MINISTRY OF HEALTH OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY

International Faculty

Department of obstetrics and gynecology

CONFIRMED by
Vice-rector for scientific and pedagogical work
Eduard BURIACHKIVSKYI
«29» August, 2024

METHODOLOGICAL RECOMMENDATIONS FOR PRACTICAL CLASS

International Faculty, Course V

Discipline “Obstetrics and Gynecology”

Practical class №14. Topic: Physiology of the postpartum period. Physiology of the neonatal period.

Approved:

Meeting of the Department of Obstetrics and Gynecology of Odesa National Medical University

Protocol No. 1 dated August 29, 2024.

Head of the Department_____ (Ihor GLADCHUK)

Developer:
Ph.D., assistant professor of
obstetrics and gynecology department_____ (G.Kozhukhar)

Practical class №14.

PHYSIOLOGY OF THE POSTPARTUM PERIOD. PHYSIOLOGY OF THE NEONATAL PERIOD

LEARNING OBJECTIVE is to gain basic knowledge about physiological changes in postpartum period, physiology of lactation and breastfeeding, primary care of newborn in order to make recommendations for management of puerperium and neonatal period and advice woman on discharge.

BASIC CONCEPTS: Retrogressive changes in reproductive system and general physiological changes in female body. Course and management of the postpartum period. Physiology of lactation. Breastfeeding. Postpartum contraception: the method of lactation amenorrhea (MLA). Physical features of the newborn. Newborn care. Advantages of cohabitation of mother and child.

EQUIPMENT

- Obstetric models and obstetric instruments.
- Professional algorithms, structural-logical schemes, tables, videos.
- Results of laboratory and instrumental researches, situational tasks, patients, medical histories.
- Multimedia equipment (computer, projector, screen), TV.

EDUCATIONAL TIME – 4 h

1. **ORGANIZATIONAL STAGE**
   - Greetings,
   - checking attendees,
   - defining of educational goals,
   - providing of positive motivation.

By convention the puerperium (postpartum period) lasts for 6 weeks from the day of the birth of the child. During this time the physiological and morphological changes that occurred during pregnancy revert to the non-pregnant state. It is also a time when the woman takes on the responsibility of caring for a dependent, demanding infant. This may cause problems, particularly if she finds it difficult to adjust to being a mother.

2. **CONTROL OF BASIC KNOWLEDGE** (written work, written testing, online testing, face-to-face interview, etc.)

2.1. Requirements for the theoretical readiness of students to perform practical classes.

Knowledge requirements:

- to collect data on patient complaints, medical history, life history;

- to evaluate information about the diagnosis using a standard procedure, based on the results of laboratory and instrumental studies. To determine the list of required clinical, laboratory and instrumental studies and evaluate their results;

- to select the leading clinical symptom or syndrome;

- to make a preliminary and a differential diagnosis and make the clinical diagnosis of the disease;

- to determine the principles of treatment of diseases, the necessary mode of work and rest, the nature of nutrition;

- to diagnose emergencies;

- to determine tactics and provide emergency medical care;

- to provide consultations on family planning, determine the tactics of the postpartum period;

- to be able to assess mother's condition; to carry out diagnostic and tactical measures in each period of labor; to conduct the postpartum period;

- to be able to assess the patient, and the necessary examination before using a contraceptive; demonstrate family planning counseling skills;

- to provide the necessary information about changes in a female body in the postpartum period;

- to formulate and bring to the patient, relatives and specialists recommendations for choosing a contraception method.

List of didactic units:

- Retrogressive changes in reproductive system and general physiological changes in female body.
- Course and management of the postpartum period.
- Physiology of lactation. Breastfeeding.
- Postpartum contraception: the method of lactation amenorrhea (MLA).
- Physical features of the newborn.
- Newborn care.
- Advantages of cohabitation of mother and child.

2.2. Questions (test tasks, tasks, clinical situations) to test basic knowledge on the topic of the class.

Questions:

- Duration and main events of postpartum period.
- Involution of uterus and other pelvic structures, general physiological changes in female body in puerperium.
- Physiology of lactation, composition of colostrum and milk.
- Ten steps for successful breastfeeding.
- The main principles of management of normal puerperium.
- Checkup and advise on discharge.
- Postpartum contraception.
- Apgar rating and immediate care of newborn.

Test tasks

Direction: For each of the multiple-choice questions select the lettered answer that is the one best response in each case.

1. A previously energetic woman complains of crying, loss of appetite, difficulty in sleeping, and feeling of low self-worth, beginning approximately 3 days after a normal vaginal delivery. These feelings persisted for approximately 1 week and then progressively diminished. Which of the following is the best term to describe her symptoms postpartum?
(A) postpartum blues
(B) postpartum depression
(C) neurosis
(D) psychosis
(E) schizoid affective disorder

2. A patient has just delivered her first child after an uncomplicated pregnancy and term vaginal delivery. She is anxious to breast-feed. As part of her postpartum discharge counseling, she should be told that few things interfere with lactation, but she should avoid which of the following?
(A) Depo-Provera
(B) frequent suckling
(C) high dose (≥50 μg estradiol) oral contraceptive pills
(D) Levonorgestrel intrauterine device (IUD)
(E) progestin-only oral contraceptive pill (minipill)

3. At delivery, a perineal laceration tore through the skin of the fourchette, vaginal mucous membrane, and the fascia and perineal muscles of the perineal body but not the anal sphincter or mucosa. This should be recorded in the medical record as what type of laceration?
(A) first-degree
(B) second-degree
(C) third-degree
(D) fourth-degree
(E) complete

4. A patient is being discharged from the hospital following an uncomplicated vaginal delivery. Discharge counseling and plans would include which of the following?
(A) discontinue prenatal vitamins
(B) no driving for 4 weeks
(C) no coitus for 6 weeks
(D) return to work only after 6 weeks of maternity leave
(E) rubella immunization for nonimmune patients

5. The postpartum nurse calls about a patient who had an uncomplicated vaginal delivery 12 hours ago. She is concerned that the patient has the following findings. Which of them should be of most concern to you?
(A) abdominal rigidity
(B) leukocytosis of 16,000
(C) proteinuria
(D) a pulse rate of 60
(E) a single temperature of 38,0°C

6. During childbirth classes, a patient should be told which of the following regarding breastfeeding?
(A) Breast milk is a major source of immunoglobulin G (IgG)
(B) Most ingested drugs that are soluble in maternal blood do not cross into breast milk
(C) Mother's milk contains a large amount of iron
(D) The postpartum period of lactation is a time of above-normal fertility
(E) Prolactin stimulates milk production and breast development

