Kingdom of Cambodia

Nation Religion King

Ministry of Health

Intrapartum Care Training for Health Center Midwives

Guide for Initial Assessment

January, 2020

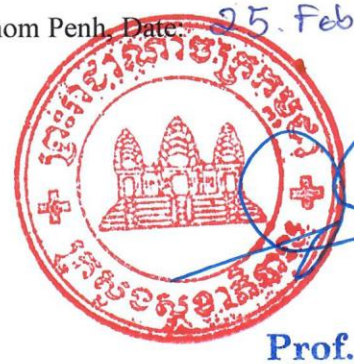
Foreword

Pregnancy and childbirth are physiological processes, which have been passed down since the first human-being was born. These processes through pregnancy until childbirth safely are valuable and meaningful, to start a new-life for mothers, newborn infants, and families smoothly. The steps and progress during delivery process may be the same, although each birth has a variety or unique characteristics.

Promoting maternal and newborn health is priority and main intervention in health sector. In the past two decades, Cambodia has succeeded in and achieved Millennium Development Goal 5 and 4 for reducing maternal mortality rate from 1020 in 1990 to 170 per 100,000 livebirths in 2014 and reduced neonatal mortality rate from 37 in 2000 to 18 per 1000 livebirth in 2014. However, currently Cambodia is trying harder to achieve Sustainable Development Goals in 2030. For safe delivery and saving the lives of mothers and babies in Cambodia, we had made a lot of efforts to promote Emergency Obstetric and Neonatal Care (EmONC) especially for abnormal/complicated delivery. In addition to this, we should improve and pay attention to the quality of care for normal delivery, which covers more than 80% among all childbirth. More careful monitoring & assessment on conditions of both mother and fetus are necessary. Professional observation and actions will contribute to early detection of abnormal/complicated cases, protection from development of complications, support for normal delivery process, and avoidance of unnecessary interventions.

This guide shows skilled birth attendance about initial assessment on woman/infant by using initial assessment tool (Initial Assessment Sheet: IAS) when pregnant women visit health facilities for delivery. I sincerely hope that this guide will strengthen service quality and promote maternal, infant and children in Cambodia.

Phnom Penh, Date: 25. Feb. 2020



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SECRETARY OF STATE

Acknowledgments

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Abbreviations

ANC	Antenatal Care
BP	Blood Pressure
CPD	Cephalopelvic Disproportion
EDD	Estimated Due Date
FHR	Fetal Heart Rate
Hb	Hemoglobin
HIV	Human Immunodeficiency Virus
IA	Initial Assessment
IAS	Initial Assessment Sheet
IM	Intra-Muscular
IV	Intra-Venous
LMP	Last Menstrual Period
LOA	Left Occiput Anterior
LOP	Left Occiput Posterior
LOT	Lett Occiput Transverse
MAS	Meconium Aspiration Syndrome
MgSO4	Magnesium Sulfate
NS	Normal Saline
OA	Occiput Anterior
OP	Occiput Posterior
OT	Occiput Transverse
PPH	Postpartum Hemorrhage

PROM	Pre-labor Rupture of Membranes
RPR test	Rapid Plasma Reagin Test
ROA	Right Occiput Anterior
ROP	Right Occiput Posterior
ROT	Right Occiput Transverse
SI	Shock Index
STI	Sexually Transmitted Infections
WHO	World Health Organization

Overview of Initial Assessment Sheet (IAS)

＜What is the 'Initial Assessment'?＞

The responsibility of a health center midwife is to take care of the pregnant woman, fetus, and newborn baby continuously as far as they are in stable condition. **Three conditions (woman, fetus, and delivery progress)** should be always observed comprehensively. It is also important to detect problems and, if necessary, to refer the woman adequately.

When a pregnant woman visits a health center for delivery, the midwife should check her condition systematically. The midwife needs to respond immediately to emergency cases, listen to complaints, collect her general information, and assesses the delivery progress. Finally, she determines the woman's situation using all integrated information. We call these steps an **'Initial Assessment'.**

＜What is an 'Initial Assessment Sheet (IAS)'?＞

For the initial assessment, the midwife can use IAS. IAS is a convenient tool to collect information comprehensively at first contact with a woman who will deliver a baby soon. Using IAS, a midwife can categorize the condition into three stages/colors: '**Normal (green)**', '**Risk of being complicated (yellow)**' and '**Abnormal/complicated/ emergency (red)**'. The midwife can refer the '**red**' cases immediately. They also can observe the '**yellow**' cases carefully in order to prevent complications.

＜Contents of IAS＞

IAS is a series of tables that include all of the information which should be collected. IAS covers six components:

1. Immediate response to an emergency for pregnant women
2. Listen to the woman's complaint

3. Woman's general information and obstetric history
4. Observe fetal condition
5. Assess the delivery progress
6. Observe maternal condition.

The order of IA from 1. to 6. is flexible and depends on the condition of the woman.

For each component in the table, there are several rows of topics to be checked. For each row, the standard data (cut-off, range, etc.) for assessment are shown in the three columns: '**Normal (green)**', '**Risk of being complicated (yellow)**' and '**Abnormal/complicated/ emergency (red)**'. The midwife can tick (✔) in the correct space after her assessment.

Section 1. Immediate response to an emergency for pregnant women

SUMMARY

- Objectives of this section are: (1) To distinguish emergency cases and (2) To provide immediate initial treatment to the case before referral.
- General impression of the woman's condition is very important to distinguish the emergency case.
- Once you consider that the pregnant woman is in very severe status, check 'consciousness', 'breathing', 'signs of shock', 'vital signs (blood pressure, pulse,
- It is important to refer the woman as soon as possible to save her life. Therefore, no need to check all items of Initial Assessment record sheet in case of emergency.

1-1. Level of consciousness

《**Summary**》

- Unconsciousness is an important sign of brain damage. Therefore, it is a very urgent condition for the pregnant woman.
- The simplest way to check 'consciousness' is to talk with the woman.
- If she does not reply or recognize you well, immediately move to the next steps: check breathing, vital signs (blood pressure, pulse and body temperature), and vaginal bleeding.
- If unconsciousness is accompanied by convulsions or a recent history of convulsions, eclampsia is the most probable cause.
- Giving Magnesium Sulphate (MgSO4) for treatment of eclampsia is required before referral.

1-1-1. Check the level of consciousness

- The simplest way to check 'consciousness' is to **talk** with the woman.
- If she does not reply or recognize you, immediately move to the next steps: check **airway and breathing** status.
- At the same time, check **vital signs (blood pressure, pulse and body temperature) and vaginal bleeding**.
- If she is unconscious or convulsing, position her on her **left side** to reduce the risk of aspiration of secretions, vomit and blood.
- Ask her family if she has had a convulsion recently.

1-1-2. Complications within emergency status

1-1-2.1. Unconsciousness

Unconsciousness is an important sign of brain damage. Therefore, it is very urgent condition for the pregnant woman. If having unconsciousness or **convulsion (including recent history of convulsion)**, **eclampsia** is the most probable reason. It is very important to confirm the history with the accompanied person (family members). Refer the woman with giving **MgSO4** for first dose.

