
Brown wheat bread	8,4
Buns	8,2
Wheat flour extract 75%	11,8
Corn flour	9,6
Husked rice	8,1
Semolina	9,4
Oatmeal	13,6
Pasta	10,9
Biscuits	8,2

Table of contents

CHAPTER I 3
ASSISTANCE AND CARE OF A TERM NEWBORN 3
CHAPTER II 10
THE CLASSIFICATION OF NEWBORN INFANTS 10
CHAPTER III 20
CLINICAL AND ANTHROPOMETRICAL TRAITS OF A TERM NEWBORN 20
CHAPTER IV 32
POSTNATAL GROWTH AND DEVELOPMENT 32
CHAPTER V 43
NEUROLOGICAL AND PSYCHICAL DEVELOPMENT OF THE NEWNBORN, INFANT AND CHILD 43
CHAPTER VI 61
CLINICAL EXAM OF A TERM NEWBORN 61
CHAPTER VII 75
THE PEDIATRIC PHYSICAL EXAMINATION 75
CHAPTER VIII 82
THE OBSERVATION FORM 82
CHAPTER IX 92
VITAL SIGNS MONITORING IN NEONATOLOGY AND PEDIATRICS 92
ANTICIPATING SPECIFIC PATHOLOGIES 92

PART II 106
CHAPTER I 107
PRACTICAL CONCEPTS IN BREASTFEEDING 107
CHAPTER II 115
MIXED FEEDING - PRACTICAL CONCEPTS 115
CHAPTER III 117
PRACTICAL CONCEPTS IN ARTIFICIAL FEEDING 117
CHAPTER IV 121
NUTRITION OF A LOW BIRTH WEIGHT NEWBORN (PRETERM, DYSMATURE) 121
CHAPTER V 139
COMPLEMENTARY FEEDING 139

CHAPTER VI 145
THE NUTRITION OF TODDLER, PRESCHOOLER AND SCHOOL-AGE CHILD 145
General rules of a toddler's nutrition 145
Preschooler's alimentation 146
School-child's alimentation 147
APPENDIX 1 158
EXAMPLES OF DIET IN COMPLEMENTARY FEEDING 158
APPENDIX 2 159
COMPLEMENTARY FEEDING DISHES 159
APPENDIX 3 161
THE PROTEIN CONTENT OF ANIMAL ORIGIN AND PLANT ORIGIN FOOD USED IN THE CHILD'S ALIMENTATION 161