7. A 16-year-old patient delivered a term infant yesterday. She is placing the child for adoption and is not going to breast-feed. She asks for something to suppress lactation. What is the simplest and cheapest method of lactation suppression?
(A) breast binding, ice packs, and analgesics
(B) bromocriptine
(C) cabergoline
(D) Depo-Provera
(E) oral contraceptive pills

8. A class C diabetic patient delivers at term. It is important to check her blood sugar levels immediately postpartum, since there may be a decrease in the insulin requirements of diabetic patients. This can be partly explained by which of the following?
(A) decreased activity
(B) decrease in plasma human placental lactogen (hPL)
(C) decrease in plasma estrogen
(D) decrease in plasma progesterone
(E) increased food intake

9. Immediately after the completion of a normal labor and delivery, the uterus should be which of the following?
(A) at the level of the symphysis pubis
(B) boggy
(C) discoid
(D) firm and rounded
(E) immobile

10. A patient had a vaginal delivery of a 4,500-g infant after a prolonged second stage. She is now unable to void. Each of the following could be a reason and can be initially treated with Foley placement. Which of the following can represent a most serious etiology of inability to void in the immediate postpartum period?
(A) anesthesia
(B) edema
(C) emotions
(D) hematoma
(E) overdistention of the bladder

11. The decidual layer is divided into several parts, most of which are shed following pregnancy. The remaining layer can be damaged with a curettage for retained placenta. Which of the following is the part that should remain?
(A) decidua capsularis
(B) decidua vera
(C) zona basalis
(D) zona functionalis
(E) zona spongiosa

12. Which of the following is normally found in the immediate postpartum period after a normal delivery?
(A) leukopenia
(B) large drop in hematocrit
(C) elevated erythrocyte sedimentation rate (ESR)
(D) retention of fluid
(E) rapid fall in plasma fibrinogen

13. The period of time from the end of delivery until the reproductive organs have returned to normal is called
(A) menopause
(B) puerperium
(C) perineum
(D) pachytene
(E) paravarium

14. Postpartum, the uterus involutes in 6 to 8 weeks. Its weight decreases by how much?
(A) 500 g
(B) 100g
(C) 900 g
(D) 1300 g
(E) 1700 g

15. Postpartum, the decidua becomes necrotic and is normally cast off within five to six days as
(A) decidual cast
(B) placental remnants
(C) lochia
(D) carunculae myrtiformis
(E) none of the above

16. A syndrome of amenorrhea-galactorrhea developing postpartum is
(A) Ahumada del Castillo
(B) Chiari-Frommel
(C) Budd-Chiari
(D) Sheehan's
(E) Simmond's

17. After parturition, endometrium regenerates from the decidual
(A) basal zone
(B) compact zone
(C) functional zone
(D) parietal layer
(E) spongy zone

18. An infant is born and at 5 minutes it has a vigorous cry, a heart rate of 105, movement of all four extremities, grimacing with stimulation, and has bluish hands and feet. What is the Apgar score of this infant?
(A) 10
(B) 9
(C) 8
(D) 7
(E) 6

19. Newborns who are allowed to remain at room temperature immediately after delivery rather than warmed by skin-to-skin contact with mom or placement in a warmer are at risk for the development of which of the following?
(A) metabolic acidosis
(B) metabolic alkalosis
(C) respiratory acidosis
(D) respiratory alkalosis
(E) pneumonia

20. Which of the following is the most common cause of failure to establish effective respiratory effort in the newborn?
(A) fetal acidosis
(B) fetal immaturity

(C) upper airway obstruction
(D) congenital laryngeal stenosis
(E) infection

Answer key

1	A	11	C
2	C	12	C
3	B	13	B
4	C	14	C
5	A	15	C
6	E	16	B
7	A	17	A
8	B	18	B
9	D	19	A
10	D	20	C

3. FORMATION OF PROFESSIONAL SKILLS (mastering skills, conducting curation, determining the treatment regimen, conducting a laboratory study, etc.).

3.1. Content of tasks (tasks, clinical situations, etc.).

Interactive task:

Students of the group are divided into 3 subgroups of 3-4 people each. They work in the classroom, women's outpatient clinic, postpartum ward, labor & delivery ward with newborns and postpartum women.

Tasks:

- Subgroup I - to assess general condition of postpartum woman, assess uterine involution, lochia character and lactation.
- Subgroup II - to assess the general condition of the newborn, check an afterbirth, to perform medical care for a healthy newborn in the first hours of life.
- Subgroup III – to provide counseling about postpartum contraception.

In 30 minutes the groups exchange tasks with each other. Finally, students assess results of their classmates.

Tests:

Direction: For each of the multiple-choice questions select the lettered answer that is the one best response in each case.

1. Which of the following would NOT be considered as part of the immediate care of the newborn?
(A) drying the skin
(B) warming the infant
(C) clearing the airway
(D) doing a brief physical examination
(E) measuring the hematocrit

2. The normal infant after delivery will have a normal adult pH in about
(A) 5 minutes
(B) 1 hour
(C) 12 hours
(D) 3 days
(E) 1 month

3. The full-term newborn has
(A) labia majora that are in contact with one another
(B) at least one testis in the scrotum
(C) fingernails that extend to or beyond the fingertips
(D) breast tissue palpable
(E) all of the above

4. Five infants are admitted to the newborn nursery after uncomplicated vaginal deliveries. Which of the following newborns would be classified as high-risk and merits closer monitoring?
(A) 3,500 g, 39 weeks' gestation, Apgar score 8/9
(B) 2,650 g, 41 weeks' gestation, Apgar score 7/8
(C) 3,800 g, 41 weeks' gestation, Apgar score 7/8
(D) 3,100 g, 38 weeks' gestation, Apgar score 7/9
(E) 2,650 g, 37 weeks' gestation, Apgar score 7/9

5. A 2-day-old newborn has a mild degree of hyperbilirubinemia. What is the most appropriate next step in management?
(A) observation only
(B) exposing the infant to light
(C) O-negative packed red blood cells (RBCs) given as an exchange transfusion
(D) spinal tap
(E) soy-based formula feeding

6. Immediate care of the normal newborn at birth should include
(A) vigorous slapping to stimulate respiration
(B) sodium bicarbonate IV
(C) prompt vigorous resuscitation
(D) holding the head down to allow mucus and amniotic fluid to drain
(E) immediate bathing to bring up the infant's body temperature

7. Newborn jaundice (icterus neonatorum) is caused mainly by
(A) excessive indirect bilirubin
(B) decreased amounts of direct bilirubin
(C) lack of carotene production in the newborn liver
(D) meconium obstruction of the newborn digestive system
(E) genetic predisposition