1-1-2-2. Convulsions

- Convulsions are also a sign of brain damage. When convulsions happen, they are frequently accompanied with difficulty in breathing. It means the **oxygen supply** from mother to baby is cut off. Convulsions also cause vomiting, which may block airway (throat and trachea) of the pregnant woman.
- If the convulsion is accompanied with severe **hypertension (Diastolic Blood Pressure ≥ 110mmHg)**, **eclampsia** is the most probable cause. Other causes may be severe malaria, epilepsy, or meningitis. However, it is better to provide the initial treatment of eclampsia regardless of the cause, because it is difficult to determine the cause at the health center level.

1-1-3. Necessary treatment before referral

(Refer, *Safe Motherhood Clinical Management National Protocol for health center* [1], p. 25)

- First, try to insert a peripheral venous line with a catheter (plastic cannula) into a peripheral vein. A bottle of Normal Saline or Ringer's lactate solution is appropriate for connecting the line.
- Although the **intravenous line** is important, it may be difficult to insert it while the convulsion is still going on. In that case, try to give **muscular injection** of MgSO4 first.

- Keep the position of the woman on her left side.
- The process for providing MgSO4 is as follows:
  - For intravenous (IV) injection, one ampoule of 50% MgSO4 (10 ml) will be aspirated by using 30 or 50 ml of syringe with 18G needle. You can use another size needle, but it is easier to aspirate the drug with a bigger needle. Then aspirate 20 ml of Normal Saline in the same syringe. It results in dilution of MgSO4. Then change the needle from 18G to 25G for scalp vein. The drug can be loaded thorough the rubber tubing of the intravenous line (described above). It should be given over 15 to 20 minutes. **DO NOT** give MgSO4 **rapidly**; it can cause **apnea and death**.
  - For intra-muscular (IM) injection, draw up one ampoule of 50% MgSO4 (10 ml) with 10 ml syringe. Prepare two syringes of this, and inject into each buttock (one in the left, another in the right) of the patient.
- If **Diastolic Blood Pressure is >100 mmHg**, give **Hydralazine**, as antihypertensive drug. Dilute Hydralazine 10 mg (1 ml) in an ample with 9 ml injection solvent. Give 10 mg by IV slowly, taking 3 to 4 minutes. If IV is not possible, give IM.

Note:

- While waiting for an ambulance or transport, if 30 minutes has passed and the diastolic blood pressure still remains > 90 mmHg, repeat Hydralazine solution 10 mg IV again. Do not give more than 20 mg in total.
- Record the **dose and time** of injection on the **Referral Slip**.

1-2. Airway and breathing

《**Summary**》

- When the woman is unconscious or not responding to you well, check the airway and ensure that it is open.
- Listen to her breathing or look at her chest moving. If she is breathing, count the respiratory rate.
- If she is not breathing, provide ventilation using a mask and Ambu-bag.
- Indicators of insufficient oxygen in blood are shallow or rapid breathing (>30 times per minute), difficulty breathing, or central cyanosis on skin mucous around mouth.
- If those symptoms are observed, give oxygen before referral (if it is available).

1-2-1. Check the airway and breathing

- When the pregnant woman is unconscious, check if she is breathing.
- If she is not breathing, check if there is anything in her mouth as it may block her airway.
- When she is breathing, listen to her breath or look her chest moving and count the respiratory rate.
- Check the color around her lips and on the tips of fingers to see if there is any cyanosis. **Cyanosis** around lips indicates severe **deficiency of oxygen**.

1-2-2. Complications signifying emergency status

- Difficulty breathing, shallow or **rapid breathing (> 30 times per minute),** and central cyanosis (bluish skin or mucous around mouth) are signs of **insufficient oxygen in blood**.
- Shock is one of causes of insufficient oxygen in the blood.

- It may also be caused by insufficient ventilation due to respiratory or heart problems, such as pneumonia, asthma, acute pulmonary edema, obstructed breathing, or heart failure.

1-2-3. Necessary treatment before referral

- If there are symptoms of the above, treat based on pathologies. What we can do at the health center level is to give **oxygen at 4-6 L per minute by mask or cannulae**[5] (if it is available). If there is anything blocking the airway (i.e. vomit), try to remove it.
- If the woman is not breathing, put her in upright position and start breathing support by using a mask and Ambu-bag.

1-3. Signs of shock

《**Summary**》

- Shock is a failure of the circulatory system to maintain adequate blood flow in the body. It may result in maternal and fetal death if it is left untreated.
- If the woman is unconscious or not responding you well, check for signs of shock: low blood pressure (Systolic BP < 90 mmHg); weak pulse; cold, sweaty and sticky skin; cyanosis in palms or around lips; and rapid breathing.
- If the signs of shock are accompanied by severe bleeding or abnormal labor pain, it may be hypovolemic shock.
- If the signs of shock are accompanied by high fever, it may be septic shock.
- Insert an IV line and give fluids rapidly before referral.

1-3-1. Definition and signs of shock

1-3-1-1. Definition of shock

- **Shock** is a **failure of the circulatory system** to maintain adequate blood flow in the body. It may result in maternal and fetal death if it is left untreated.

1-3-1-2. Signs of shock

- The main feature of shock is **low blood pressure**. It can be diagnosed if **Systolic Blood Pressure is < 90 mmHg**.
- Other symptoms are:
    - Weak and/or rapid pulse (> 100 bpm)
    - Cold, sweaty and sticky skin
    - Cyanosis (palms or around lips)
    - Rapid breathing

- Decreased urine flow

1-3-2. Check the circulation and signs of shock

1-3-2-1. Blood pressure

- It may be difficult to measure the blood pressure by standard method (by using sphygmomanometer and stethoscope) in case of shock.
- Measurement by feeling arterial pulse by **touching radial artery pulse (palpatory method)** is recommended.
- As indicated in the definition, **Systolic Blood Pressure less than 90 mmHg** indicates **shock**. Measurement of the pulse should be conducted at the same time.

1-3-2-2. Pulse

Tachycardia (pulse >100 beats per minutes (bpm)) can be one of the signs of shock. Calculation of '**shock index (SI)**' is a useful indicator to evaluate the grade of shock.
SI is drawn by a simple formula.

$$\textbf{SI} = \frac{\textbf{Pulse}}{\textbf{Systolic Blood Pressure}}$$

Evaluation of SI is shown in the next table.

SI	Evaluation
1.0 <	Mild shock
1.5 <	Moderate shock
2.0 <	Severe shock

For example, SI is 1.1 if the pulse is 100 bpm and systolic blood pressure is 90 mmHg. It indicates mild shock. SI is 1.5 if pulse is 120 bpm and systolic blood pressure is 80 mmHg. It indicates moderate shock. SI is 2.0 if pulse is 140 bpm and systolic blood pressure is 70 mmHg. It indicates severe shock.

$$SI = \frac{\text{Pulse 100 bpm}}{\text{90 mmHg}} = 1.1$$

= indicates **mild shock**

$$SI = \frac{\text{Pulse 120 bpm}}{\text{80 mmHg}} = 1.5$$

= indicates **moderate shock**

$$SI = \frac{\text{Pulse 140 bpm}}{\text{70 mmHg}} = 2.0$$

= indicates **severe shock**

> **Note:** According to *Safe Motherhood Clinical Management National Protocol for health center* [1], criteria of shock are indicated as systolic blood pressure < 90 mmHg and pulse > 110 bpm. However, as it is shown above, it already indicates mild shock. Evaluation of pulse with systolic blood pressure is always recommended.