8. On the 3th day of life, how would the weight of a term infant that weighed 3400 g at birth be expected to change?
(A) increased 140-200 g
(B) increased 70 g
(C) remained the same
(D) decreased 70 g
(E) decreased 140-200 g

9. The first-time mother of a newborn would like to know about the care of the umbilical cord stump. When does the umbilical cord stump of a newborn most frequently slough off?
(A) 2nd day after delivery
(B) 5th day after delivery
(C) 10th day after delivery
(D) 15th day after delivery
(E) 21st day after delivery

10. A term infant is delivered via cesarean delivery as a double-footling breech. It is noted to have an Apgar score of 3 at 1 minute and later to be irritable and restless. The infant's muscles are rigid, and the anterior fontanel bulges. The infant develops progressive bradycardia. What is the most likely cause of these findings?
(A) brain stem injury
(B) infection
(C) congenital abnormality
(D) neonatal sepsis
(E) intracranial hemorrhage

1	E	6	D
2	B	7	A
3	E	8	E
4	B	9	C
5	B	10	E

Case

An 18-year-old woman with a body mass index of 35 who had a forceps delivery after a prolonged second stage of labor 10 days previously presented with heavy, fresh vaginal bleeding and clots. She felt unwell and complained of abdominal cramps. On examination she had a temperature of 38.2°C and there was mild suprapubic tenderness. Vaginal examination revealed blood clots, but no products of conception. The cervix admitted one finger and the uterus was tender and measured 16 weeks in size. A review of the delivery notes revealed that the placenta was delivered complete, but the membranes were noted to be ragged.

1. What is the most likely diagnosis?
2. What are the key features that suggest retained products of conception?
3. How should the patient be managed?

Answer

1. Secondary PPH due to infected retained products of conception.
2. Secondary postpartum haemorrhage. Enlarged uterus. Open cervical os.
3. Blood cultures. Intravenous broad-spectrum antibiotics (e.g. cephalosporin and metronidazole). Surgical evacuation of the retained products.

3.2. Educational materials, recommendations (instructions) for performing tasks

PUERPERIUM is the period following childbirth during which the body tissues, specially the pelvic organs revert back approximately to the prepregnant state both anatomically and physiologically. The retrogressive changes are mostly confined to the reproductive organs with the exception of the mammary glands which in fact show features of activity. Involution is the process whereby the genital organs revert back approximately to the state as they were before pregnancy. The woman is termed as a puerpera.

Puerperium begins as soon as the placenta is expelled and lasts for approximately 6 weeks when the uterus becomes regressed almost to the non-pregnant size. The period is arbitrarily divided into — (a) early – within 24 hours; (b) remote – up to 6 weeks. It is the time from delivery until complete physiological involution and psychological adjustment.

INVOLUTION OF THE UTERUS

Uterus: Immediately following delivery, the uterus becomes firm and retract with alternate hardening and softening. The uterus measures about 20 × 12 × 7.5 cm (length, breadth and thickness) and weighs about 1000 gm. At the end of 6 weeks, its measurement is almost similar to that of the non-pregnant state and weighs about 60 gm. The placental site contracts rapidly presenting a raised surface with measures about 7.5 cm and remains elevated even at 6 weeks when it measures about 1.5 cm.

Lower uterine segment: Immediately following delivery, the lower segment becomes a thin, flabby and collapsed structure. It takes a few weeks to revert back to the normal shape and size of the isthmus, i.e. the part between the body of the uterus and internal os of the cervix.

Cervix: The cervix contracts slowly; the external os admits two fingers for a few days but by the end of first week, narrows down to admit the tip of a finger only. The contour of the cervix takes a longer time to regain (6 weeks) and the external os never reverts back to the nulliparous state.

The physiological process of involution is most marked in the body of the uterus. Changes occur in the following components: (1) Muscles (2) Blood vessels (3) Endometrium.

Muscles: There is marked hypertrophy and hyperplasia of muscle fibers during pregnancy and the individual muscle fiber enlarges to the extent of 10 times in length and 5 times in breadth. During puerperium, the number of muscle fibers is not decreased but there is substantial reduction of the myometrial cell size. Withdrawal of the steroid hormones, estrogen and progesterone, may lead to increase in the activity of the uterine collagenase and the release of proteolytic enzyme. Autolysis of the protoplasm occurs by the proteolytic enzyme with liberation of peptones which enter the blood stream. The connective tissues also undergo the same type of degeneration. The conditions which favors involution are — (a) efficacy of the enzymatic action and (b) relative anoxia induced by effective contraction and retraction of the uterus.

Blood vessels: The changes of the blood vessels are pronounced at the placental site. The arteries are constricted by contraction of its wall and thickening of the intima followed by thrombosis. During the first week, the arteries undergo thrombosis, hyalinization and fibrinoid end arteritis. The veins are obliterated by thrombosis, hyalinization and endophlebitis. New blood vessels grow inside the thrombi.

Endometrium: Following delivery, the major part of the decidua is cast off with the expulsion of the placenta and the membranes, more at the placental site. The endometrium left behind varies in thickness from 2–5 mm. The superficial part containing the degenerated decidua, blood cells and bits of fetal membranes becomes necrotic and is cast off in the lochia. Regeneration starts by 7th day. It occurs from the epithelium of the uterine gland mouths and interglandular stromal cells. Regeneration of the epithelium is completed by 10th day and the entire endometrium is restored by the day 16, except at the placental site where it takes about 6 weeks.

CLINICAL ASSESSMENT OF INVOLUTION

The rate of involution of the uterus can be assessed clinically by noting the height of the fundus of the uterus in relation to the symphysis pubis. The measurement should be taken carefully at a fixed time every day, preferably by the same observer. Bladder must be emptied before hand and preferably the bowel too, as the full bladder and the loaded bowel may raise the level of the fundus of the uterus. The uterus is to be centralized and with a measuring tape, the fundal height is measured above the symphysis pubis. Following delivery, the fundus lies about 13-14 cm above the symphysis pubis. During the first 24 hours, the level remains constant; thereafter, there is a steady decrease in height by 1,5-2 cm in 24 hours, so that by the end of second week the uterus becomes a pelvic organ. The rate of involution thereafter slows down until by 6 weeks, the uterus becomes almost normal in size.

The involution may be affected adversely and is called subinvolution. Sometimes, the involution may be continued in women who are lactating so that the uterus may be smaller in size — superinvolution. The uterus, however, returns to normal size if the lactation is withheld.

INVOLUTION OF OTHER PELVIC STRUCTURES

Vagina: The distensible vagina, noticed soon after birth takes a long time (4-8 weeks) to involute. It regains its tone but never to the virginal state. The mucosa remains delicate for the first few weeks and submucous venous congestion persists even longer. It is the reason to withhold surgery on puerperal vagina. Rugae partially reappear at third week but never to the same degree as in prepregnant state. The introitus remains permanently larger than the virginal state. Hymen is lacerated and is represented by nodular tags — the carunculae myrtiformes.

Broad ligaments and round ligaments require considerable time to recover from the stretching and laxation.

Pelvic floor and pelvic fascia take a long time to involute from the stretching effect during parturition.

LOCHIA

It is the vaginal discharge for the first fortnight during puerperium. The discharge originates from the uterine body, cervix and vagina.

Odor and reaction: It has got a peculiar offensive fishy smell. Its reaction is alkaline tending to become acid towards the end.

Color: Depending upon the variation of the color of the discharge, it is named as: (1) Lochia rubra (red) 1-4 days. (2) Lochia serosa (5-9 days) — the color is yellowish or pink or pale brownish. (3) Lochia alba — (pale white) — 10-15 days.

Composition: Lochia rubra consists of blood, shreds of fetal membranes and decidua, vernix caseosa, lanugo and meconium. Lochia serosa consists of less RBC but more leukocytes, wound exudate, mucus from the cervix and microorganisms (anaerobic streptococci and staphylococci). The presence of bacteria is not pathognomonic unless associated with clinical signs of sepsis. Lochia alba contains plenty of decidual cells, leukocytes, mucus, cholesterol crystals, fatty and granular epithelial cells and microorganisms.

Amount: The average amount of discharge for the first 5–6 days, is estimated to be 250 mL.

Normal duration: The normal duration may extend up to 3 weeks. The red lochia may persist for longer duration especially in women who get up from the bed for the first time in later period. The discharge may be scanty, especially following premature labors or may be excessive in twin delivery or hydramnios.

Clinical importance: The character of the lochial discharge gives useful information about the abnormal puerperal state.

The vulval pads are to be inspected daily to get information:

• Odor: If malodorous, indicates infection. Retained plug or cotton piece inside the vagina should be kept in mind.

• Amount: Scanty or absent — signifies infection or lochiometra. If excessive — indicates infection.

• Color: Persistence of red color beyond the normal limit signifies subinvolution or retained bits of conceptus.

• Duration: Duration of the lochia alba beyond 3 weeks suggests local genital lesion.

GENERAL PHYSIOLOGICAL CHANGES

PULSE: For a few hours after normal delivery, the pulse rate is likely to be raised, which settles down to normal during the second day. However, the pulse rate often rises with after-pain or excitement.

TEMPERATURE: The temperature should not be above 37.2°C within the first 24 hours. There may be slight reactionary rise following delivery by 0.5°C but comes down to normal within 12 hours.

On the 3rd day, there may be slight rise of temperature due to breast engorgement which should not last for more than 24 hours. However, genitourinary tract infection should be excluded if there is rise of temperature.

URINARY TRACT: The bladder mucosa becomes edematous and hyperemic and often shows evidences of submucous extravasation of blood. The bladder capacity is increased. The bladder may be over distended without any desire to pass urine. The common urinary problems are: over distension, incomplete emptying and presence of residual urine. Urinary stasis is seen in more than 50% of women. The risk of urinary tract infection is, therefore, high. Dilated ureters and renal pelves return to normal size within 8 weeks. There is pronounced diuresis on the second or third day of the puerperium.

GASTROINTESTINAL TRACT: Increased thirst in early puerperium is due to loss of fluid during labor, in the lochia, diuresis and perspiration. Constipation is a common problem for the following reasons: delayed GI motility, mild ileus following delivery, together with perineal discomfort. Some women may have the problem of anal incontinence.

WEIGHT LOSS: In addition to the weight loss (5–6 kg) as a consequence of the expulsion of the fetus, placentae, liquor and blood loss, a further loss of about 2 kg occurs during puerperium chiefly caused by diuresis. This weight loss may continue up to 6 months of delivery.

FLUID LOSS: There is a net fluid loss of at least 2 liters during the first week and an additional 1.5 liters during the next 5 weeks. The amount of loss depends on the amount retained during pregnancy, dehydration during labor and blood loss during delivery. The loss of salt and water are larger in women with preeclampsia and eclampsia.

BLOOD VALUES: Immediately following delivery, there is slight decrease of blood volume due to blood loss and dehydration. Blood volume returns to non-pregnant level by the second week. Cardiac output rises soon after delivery to about 80% above the pre-labor value but slowly returns to normal within one week.

RBC volume and hematocrit values return to normal by 8 weeks postpartum after the hydremia disappears. Leukocytosis to the extent of 25000 per ml occurs

following delivery probably in response to stress of labor. Platelet count decreases soon after the separation of the placenta but secondary elevation occurs, with increase in platelet adhesiveness between 4-10 days. Fibrinogen level remains high up to the second week of puerperium. A hypercoagulable state persists for 48 hours postpartum and fibrinolytic activity is enhanced in first 4 days. The secondary increase in fibrinogen, factor VIII and platelets in the first week increases the risk for thrombosis. The increase in fibrinolytic activity after delivery acts as a protective mechanism.

MENSTRUATION AND OVULATION: The onset of the first menstrual period following delivery is very variable and depends on lactation. If the woman does not breastfeed her baby, the menstruation returns by 6th week following delivery in about 40% and by 12th week in 80% of cases.

In non-lactating mothers, ovulation may occur as early as 4 weeks and in lactating mothers about 10 weeks after delivery. In lactating mothers the mechanism of amenorrhea and anovulation are depicted schematically above. A woman who is exclusively breastfeeding, the contraceptive protection is about 98% up to 6 months of postpartum. Thus, lactation provides a natural method of contraception. However, ovulation may precede the first menstrual period in about one-third and it is possible for the patient to become pregnant before she menstruates following her confinement. Non-lactating mother should use contraceptive measures in 3rd postpartum week and the lactating mother in 3rd postpartum month.

LACTATION

For the first two days following delivery, no further anatomic changes in the breasts occur. The secretion from the breasts called colostrum which starts during pregnancy becomes more abundant during the period.

COMPOSITION OF THE COLOSTRUM: It is deep yellow serous fluid, alkaline in reaction. It has got a higher specific gravity; a high protein, vitamin A, sodium and chloride content but has got lower carbohydrate, fat and potassium than the breast milk. It contains antibody (IgA) produced locally.

Advantages: (1) The antibodies (IgA, IgG, IgM) and humoral factors (lactoferrin) provides immunological defense to the new born. (2) It has laxative action on the baby because of large fat globules.