1-3-3. Possible causes of shock

Shock can be caused by: (1) lower blood volume **(hypovolemic shock)**, (2) excessive widening of blood vessels **(distributive shock)**, and (3) inadequate pumping action of the heart **(cardiogenic shock)**.

1-3-3-1. Hypovolemic shock

- When the blood volume is suddenly lost, the heart cannot pump out enough blood to the body. The reduced blood volume results in shock status, which is referred to as **hypovolemic shock**.
- For pregnant women, the most common cause of hypovolemic shock is **severe bleeding**.

- Check if there is any external bleeding as well as abnormal labor pain due to **placental abruption** or **ruptured uterus** which cause internal bleeding of the uterus or abdomen.
- In hypovolemic shock, the pulse becomes rapid to maintain circulation. When the pulse per minute is the same or more than the number of systolic blood pressure, it indicates a substantial amount of blood loss.

1-3-3-2. Distributive shock

- Excessive widening of blood vessels decreases blood pressure resulting in a decrease of blood flow and oxygen delivery to organs.
- The excessive widening of blood vessels is caused by a serious **allergic** reaction (called **anaphylactic shock**), severe **bacterial infection** (called **septic shock**) or other reasons such as drugs or neurogenic.
- In cases of **septic shock**, it is mostly accompanied by **high fever (> 38°C)**, and the hands are warm in the first stage.

1-3-3-3. Cardiogenic shock

- Inadequate pumping action of the heart can result in inadequate amount of blood being pumped out with every heartbeat, called **cardiogenic shock**.
- It can be caused by heart disease or a blood clot in the lungs.

1-3-4. Necessary treatment before referral

(Refer, *Safe Motherhood Clinical Management National Protocol for Health Center*[1], *p.14*)

- When there are any signs of shock, insert an IV line with 16G or 18G catheter and give fluids rapidly **(Ringer's lactate or Normal Saline)**.
- When the woman is bleeding, position her on her left side with the legs higher than chest and keep her warm.

1-4. Abnormal vital signs - Elevated Diastolic Blood Pressure

《**Summary**》

- Elevation of Diastolic Blood Pressure (≥ 90 mmHg) is one of the important signs of pre-eclampsia.
- High Diastolic Blood Pressure (≥ 110 mmHg) highly indicates severe pre-eclampsia. Immediate treatment and referral are required.

1-4-1. Definition of pre-eclampsia

(Refer, *Safe Motherhood Clinical Management National Protocol for health center*[1], p. 24 and *6. Observe maternal condition, 6-1. Blood pressure,* p.95)

- **High Diastolic Blood Pressure** is defined as **90 mmHg or more**.
- If it is accompanied with **proteinuria**, it is typical **pre-eclampsia**.
- If **Diastolic Blood Pressure is 110 mmHg or more with proteinuria**, it is **severe pre-eclampsia**.

Note: With a **urine dipstick**, if it is accompanied with proteinuria (++), it is mild **pre-eclampsia**. If Diastolic Blood Pressure is 110 mmHg or more with **proteinuria (more than ++)**, it is **severe pre-eclampsia**.

1-4-2. Complications with abnormal status

- Any type of pre-eclampsia has a risk of developing eclampsia.
- Fetuses frequently grow slower than normal in cases of pre-eclampsia, which can be a cause of **fetal distress** during delivery.
- Therefore, immediate referral is recommended.

1-4-3. Necessary treatment before referral

- In case of severe pre-eclampsia, provision of **Magnesium Sulphate (MgSO4)** is highly recommended before referral. The method is as same as the case of eclampsia. (See, *1-1-3. Necessary treatment before referral,* p.5)

1-5. Abnormal vital signs - Fever

《**Summary**》

- High grade fever (> 38.0ºC) indicates a severe form of infection. It may indicate sepsis.
- If fever is accompanied by ruptured membranes, intrauterine infection is suspected.
- Immediate treatment with an IV infusion and antibiotics before referral are recommended if bacterial infection is suspected.

1-5-1. Definition of fever

- Fever can indicate abnormal signs of the body.
- If it **exceeds 38.0ºC**, there can be **bacterial infection**.

1-5-2. Complications indicating abnormal status

(See, *6. Observe maternal condition,* p.94 and *6-4. Body temperature*, p.101)

- Typical form of severe bacterial infection in a pregnant woman or a woman in labor is **intrauterine infection**. It also affects the health status of fetus.
- **Sepsis** is an important cause of maternal and neonatal deaths.

1-5-3. Necessary treatment before referral

- Appropriate description is necessary.
- Start an IV infusion as well as encourage fluid intake.[1]
- Check for other infectious signs and give appropriate antibiotics before the referral[1].

Symptoms	**Kind of antibiotics**	**Route**	**Dose**
Rupture of membranes **AND** > 38°C **OR** foul smelling vaginal discharge	Ampicillin	IV/IM	2 g
	(AND) Gentamicin	IM	80 mg
	(AND) Metronidazole	IV	500 mg
Rupture of membranes for over 18 hours	Ampicillin	IV/IM	1 g
	(AND) Gentamicin	IM	80 mg
Any signs of urinary tract infection: - Burning urination - Painful or difficult urination - Increased frequency and urgency of urination - Lower abdominal pain	Amoxicillin[2]	Tablet	500 mg[2]
	(OR) Trimethoprim/ Sulfamethoxazole[2]	Tablet	80/400 mg[2]

1-6. Abnormal vital signs - Bleeding

《**Summary**》

- Excessive bleeding before or during labor indicates severe abnormalities.
- Frequently check blood pressure and pulse if there is abnormal vaginal bleeding.
- Provide treatment as written in 'shock' before referral.

1-6-1. Definition of abnormal vaginal hemorrhage

- Appropriate description of bleeding is necessary.
- When **the pad or cloth is soaked or wet in a few minutes**, or there is **continuous fresh bleeding from vagina**, the bleeding is obviously abnormal.

1-6-2. Complications signifying abnormal status

- Point of bleeding can be from placenta, umbilical cord, or uterus. It affects blood flow both to fetus and mother.
- If blood flow to placenta and umbilical cord is severely affected, it can cause intra-uterine fetal death and stillbirths.
- The probable causes are **placental abruption**, **ruptured uterus** and **placenta previa** (See, *2. Listen to women's complaint, 2-1. Bleeding*, p.20 and *6. Observe maternal condition, 6-6. Bleeding*, p.107).