PHYSIOLOGY OF LACTATION

Although, lactation starts following delivery, the preparation for effective lactation starts during pregnancy.

The physiological basis of lactation is divided into four phases:

(a) Preparation of breasts (mammogenesis).

(b) Synthesis and secretion from the breast alveoli (lactogenesis).

(c) Ejection of milk (galactokinesis).

(d) Maintenance of lactation (galactopoiesis).

Mammogenesis: Pregnancy is associated with a remarkable growth of both the ductal and lobuloalveolar systems. An intact nerve supply is not essential for the growth of the mammary glands during pregnancy.

Lactogenesis: Though some secretory activity is evident (colostrum) during pregnancy and accelerated following delivery, milk secretion actually starts on 3rd or 4th postpartum day. Around this time, the breasts become engorged, tense, tender and feel warm. Inspite of a high prolactin level during pregnancy, milk secretion is kept in abeyance. Probably, the steroids — estrogen and progesterone circulating during pregnancy make the breast tissues unresponsive to prolactin. When the estrogen and progesterone are withdrawn following delivery, prolactin begins its milk secretory activity in previously fully developed mammary glands. Prolactin and glucocorticoids are the important hormones in this stage. The secretory activity is enhanced directly or indirectly by also growth hormone, thyroxine and insulin. For milk secretion to occur, nursing effort is not essential.

Galactokinesis: Discharge of milk from the mammary glands depends not only on the suction exerted by the baby during suckling but also on the contractile mechanism which expresses the milk from the alveoli into the ducts. Oxytocin is the major galactokinetic hormone.

The milk ejection (or 'let-down') reflex is initiated by suckling and is mediated via the hypothalamus and pituitary gland, which release oxytocin into the bloodstream. The oxytocin causes contractions of the myoepithelial cells and milk is ejected from the alveoli and small ducts to flow to the large ducts and the subareolar reservoirs. Oxytocin may also inhibit the release of dopamine from the hypothalamus, further encouraging the secretion of milk.

Negative emotional and physical factors can reduce the letdown reflex, with the result that for lactation to be established the mother must be confident that she can breastfeed.

TEN STEPS TO SUCCESSFUL BREASTFEEDING

Every facility providing maternity services and care for newborn infants should:

1. Have a written breastfeeding policy that is routinely communicated to all healthcare staff.
2. Train all healthcare staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they are separated from their infants.
6. Give newborn infants no food or drink other than breast milk unless medically indicated.
7. Practice rooming-in. Allow mothers and infants to stay together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies and soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from hospital or clinic.

Galactopoiesis: Prolactin appears to be the single most important galactopoietic hormone. For maintenance of effective and continuous lactation, suckling is essential. It is not only essential for the removal of milk from the glands, but it also causes the release of prolactin. Secretion is a continuous process unless suppressed by congestion or emotional disturbances. Milk pressure reduces the rate of production and hence periodic breastfeeding is necessary to relieve the pressure which in turn maintains the secretion.

MILK PRODUCTION: A healthy mother will produce about 500-800 mL of milk a day to feed her infant. This requires about 700 Kcal/day for the mother, which must be made up from diet or from her body store. For this purpose a store of about 5 kg of fat during pregnancy is essential to make up any nutritional deficit during lactation.

Lactation suppression: It may be needed for women who cannot breastfeed for personal or medical reasons. Lactation is suppressed when the baby is born dead or dies in the neonatal period or if breastfeeding is contraindicated. Methods commonly used are: (i) To stop breastfeeding (ii) To avoid pumping or milk expression (iii) To wear breast support (iv) Ice packs to prevent engagement (v) Analgesics (aspirin) to relieve pain (vi). A tight compression bandage is applied for 2–3 days. The natural inhibition of prolactin secretion will result in breast involution.

Medical methods of suppression with estrogen, androgen or bromocriptine is not recommended. The side effects of bromocriptine are: hypotension, rebound secretion, seizures, myocardial infarction and puerperal stroke.

MANAGEMENT OF NORMAL PUERPERIUM

The principles in management are: (1) To restore the health of the mother. (2) To prevent infection. (3) To take care of the breasts, including promotion of breastfeeding. (4) To motivate the mother for contraception.

Immediate attention: Immediately following delivery, the patient should be closely observed. She may be given a drink of her choice or something to eat, if she is hungry. Emotional support is essential. Usually the first feeling of mother is the sense of happiness and relief, with the birth of a healthy baby. The woman needs emotional support when she suffers
from postpartum blues or stress due to newborn’s prematurity, illness, congenital malformation or death.

REST AND AMBULANCE: Early ambulation after delivery is beneficial. After a good resting period, the patient becomes fresh and can breastfeed the baby or moves out of bed to go to the toilet. Early ambulation is encouraged. Advantages are: (1) Provides a sense of well-being (2) Bladder complications and constipation are less (3) Facilitates uterine drainage and hastens involution of the uterus (4) Lessens puerperal venous thrombosis and embolism. Following an uncomplicated delivery, climbing stairs, lifting objects, daily household work, cooking may be resumed.

HOSPITAL STAY: Early discharge from the hospital is an almost universal procedure. If adequate supervision by trained health visitors is provided, there is no harm in early discharge. Most women are discharged fit and healthy after 2 days of

spontaneous vaginal delivery with proper education and instructions. Early discharge may be done in a few selected women. Some need prolonged hospitalization due to morbidities (infections of urinary tract, or the perineal wound, pain, or breastfeeding problems).

DIET: The patient should be on normal diet of her choice. If the patient is lactating, high calories, adequate protein, fat, plenty of fluids, minerals and vitamins are to be given. However, in non-lactating mothers, a diet as in non-pregnant is enough.

CARE OF THE BLADDER: The patient is encouraged to pass urine following delivery as soon as convenient. At times, the patient fails to pass urine and the causes are — (1) Unaccustomed position and (2) Reflex pain from the perineal injuries. This is common after a difficult labor or a forceps delivery. If the patient still fails to pass urine, catheterization should be done. Catheterization is also indicated in case of incomplete emptying of the bladder evidenced by the presence of residual urine of more than 60 mL. Continuous drainage is kept until the bladder tone is regained. The underlying principle of the bladder care is to ensure adequate drainage of urine so that infection and cystitis are avoided.

CARE OF THE BOWEL: The problem of constipation is much less because of early ambulation and liberalization of the dietary intake. A diet containing sufficient roughage and fluids is enough to move the bowel. If necessary, mild laxative may be given at bed time.

SLEEP: The patient is in need of rest, both physical and mental. So she should be protected against worries and undue fatigue. Sleep is ensured providing adequate physical and emotional support. If there is any discomfort, such as after pains or painful piles or engorged breasts, they should be dealt with adequate analgesics (Ibuprofen).

CARE OF THE VULVA AND EPISIOTOMY WOUND: Shortly after delivery, the vulva and buttocks are washed with soap water down over the anus and a sterile pad is applied. The patient should look after personal cleanliness of the vulval region. The perineal wound should be dressed with spirit and antiseptic powder after each act of micturition and defecation or at least twice a day. The nurse should use sterilised gloves during dressing.

Cold (ice) sitz baths relieve pain. When the perineal pain is persistent, a vaginal and rectal examination is done to detect any hematoma, wound gaping or infection. For pain Ibuprofen is safe for nursing mothers.

CARE OF THE BREASTS: The nipple should be washed with sterile water before each feeding. It should be cleaned and kept dry after the feeding is over. A nursing brassiere provides comfortable support. Nipple soreness is avoided by frequent short feedings rather than the prolonged feeding, keeping the nipples clear and dry. Nipple confusion is a situation where the infant accepts the artificial nipple but refuses the mother’s nipple. This is avoided by making the mother’s nipple more protractile and not offering any supplemental fluids to the infant.

MATERNAL–INFANT BONDING (ROOMING-IN): It starts from first few moments after birth. This is manifested by fondling, kissing, cuddling and gazing at the infant. The baby should be kept in her bed or in a cot besides her bed. This not

only establishes the mother-child relationship but the mother is conversant with the art of baby care so that she can take full care of the baby while at home. Baby-friendly hospital initiative promotes parent-infant-bonding, baby rooming with the mother and breastfeeding.

ASEPSIS AND ANTISEPTICS: Asepsis must be maintained especially during the first week of puerperium. Liberal use of local antiseptics, aseptic measures during perineal wound dressing, use of clean bed linen and clothing are positive steps. Clean surroundings and limited number of visitors could be of help in reducing nosocomial infection.

IMMUNISATION: Administration of anti–D–gamma globulin to unimmunized Rh–negative mother bearing Rh–positive baby.

MANAGEMENT OF AILMENTS

After pain — It is the infrequent, spasmodic pain felt in the lower abdomen after delivery for a variable period of 2–4 days. Presence of blood clots or bits of the afterbirths lead to hypertonic contractions of the uterus in an attempt to expel them out. This is commonly met in primipara. The pain may also be due to vigorous uterine contraction especially in multipara. The mechanism of pain is similar to cardiac anginal pain induced by ischemia. Both the types are excited during breastfeeding. The treatment includes massaging the uterus with expulsion of the clot followed by administration of analgesics (Ibuprofen) and antispasmodics.

Pain on the perineum: Never forget to examine the perineum when analgesic is given to relieve pain. Early detection of vulvo-vaginal hematoma can thus be made. Sitz baths (hot or cold) can give additional pain relief.

Correction of anemia: Majority of the women remain in an anemic state following delivery. Supplementary iron therapy (ferrous sulfate 200 mg) is to be given daily for a minimum period of 4–6 weeks.

Hypertension is to be treated until it comes to a normal limit. The physician should be consulted if proteinuria persists.

TO MAINTAIN A CHART: A progress chart is to be maintained noting the following: (1) Pulse, respiration and temperature recording 6 hourly or at least twice a day (2) Measurement of the height of the uterus above the symphysis pubis once a day in a fixed time with prior evacuation of the bladder and preferably the bowel too (3) Character of the lochia (4) Urination and bowel movement.

POSTPARTUM EXERCISE: The objectives of postpartum exercises are: (1) To improve the muscle tone, which are stretched during pregnancy and labor especially the abdominal and perineal muscles. (2) To educate about correct posture to be attained when the patient is getting up from her bed. This also includes the correct principle of lifting and working positions during day-to-day activities.

Advantages gained thereby are: (1) To minimize the risk of puerperal venous thrombosis by promoting arterial circulation and preventing venous stasis (2) To prevent backache (3) To prevent genital prolapse and stress incontinence of urine.

PROCEDURE: (1) Initially, she is taught breathing exercise and leg movements lying in bed. (2) Gradually, she is instructed to tone up the abdominal and perineal muscles and to correct the postural defects. These can well be taught by a trained physiotherapist. The exercise should be continued for at least 3 months. The

common exercises prescribed are: (a) To tone up the pelvic floor muscles: The patient is asked to contract the pelvic muscles in a manner to withhold the act of defecation or urination and then to relax. The process is to be repeated as often as possible each day. (b) To tone up the abdominal muscles: The patient is to lie in dorsal position with the knees bent and the feet flat on the bed. The abdominal muscles are contracted and relaxed alternately and the process is to be repeated several times a day. (c) To tone up the back muscles: The patient is to lie on her face with the arms by her side. The head and the shoulders are slowly moved up and down. The procedure is to be repeated 3–4 times a day and gradually increased each day.

Physical activity should be resumed without delay. Sexual activity may be resumed (after 6 weeks) when the perineum is comfortable and bleeding has stopped.

CHECK-UP AND ADVICE ON DISCHARGE: A thorough check-up of the mother and the baby is mandatory prior to discharge of the patient from the hospital. Discharge certificate should have all the important information as regard the mother and baby.

Advices include: (1) Measures to improve her general health. Continuance of supplementary iron therapy (2) Postnatal exercises (3) Procedures for a gradual return to day-to-day activities (4) Breastfeeding and care of the newborn (5) Avoidance of intercourse for a reasonable period of 4–6 weeks until lacerations or episiotomy wound are well healed (6) Family planning advice and guidance — Non-lactating women should practice some form of contraceptive measures after 3 weeks and the lactating women should start 3 months after delivery (7) To have postnatal check up after 6 weeks.

The method of contraception will depend upon breastfeeding status, state of health and number of children. Natural methods cannot be used until menstrual cycles are regular. Exclusive breastfeeding provides 98% contraceptive protection for 6 months. Barrier methods may be used. Steroidal contraceptions — combined preparations are suitable for nonlactating women and should be started 3 weeks after. In lactating women it is avoided due to its suppressive effects. Progestin only pill may be a better choice for them. Other progestins (DMPA, Levonorgestrel implants) may be used. IUDs are also a satisfactory method irrespective of breastfeeding status.

IMMEDIATE CARE OF THE NEWBORN

Soon after the delivery of the baby, it should be placed on a tray covered with clean dry linen with the head slightly downwards (15°). It facilitates drainage of the mucus accumulated in the tracheobronchial tree by gravity. The tray is placed between the legs of the mother and should be at a lower level than the uterus to facilitate gravitation of blood from the placenta to the infant.

Air passage (oropharynx) should be cleared of mucus and liquor by gentle suction.