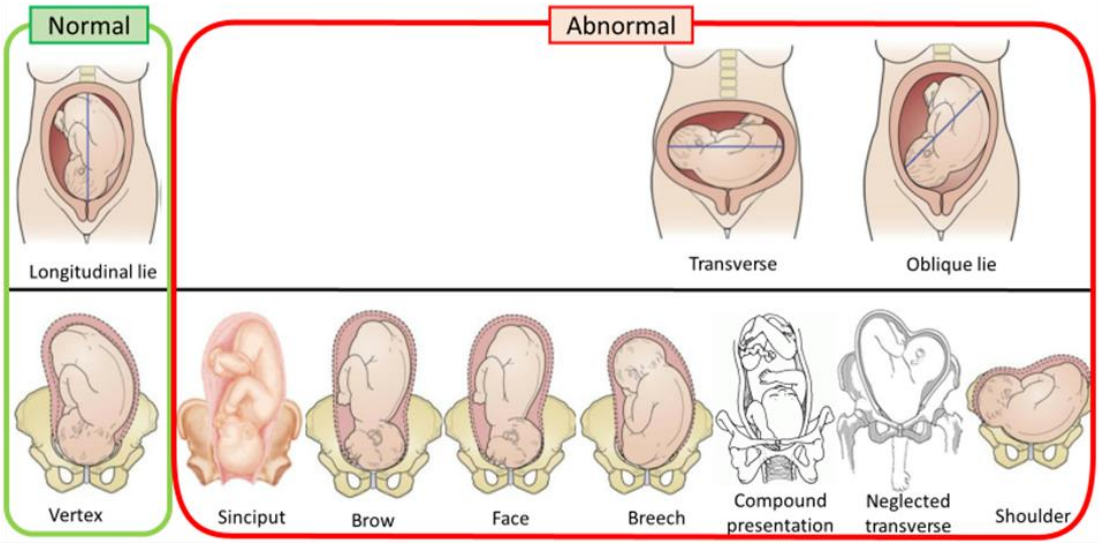
1-6-3. Necessary treatment before referral

- No specific treatment for vaginal bleeding before or during labor can be conducted at the health center level.
- Therefore, it is necessary to provide treatment as written in 'shock'. (See*, 1-3-4. Necessary treatment before referral*, p.12)
- Continuous **observation of vital signs** is also required.

1-7. Dystocia presentation

When you detect any abnormality (brow, sinciput, face, transverse, oblique lie, neglected transverse, breech, compound presentation, cord prolapse, etc.), refer the woman immediately.

＜Fetal lie and presentation＞



Section 2. Listen to the woman's complaint

SUMMARY

- Objectives of this section are: (1) To identify which of the mother's sign/symptom is her priority, and (2) To listen to her complaint to make her feel comforted.
- It's necessary to listen to a woman's complaint (subjective information) first. After listening to her explanation, check her and fetal condition objectively.
- Confirm if there is any severe abnormality in her delivery process.
- 'Bleeding', 'rupture of membranes', 'uterine contraction and labor pain' and 'fetal movement' should be checked by interviewing (asking) the woman.

2-1. Bleeding

《**Summary**》

- Bleeding is usually observed during normal delivery process.
- However, if the amount of bleeding exceeds 'normal' level, it can be a sign of some complications.
- Check other signs of bleeding (abnormal pain, tenderness, etc.).
- Ask if she has had any bleeding before you do the vaginal examination.
- When the woman has more than usual bleeding with abnormal labor pain, a placental abruption or ruptured uterus can be suspected.

2-1-1. Complication with abnormal bleeding

(See, *6. Observe maternal condition, 6-6. Bleeding*, p.107)

2-1-1-1. Soaked pad or wet clothes in < 5 minutes

- **Three major causes of bleeding** are:

(1) **Placenta previa** is a condition in which the placenta is located in the lower part of uterus, and the placenta covers the cervix partially or totally. Severe bleeding occurs when the cervix starts to dilate due to the separation of the placenta. Normally the woman does not complain of severe pain.

(2) **Placental abruption** is the separation of the placenta which is located in the middle or upper part of uterus. Bleeding comes out of uterus as vaginal bleeding or blood-stained amniotic fluid, but sometimes there is no external bleeding. The woman often has severe abdominal pain or tenderness, and a quite hard firmness of the uterus. (See, *2. Listen to woman's complaint, 2.3 Uterine contraction and labor pain*, p.25)

(3) **Ruptured uterus** means rupture of uterine wall or muscle at the previous uterine incision or scar. The woman complains of severe abdominal pain.

(See, *2. Listen to woman's complaint, 2.3 Uterine contraction and labor pain,* p.25)

Note: Do not conduct vaginal examination if there is severe bleeding (pad or cloth soaked in relatively short period, say within five minutes), since it may be caused by placenta previa and the examination may worsen the bleeding.

2-2. Fluid leakage from vagina

《**Summary**》

- Rupture of membranes always happens somewhere during delivery process.
- If the pregnant woman feels ‘wet’ or ‘leakage of warm water’, those are possible signs of ‘rupture of membranes’.
- Confirm the rupture of membranes by looking for continuous leakage of fluid from the vagina or touching membranes, or fetus head (hair) by vaginal examination.
- Ask the mother when she felt the rupture of membranes. Record the time and calculate the time elapsed since the rupture of membranes.
- Some complications (intrauterine infection, fetal distress by lower volume of amniotic fluid, prolapse of umbilical cord) can happen, especially with pre-labor rupture of membranes or longer time elapsed from rupture of membranes.

2-2-1. Definition of rupture of membranes

- Fetus inside of uterus is surrounded by amniotic fluid, which is entirely kept by **‘amniotic membrane’**.
- **Rupture of membranes** happens anytime during delivery process, and it can be known by leakage of amniotic fluid. The rupture can occur either in the front part or inside part of the membranes.
- When the inside part of membranes ruptures, amniotic fluid may not leak so much while the front part of the membranes remains intact.

2-2-2. The way to know if the membranes are ruptured

(1) **Look** to see if any fluid is continuously leaking from the vagina by using a speculum (if it’s available).

(2) **Feel** whether you can touch the intact membranes or fetus head (hair) by vaginal examination.

(3) If fluid leaking or intact membranes is uncertain, **observe** if she continues to feel leaking when she moves. Place a sanitary pad or any cloth and wait for a short time. If the pad or cloth gets wet, it may be a rupture of membranes.

<If the membranes are ruptured>

(1) **Check** the prolapsed cord by vaginal examination and Fetal Heart Rate (FHR).

(2) **Check** the characteristics of amniotic fluid (See, *4. Observe fetal condition, 4-2-2. Amniotic fluid*, p.75), body temperature, and any signs of infection.

(3) **Ask** the mother when she felt the ruptured membranes. **Record** the date and time and calculate the time elapsed from the rupture of membranes.

2-2-3. Complications with the rupture of membranes

- Some complications can happen after the rupture of membranes.
- The membranes work as a barrier to isolate the fetus from the outside environment. When part of membranes ruptures, it means that there is a connection between the inside and outside of the uterus. This connection may increase the risk of **intrauterine infection**.
- After the membranes are ruptured, amniotic fluid continues to leak. The reduced amniotic fluid may cause **umbilical cord compression** during uterine contraction, and fetal distress is more likely to occur.
- If the fetal head is not fixed in the pelvis, cord prolapse may occur.