Apgar rating at 1 minute and at 5 minutes is to be recorded.

Clamping and ligature of the cord—The cord is clamped by two Kocher's forceps, the nearest one is placed 5 cm away from the umbilicus and is cut in between. Two separate cord ligatures are applied with sterile cotton threads 1 cm

apart using reef-knot, the proximal one being placed 2.5 cm away from the navel. Leaving behind a length of the cord attached to the navel not only prevents inclusion of the embryonic structure, if present, but also facilitates control of primary haemorrhage due to a slipped ligature. The cord is divided with scissors about 1 cm beyond the ligatures taking aseptic precautions so as to prevent cord sepsis.

The purpose of clamping the cord on the maternal end is to prevent soiling of the bed with blood and to prevent fetal blood loss of the second baby in undiagnosed monozygotic twin.

Delay in clamping for 2–3 minutes or till cessation of the cord pulsation facilitates transfer of 80-100 mL blood from the compressed placenta to a baby when placed below the level of uterus. This is beneficial to a mature baby but may be deleterious to a pre-term or a low birth weight baby due to hypervolemia. But early clamping should be done in cases of Rh-incompatibility (to prevent antibody transfer from the mother to the baby) or babies born asphyxiated or one of a diabetic mother.

Quick check is made to detect any gross abnormality and the baby is wrapped with a dry warm towel.

The identification tape is tied both on the wrist of the baby and the mother.

Once the management of third stage is over (usually 10–20 minutes), baby is given to the mother.

3.3. Requirements for the results of work.

- To take a medical history (general and specific) and record information in a standardized proforma,
- to perform general examination, assess the health status of the puerpera,
- to assess uterine involution, character of lochia, lab tests,
- to counsel the women about physiological changes in postpartum period,
- to assess complaints of puerpera, explain the origins of minor ailments in postpartum period, give advice how to reduce the problem,
- to develop a plan of management of normal postpartum period,
- to understand the common disorders of the puerperium and how to manage them
- to be able to recognize and manage common postpartum psychiatric disorders,
- to counsel woman about physiology of lactation, benefits of breastfeeding,
- to check up woman on discharge, give judicious advice regarding diet, drugs and hygiene,
- to provide counseling about postpartum contraception,
- to rate a newborn according Apgar scale,
- to perform immediate care of newborn.

3.4. Control materials for the final stage of the class: tasks, tests, etc.

Tests

1. A heroin-abusing woman presents to labor and delivery and has a precipitous vaginal delivery of a term infant who has poor respiratory effort and Apgar scores 2/4/6. Rather than simply sedation from narcotic abuse, what is the most likely finding in a neonate with intrapartum asphyxia?
(A) alkalemia
(B) hypoxia
(C) hypocapnia
(D) tachycardia
(E) increased anal sphincter tone

2. Continued apnea in the newborn most often results from which of the following?
(A) maternal infection
(B) epidural anesthesia
(C) central nervous system (CNS) depression
(D) maternal hyperventilation
(E) naloxone administration

3. After a delivery complicated by a shoulder dystocia, a newborn is found to have paralysis of one arm with the forearm extended and rotated inward next to the trunk. These findings are most consistent with which of the following?
(A) damage to the C8–T1 nerve roots
(B) neonatal asphyxia
(C) damage to the brachial plexus
(D) fracture of the clavicle
(E) comminuted fracture of the humerus

4. Within the first minute after delivery, the baby does not breathe spontaneously. The heart rate is 80 to 90 bpm. There is some movement, with pale and limited irritability. What is the most appropriate next step in management?
(A) dry and warm the newborn
(B) slap the baby’s back gently at first, then vigorously if necessary
(C) ventilate the infant by mask
(D) do external cardiac massage
(E) administer intravenous bicarbonate via umbilical vein

5. At a new obstetrics visit, a nulliparous patient shares her fears of having a neonatal death because her mother had a child with a neonatal death. In counseling the patient, you explain that which of the following is the most common factor associated with neonatal death?
(A) birth injury

(B) prematurity
(C) congenital malformations
(D) metabolic diseases
(E) intrauterine growth restriction

6. Neurologic abnormalities are found in greatest proportion in infants with which of the following?
(A) high Apgar scores and normal birth weight
(B) low Apgar scores and normal birth weight
(C) low Apgar scores and low birth weight
(D) high Apgar scores and high birth weight
(E) low Apgar scores and high birth weight

7. You deliver an infant who has a moderate shoulder dystocia and at 1 minute it does not cry, as well as has flexed extremities, irregular respiration, a bluish color, and a heart rate of 90 bpm. What is the most appropriate Apgar score for this infant?
(A) 1
(B) 3
(C) 5
(D) 7
(E) 9

8. At 5 minutes after resuscitation efforts, the infant has a pink body, blue fingers, vigorous cry and active motion, good respiration, and heart rate of 120 bpm. What is the most appropriate Apgar score for this infant?
(A) 1
(B) 3
(C) 5
(D) 7
(E) 9

9. Antimicrobial therapy is routinely applied to the eyes of newborns to prevent blindness caused by which of the following?
(A) Neisseria gonorrhoeae
(B) Chlamydial conjunctivitis
(C) Herpes simplex
(D) Group B streptococcus
(E) Hemophilus Ducreyi

10. What is the most common cause of clonic seizures in the initial 24-hour newborn period?
(A) hypoxic-ischemic encephalopathy
(B) intracranial hemorrhage
(C) infection
(D) hypoglycemia

(E) drug withdrawal

Answer key

1	B	6	C
2	C	7	B
3	C	8	D
4	C	9	A
5	B	10	A

Case

A 25 years old primipara was seen by her GP at 12 weeks' gestation. The only history of note was that her father had suffered a long-standing psychiatric illness that the woman believed to be 'schizophrenia'. He had died when she was young in a road traffic accident. Her pregnancy proceeded without complication, and she went home on the second postnatal day following a normal delivery at term. Within a couple of weeks, her partner reported to the community midwife that he had concerns about her mood. She seemed agitated, fearful and unduly concerned about the wellbeing of the baby and refused any help offered by him. The GP saw her and diagnosed 'postnatal depression'. He commenced tricyclic antidepressants. However, 1 week later she became frankly delusional and believed that her partner was trying to kill the baby. She was hardly sleeping and eating very little, but was continuing to breastfeed her baby.

1. What is the most likely diagnosis?
2. How should this be managed?
3. How should her breastfeeding be managed?
4. In retrospect, how should the pregnancy have been managed?

Answer

1. The most likely diagnosis is puerperal psychosis.

2. She should be admitted to a regional mother-and-baby unit with her newborn where she can receive multidisciplinary care from the specialist medical, nursing and midwifery staff. The antidepressants should be stopped and she should be treated with antipsychotics.

3. She should be encouraged to continue breastfeeding but the baby should be monitored for side-effects.

4. Ideally, the woman should have been asked to explore the nature of her family history. This would have revealed that her father suffered from schizophrenia. If

this had been known, then it could have prompted review by a specialist in perinatal mental health, leading to regular postnatal review by a psychiatric nurse being organized. This might have led to earlier intervention and prevented her deterioration to such a severe state.

4. SUMMING UP

Assessment of the ongoing learning activity at the practical class:

1. Assessment of the theoretical knowledge on the theme:
   - methods: individual survey on the theme, participation of the students in the discussion of problem situations; assessment of performance of tests on the theme;
   - the maximum score – 5, the minimum score – 3, the unsatisfactory score – 2.
2. Assessment of practical skills on the theme:
   - methods: assessment of the solution of situational tasks (including calculation) on the theme;
   - the maximum score – 5, the minimum score – 3, the unsatisfactory score – 2.

Assessment of the individual task:

1. Assessment of the quality of the performance of the individual task:
   - the maximum score – 5, the minimum score – 3, the unsatisfactory score – 2.
2. Assessment of the presentation and defense of an individual task, participation in the assessment of the business plan of the competitors and its critical analysis:
   - the maximum score – 5, the minimum score – 3, the unsatisfactory score – 2.

The score for one practical class is the arithmetic average of all components and can only have an integer value (5, 4, 3, 2), which is rounded statistically.

Criteria for ongoing assessment at the practical class:

5	The student is fluent in the material, takes an active part in the discussion and solution of situational clinical problems, confidently demonstrates practical skills during the examination of a pregnant and interpretation of clinical, laboratory and instrumental studies, expresses his opinion on the topic, demonstrates clinical thinking.
4	The student is well versed in the material, participates in the discussion and solution of situational clinical problems, demonstrates practical skills during the examination of a pregnant and interpretation of clinical, laboratory and instrumental studies with some errors, expresses his opinion on the topic, demonstrates clinical thinking.
3	The student isn’t well versed in material, insecurely participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during the examination of a pregnant and interpretation of clinical, laboratory and instrumental studies with significant errors.

2	The student isn't versed in material at all, does not participate in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the examination of a pregnant and the interpretation of clinical, laboratory and instrumental studies.

RECOMMENDED LITERATURE

Basic:

1. Gladchuk I.Z. Obstetrics: student`s book / Gladchuk I.Z., Ancheva I.A. . – Vinnitsia: Nova Knyha, 2021. – 288 p.
2. Obstetrics and Gynecology: in 2 volumes. Volume 1. Obstetrics: textbook / V.I. Gryshchenko, M.O. Shcherbina, B.M. Ventskivskyi et al. (2nd edition). – «Medicina», 2018. – 392 p.
3. Hiralal Konar DC Dutta's Textbook of Obstetrics (9th Ed.) / Hiralal Konar (Ed.). – Jp Medical Ltd, 2018. – 700 p.
4. F. Gary Cunningham Williams Obstetrics (26th Edition) / F. Gary Cunningham, Kenneth Leveno, Jodi Dashe, Barbara Hoffman, Catherine Spong, Brian Casey. – McGraw Hill / Medical, 2022. – 1328 p.
5. Jeremy Oats, Suzanne Abraham Llewellyn-Jones Fundamentals of Obstetrics and Gynaecology (10th Ed) / Jeremy Oats, Suzanne Abraham. – Elsevier, 2016. – 384 p.

Additional:

1. The PROMPT-CIPP Editorial Team. (2019). PROMPT-CIPP Course Participant's Handbook: Care of the Critically Ill Pregnant or Postpartum Woman (Critical Car Prompt Practical Obstetric Multi-professional Training). – Cambridge University Press; 1st edition, 2019. – 136 p.
2. L. A. Magee The FIGO Textbook of Pregnancy Hypertension. An evidence-based guide to monitoring, prevention and management. / L. A. Magee, P. Dadelszen, W. Stones, M. Mathai (Eds). – The Global Library of Women's Medicine, 2016. – 456 p.
3. Edwin Chandraharan Handbook of CTG Interpretation: From Patterns to Physiology / Edwin Chandraharan. – Cambridge University Press; 1st edition, 2017. – 256 p.
4. Louise C. Kenny, Jenny E. Myers Obstetrics by Ten Teachers (20th ed) / Louise C. Kenny, Jenny E. Myers. – CRC Press, 2017. – 342 p.
5. J. Studd Current Progress in Obstetrics and Gynaecology. Vol 4. / J. Studd, Seang Lin Tan, F. Chervenak. – TreeLife Media (A Div of Kothari Medical), 2017. – 419 p.
6. J. Studd Current Progress in Obstetrics and Gynaecology. Vol 5. / J. Studd, Seang Lin Tan, F. Chervenak. – TreeLife Media (A Div of Kothari Medical), 2019. – 403 p.
7. J. Studd Current Progress in Obstetrics and Gynaecology. Vol 6. / J. Studd, Seang Lin Tan, F. Chervenak. – TreeLife Media (A Div of Kothari Medical), 2022. – 309 p.

8. Mark Landon Obstetrics: Normal and Problem Pregnancies, 8th Edition / Mark Landon, Henry Galan, Eric Jauniaux, Deborah Driscoll, Vincenzo Berghella, William Grobman, et al. – Elsevier, 2021. – 1280 pp.
9. Mark B. Landon Gabbe's Obstetrics Essentials: Normal & Problem Pregnancies, 1st Edition / Mark B. Landon, Deborah A. Driscoll, Eric R. M. Jauniaux, Henry L. Galan, William A. Grobman, Vincenzo Berghella. – Elsevier, 2019. – 496 pp.
10. Ian M. Symonds, Sabaratnam Arulkumaran Essential Obstetrics and Gynaecology, 6th Edition / Ian M. Symonds, Sabaratnam Arulkumaran. – Elsevier, 2020. – 480 pp.
11. Myra J. Wick Mayo Clinic Guide to a Healthy Pregnancy, 2nd Edition / Myra J. Wick. – Mayo Clinic Press, 2018. – 520 p.

INTERNET SOURCES:

- https://www.cochrane.org/
- https://www.ebcog.org/
- https://www.acog.org/
- https://www.uptodate.com
- https://online.lexi.com/
- https://www.ncbi.nlm.nih.gov/
- https://pubmed.ncbi.nlm.nih.gov/
- https://www.thelancet.com/
- https://www.rcog.org.uk/
- https://www.npwh.org/