2-2-3-1. Pre-labor Rupture of Membranes (PROM)

- The best physiological time of the rupture of membranes is during the active phase in the 1st or 2nd stage of labor.
- However, the membranes may sometimes rupture **before the onset of labor**. It is called **Pre-labor Rupture of Membranes (PROM)**.

- The fetal head is often not engaged into the pelvis before starting labor. There is a high risk of **deficiency of amniotic fluid** and **prolapsed cord**, and it may result in **fetal distress**.
- There is a high risk of **intrauterine infection** as time elapses from the rupture of membranes.

2-2-3-2. > 18 hours past from the rupture of membranes

- When **> 18 hours** from the rupture of membranes has passed, the risk of fetal **bacterial infection** increases. Refer the woman to prevent fetal infection.
- Give **antibiotics** (Ampicillin 1 g IV or IM and Gentamicin 80 mg IM) before referral. (Refer, *Safe Motherhood Clinical Management National Protocol for health center*[1], p. 41 and *1. Immediate response to emergency for pregnant woman, 1-5-3. Necessary treatment before referral*, p.15)

2-3. Uterine contraction and labor pain

《**Summary**》

- Uterine contraction during labor is essential for delivery since it works as a force to open the cervix and push out the fetus from the uterus.
- When the woman complains of uterine contractions, first check to see if it is uterine contractions in labor, 'true labor' or not.
- Characteristic of uterine contraction during labor is regularity with interval.
- When the uterine contraction is true labor, confirm the time when regular contractions started and record it.
- Diagnosing the onset of labor is very important to assess the duration of the latent phase.
- If the pain is too strong or continues without an interval, these may be the signs of abnormal labor or complications.

2-3-1. Definition of uterine contractions in labor

- Uterine **contraction** is an involuntary contraction of the uterine muscle. It is essential for delivery since it works as a force to open the cervix and push out the fetus from the uterus.
- Characteristic of uterine contraction in labor, so called **'true labor'** is **repeating uterine contractions at regular intervals (relaxation of uterine muscle).** The labor uterine contractions are mostly accompanied with **pain**. It usually has short-duration contractions with longer intervals at the beginning. The duration of contraction becomes longer and interval becomes shorter as delivery progresses.

2-3-2. Definition of the onset of labor

- Diagnosing the **onset of labor** is very important to assess the duration of the latent phase. The onset of labor is **the time the regular uterine contractions started**[9].
- It's important to know that **a show and cervical dilatation never define the onset of labor**. A show is just a sign that the labor is about to happen, and it is released prior to the onset of labor or during latent phase[6, 9]. Cervical dilatation also does not define the onset of labor; it is an indicator to decide the stage and phase of labor.

2-3-3. The way to confirm the onset of labor

- **Ask** the mother if she has regular or rhythmic uterine contractions. Most mothers feel pain, but some do not.

  "Do you feel repeating uterine contractions?"

  "How long is the interval?"

  "Is it the same or a varying interval?"

  "Are the uterine contractions more painful or uncomfortable than usual?"
- Find out and **record what time the regular uterine contractions started**. The time is the onset of labor.
- Confirm the uterine contractions by palpation. (See, *5. Assess the delivery progress, 5-3-1. Power,* p.83)

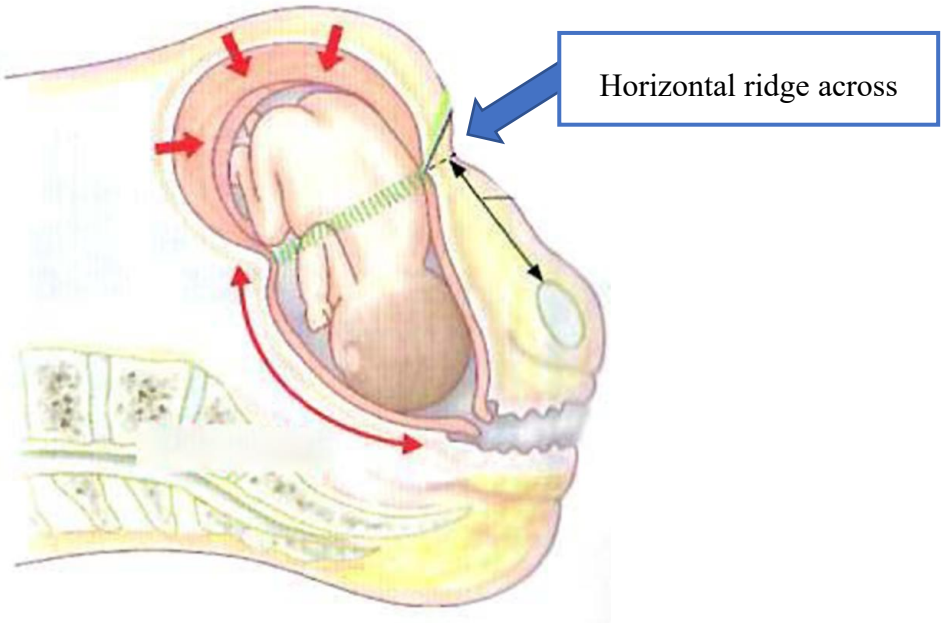
2-3-4. Complications with abnormal pain

2-3-4-1. Constant pain between contractions; Sudden and severe abdominal pain

These symptoms may indicate **placental abruption** or a **ruptured uterus.**

- **Placental abruption** is the **separation of the placenta from uterus**. The woman feels severe abnormal pain, constant pain between contractions and tenderness (feels pain when the provider palpates) because the uterus tries to contract stronger in order to stop the bleeding from the attached part of placenta.

- **Ruptured uterus** is a rupture of the uterine wall or muscle. A horizontal ridge across may be found in lower abdomen before rupture. The ruptured uterus likely occurs at the previous uterine incision or scar such as caesarean section and curettage.



Source: *Wellness kara mita boseikango katei*, 3rd edition

2-3-4-2. The pain that differs from the pain associated with contraction

- The pain only in one side of abdomen, accompanied with tenderness or not associated with uterine contractions may indicate appendicitis or other surgical causes such as peritonitis, pelvic abscess, or ovarian cyst[5].

2-3-4-3. Irregular uterine contractions or no uterine contraction

- In late pregnancy, some women feel painful uterine contractions. The contractions are usually irregular, or the regularity does not continue for a long time[9] and the cervix does not dilate. This uterine contraction is called a **'false labor',** and it means the true labor may not have started yet. **Observe** the woman **for at least 8 hours**[1] as well as the latent phase, paying attention to characteristics of uterine contractions and the change of cervix.

2-4. Fetal movements

《**Summary**》

- If a woman complains of decreased fetal movement or no movement, it may indicate fetal distress. Confirm the fetal condition by listening FHR.
- During labor, confirm the fetus condition by FHR auscultation rather than fetal movement.

2-4-1. Normal characteristic of fetal movements

- Recognition of fetal movement by mother starts **from 16 to 20 weeks**. The movement becomes more frequent and stronger during the second trimester[9].

2-4-2. Complications with reduced or no fetal movement

- If the woman complains of decreased fetal movement or no movement, it may indicate **fetal distress** caused by an obstetrical reason such as placental abruption[1, 5 (S-155)].
- First, **listen to FHR**. If it is normal, ask the woman to lie down and rest to feel fetal movements. During labor, it may be difficult to feel fetal movement. Always confirm the fetus condition by listening FHR.
- If fetal movements are totally absent and the fetal heartbeat cannot be heard, suspect **fetal death**[5 (S-155)].

Section 3. Woman's general information and obstetrical history

SUMMARY

- Objectives of this section are: (1) To understand the mother's general information and obstetrical history and (2) To identify if she has normal or abnormal signs in her general information and obstetrical history.
- Risks of some severe complications or abnormality can be detected by assessment of the basic information of the woman and fetus.
- Basic information can be collected from the woman, Mother's Health Record ('pink book') and simple measurements, or calculation.

3-1. Gestational age at admission

《**Summary**》

- It's necessary to know gestational age to identify term, preterm or post-term delivery.
- Calculate the gestational age with the Last Menstrual Period (LMP).
- If the woman does not remember the LMP, she should be treated as unknown gestational age.
- Premature newborn babies require respiratory, thermal, and feeding support in clean environments due to their immaturity.
- Post-term fetuses are more likely to have fetal distress during labor due to placental dysfunction. Prolonged labor likely also happens due to the large size of a fetus.

3-1-1. Definition of gestational age

- **Gestational age** is the time elapsed **since the first day of the Last Menstrual Period (LMP)**[6]. Gestational age is expressed in both completed **weeks and days**[8], such as 37 weeks and 4 days.

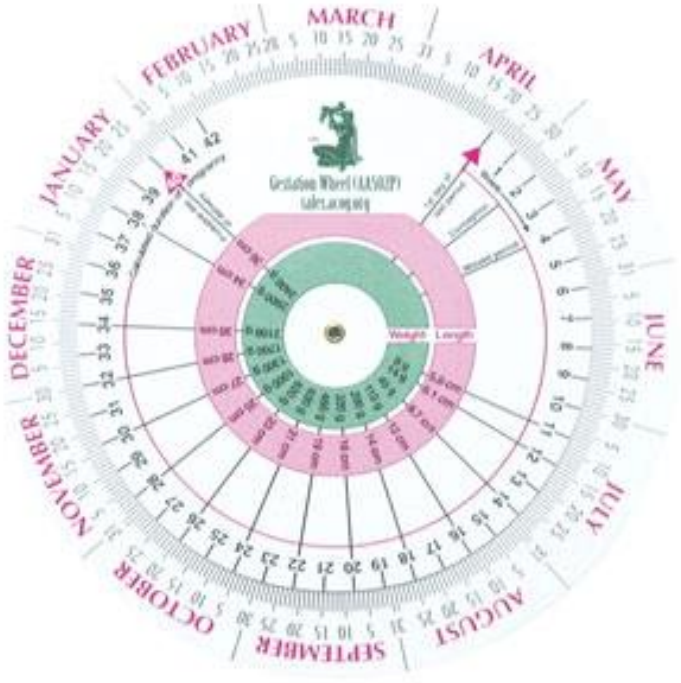
3-1-2. The ways to know gestational age

3-1-2-1. Calculation from the Last Menstrual Period (LMP)

- **Estimated Due Date (EDD)** and gestational age can be measured from **the first day of the LMP**[8] by pregnancy wheel calendar or method of EDD calculation.
- If the gestational age is unknown and the mother does not know LMP, check **fundal height** (See, *3-2-2. The way to measure fundal height*, p.35).

<Pregnancy wheel calendar>

- A pregnancy wheel is the small calendar that helps to find gestational age at admission and EDD from LMP.
- EDD is set at 40 weeks and 0 days of gestational age.
- Select the arrow for the LMP; then you can find the current gestational age when you see today's date.
- Another arrow with 40 weeks and 0 days shows EDD.



Source: https://www.acog.org/About-ACOG/News-Room/News-Releases/2016/ACOG-Reinvents-the-Pregnancy-Wheel?IsMobileSet=false

<Simple methods to calculate EDD>

Method 1: Add 7 days to LMP and deduct 3 months (and add 1 year).

Method 2: Add 7 days to LMP and add 9 months.

Example 1:	22	December	2018
	↓ +7	↓ -3	↓ +1
EDD	29	September	2019

Example 2:	2	January	2019
	↓ +7	↓ +9	↓
EDD	9	October	2019

3-1-2-2. Ultrasound

- Ultrasound is another way to know gestational age, but the estimation must be done in **the first trimester (up to 13 weeks 6 days of gestation)[7].** Gestational age and EDD estimated by ultrasound after this period are not accurate.
- Therefore, you must not use the EDD and current gestational age written in the ultrasound at second and third trimesters.

3-1-3. Classification of gestational age

The gestational age is classified into three periods:

(1) Term: 37 weeks and 0 day to 41 weeks and 6 days

(2) Preterm: ≤ 36 weeks and 6 days

(3) Post-term: ≥ 42 weeks and 0 day

3-1-4. Complications due to preterm and post-term delivery

3-1-4-1. Preterm delivery

For a preterm fetus or newborn baby, the prematurity contributes several complications.

(1) A preterm fetus is more likely to be affected by the stress of uterine contraction so that their FHR easily drops during labor and may result in **fetal distress**.

(2) A preterm newborn baby's lungs are still premature so he/she is more likely to have **respiratory** problems.

(3) A preterm newborn baby cannot generate enough heat to keep its body

temperature, so **hypothermia (low body temperature)** is more likely to happen.

(4) A preterm newborn baby is still developing an immune system. It is common that infections can quickly spread to the blood stream **(sepsis)**.

(5) A preterm newborn baby has **difficulty latching onto the breast** by him/ herself.

3-1-4-2. Post-term delivery

When gestational age is **42 weeks or more**, the placenta function to supply oxygen and nutrients starts to decrease **(placental dysfunction)**. This contributes several complications.

(1) Placental dysfunction causes insufficient oxygen supply from mother to fetus. As a result, FHR may often drop and result in **fetal distress**.

(2) The volume of amniotic fluid continues to decrease from term period[6]. During labor, the umbilical cord is easily compressed with uterine contractions due to the decreased amniotic fluid, so it causes fetal distress during labor.

(3) The fetus continues to grow and becomes a large size. It may cause **prolonged labor** or **shoulder dystocia**.

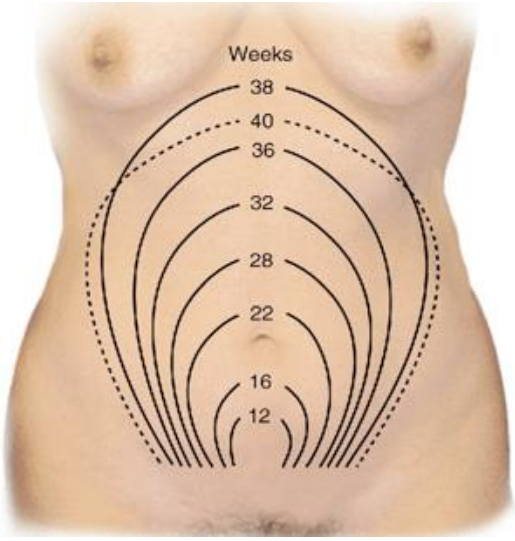
3-2. Fundal height at admission

《**Summary**》

- The fundal height is one of the indicators to assess the contents of the uterus because it correlates with the size of uterine contents: fetus/fetuses, amniotic fluid, and placenta.
- If the fundal height is abnormally big or small, the size of fetus or the volume of amniotic fluid may be abnormal.
- When gestational age is unknown, small fundal height indicates a small fetus due to preterm or growth restriction.

3-2-1. Definition of fundal height

- **Fundal height** is **the distance along the abdominal wall from the upper edge of the symphysis pubis to the top of the fundus.**
- The fundal height correlates with the size of the uterine contents. The uterine contents are the **fetus, amniotic fluid, and placenta**.
- The size of the fetus and the volume of amniotic fluid changes as gestational age proceeds.
- Therefore, the fundal height can be used as a guide to assess the size of the fetus and the volume of amniotic fluid for each gestational age.



Source: https://www.grepmed.com/images/4172/approximation-obstetrics-diagnosis-fundal-height-obgyn

3-2-2. The way to measure fundal height

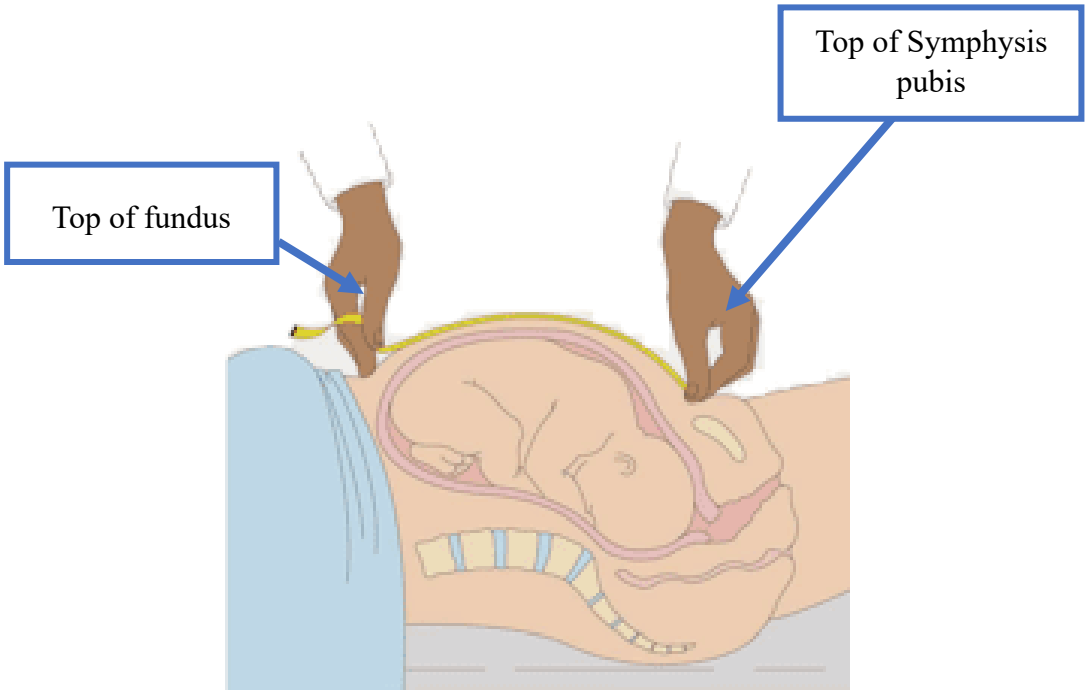
(1) The bladder must be emptied before fundal measurement.

(2) Ask the mother to take a supine position.

(3) Find the fundus: place your hand just below the xiphisternum and press gently; move the hand down the abdomen until you feel the curved upper border of the fundus.

Note: You can ask the mother to bend her knees while you are finding the fundus, but it should be extended when you measure the fundal height.

(4) Find the symphysis pubis: Hold the measure at the fundus and extend down to the upper edge of symphysis pubis.



Source: https://www.grepmed.com/images/4172/approximation-obstetrics-diagnosis-fundal-height-obgyn

3-2-3. Complication with fundal height deviated from normal range

3-2-3-1. Fundal height ≥ 35 cm

Fundal height **≥ 35 cm** is **too big** at term period for a single fetus. It may indicate the following complications:

- There is a possibility of **multiple** fetuses. (See, *3-5. Number of fetuses*, p.42)
- There is a possibility of a **large** fetus. The fetus head may not be able to descend due to the disproportion between pelvic inlet and fetus head **(Cephalopelvic Disproportion: CPD)**. A large fetus may also cause **prolonged labor** or **obstructed labor** such as shoulder dystocia.
- There is a possibility of **abnormality of lie, presentation, and position**.
- There is a possibility of abnormality of **increased volume of amniotic fluid**: abnormally increased amniotic fluid associated with **prolonged labor** due to overdistension of uterus, **abnormality of lie, presentation, or position**. When the membranes are ruptured, **placental abruption** and **prolapsed cord** may occur[5, 6].

- There is a possibility that the uterus is **overdistended**. It may lead to **Postpartum Hemorrhage (PPH)** due to uterine **atony** which is the failure of the uterus to contract sufficiently to stop bleeding from vessels at the placental implantation site[6].

3-2-3-2. Fundal height 33 to 34 cm

- Fundal height of 33 to 34 cm is within normal range, but relatively big. Be aware of symphysis above possible complications and monitor the mother, fetus, and delivery progress routinely.

3-2-3-3. Fundal height ≤ 28 cm

Fundal height ≤ 28 cm is **too small** at term period. It may indicate the following complications:

- There is a possibility of **preterm** pregnancy when the gestational age is unknown.
- There is a possibility of a **small fetus for the term period**. The fetus growth may be restricted due to some problems with fetus, mother, or placenta.
- There is a possibility of **abnormally decreased volume of amniotic fluid**. During labor, the umbilical cord is easily compressed with uterine contractions due to the decreased amniotic fluid, so it causes **FHR decrease** during labor. The fetus may have a problem in the development of lungs, and it leads **respiratory problem** of newborn baby.

Note: The cut-off (threshold) of fundal height for referral and risk to be complicated is tentatively set after discussion with core member for intrapartum care training.

3-3. Age

《**Summary**》

- Younger or older maternal age may cause obstetrical complications.
- Check her birthday with ID card or other relevant documents.
- The physiological characteristics based on age may influence maternal, delivery, and fetus conditions.
- For young women, their body immaturity may influence the delivery progress. For older women, the risk for obstetrical complications increases.

3-3-1. The way to know age

- Confirm the birthday (year, month, and date) with **ID card or other document (medical record, mother's health record (pink card), etc.)**. If nothing indicates her exact birthday, please ask her or her family.

3-3-2. Complications from younger or older maternal age

3-3-2-1. Pregnancy ≤ 17 years old

- Their body immaturity may cause some obstetrical complications, such as **anemia, pre-eclampsia, prolonged labor, and low birth weight infants**.[6(p161)]

3-3-2-2. Pregnancy ≤ 15 years old

- In addition to above risks, pelvic bones and birth canal of girls ≤15 years old are still immature. This may cause **obstructed labor** and other obstetric complications such as **fistulas**[10].

3-3-2-3. Pregnancy ≥ 35 years old

- As maternal age advances, the risk of complications increases such as **hypertension, diabetes, placenta previa, placental abruption and postpartum hemorrhage (PPH)**[4,6].
- For both young and older mothers, routine monitoring of mother (especially for blood pressure and condition of bleeding), fetus and delivery progress is especially important.

3-4. Gravidity, Parity and Induced/Spontaneous abortion

《**Summary**》

- Confirm the number of pregnancies, deliveries, and abortions by asking the mother.
- The number of deliveries significantly influences to the progress of labor. Notice that process of labor in multipara is usually quicker than that of primipara.
- In addition, the number of delivery and induced abortion may lead some obstetrical complications.

3-4-1. Theoretical definition of gravidity, parity and abortion

(1) **Gravidity:** total number of pregnancies, **including current pregnancy,** irrespective of the pregnancy outcome.

(2) **Parity:** the number of times that the woman has delivered **at 27 weeks 0 days or more**[1], irrespective of single or multiple fetuses, or if the baby was born alive or dead. **'Grand multiparity'** means the woman has delivered **≥5 fetuses**.[4]

(3) **Spontaneous abortion:** the unintended loss of pregnancy **before 26 weeks 6 days or less**.[1]

(4) **Induced abortion:** a process by which pregnancy is **intentionally** terminated in a medical procedure **before 26 weeks 6 days** [1].

3-4-2. The way to know parity and abortion

Check the **mother's health record (pink book)** or ask the mother how many times she has been pregnant, delivered, and experienced abortion, as follows:

(1) Number of pregnancies

(2) Number of deliveries

a. Number of children now living

b. Number of stillbirths

(3) Number of induced abortions

c. Kind of abortions she experienced

(4) Number of spontaneous abortions

3-4-3. Complications associated with grand multipara and experience of induced or spontaneous abortion

3-4-3-1. Grand multiparity: the woman who has delivered ≥ 5 fetuses.[4]

- The risk of **anemia and undernutrition** becomes high as the parity increases, especially when the pregnancy interval is short, and it may cause PPH and low birth weight[4]. Those risks become much higher among multiparas **≥ 5** parity.
- Advanced maternal age of grand multiparas may also cause other complications. (See, *3-3. Age*, p.38)
- The delivery progress of multiparas is generally faster than primiparas, and it becomes faster as parity increases.

3-4-3-2. 4th parity

- The mother can deliver at a health center but still has risks of the above complications.
- Monitor the mother and fetus condition routinely, and carefully observe any sign of delivery progress.

3-4-3-3. Experience of induced or spontaneous abortion

- The experience of induced or spontaneous abortion may indicate a history of **surgical abortion (Manual Vacuum Aspiration, Dilatation and Curettage or Dilatation and Evacuation)**.
- In the case that the mother experienced any surgical abortion or procedure, the mother may have a **scar** inside of her uterus. The scar inside of the uterus may lead to **placenta previa** and **retained placenta**[6].

3-5. Number of fetuses

《**Summary**》

- Confirm the number of fetuses with asking the woman, or check her mother's health record (pink book).
- Multiple pregnancies must be referred immediately, since they indicate a higher chance of developing complications for the woman, fetus, or delivery progress.

3-5-1. The way to examine the number of fetuses

- Check the mother's health record (pink book), or ask the mother whether she has ever been told of having multiple pregnancies at previous ANC or ultrasound examinations.
- Palpating two fetal heads is another way for twin diagnosis, but it is difficult when one twin overlies the other.

3-5-2. Complications from multiple pregnancies

- **Multiple** pregnancies is a great burden to the maternal body, and it may cause **pre-eclampsia** or **anemia**.
- The big content of the uterus (≥ 2 fetuses) makes the **uterus overdistended**. It may cause **prolonged labor** or **PPH**. When the uterus cannot keep the large content of the uterus, preterm delivery may happen.
- The **positions and presentation** of fetuses are often **abnormal**, which cause **interlocking collision** or **obstructed labor**[6]. **Cord prolapse** is also frequent in the circumstances.

3-6. Height of woman

《**Summary**》

- Size of a woman's pelvis correlates to her body height, so it is essential to measure the height.
- Check mother's health record (pink book) for height. If there is no information, measure height.
- There is a possibility of CPD when the fetal head does not descend for a small woman ≤ 150 cm.

3-6-1. The purpose of measuring height

- Height is the measurement of the human body from the top of the head to the foot.
- The size of her pelvis correlates to the body height, so it is essential to measure her height.
- Height is affected by a deformity in the backbone, pelvic bone or hip joints, or legs. The deformity may prevent the birth canal from widening. Check the deformity when you measure the body height.

3-6-2. The way to measure height

- Measure height with the woman standing straight, barefoot with the toes open at a 30- to 40-degree angle.
- Put the occiput, back, hip, and heels on the measure and pull in chin.

3-6-3. Complication with shorter height

3-6-3-1. ≤ 145 cm

- A small woman is likely to have a small pelvis, and she may have a **contracted pelvis inlet (the entrance of pelvis),** which affects the delivery progress.

- A contracted pelvic inlet may prevent the fetus from entering the pelvis. This is one of the causes of **CPD**, and labor may be **prolonged or obstructed**.

3-6-3-2. 145 to 150 cm

A woman with a height of **145 to 150 cm** does not require immediate referral, but note that there is a possibility of CPD. The delivery progress must be monitored routinely, especially the fetal descent.

3-7. Anemia

《**Summary**》

- Anemia in pregnancy reduces the chances of survival when the woman has bleeding. And severe anemia during pregnancy increases the risk of low birth weight infants.
- Check the record about anemia at antenatal care (ANC) in the mother's health record (pink book).
- Check the palmer and conjunctival color, and other signs of anemia.

3-7-1. Definition of anemia in pregnancy

- **Anemia** is a condition in which the number of **red blood cells or their oxygen-carrying capacity is insufficient** to meet the physiological needs[9].
- Hemoglobin in red blood cells has a function to carry oxygen. Physiologically, **hemoglobin concentration (Hb)** values decline with pregnancy.
- The most common case of anemia is **iron deficiency**[9].

3-7-2. The way to check anemia

- Check the mother's health record (pink book) for anemia and the result of hemoglobin (Hb).
- Check symptoms:
  - Check palmer and conjunctival pallor.
  - Ask if the woman has had dizziness, tiredness, or breathlessness recently.
  - If there is a **HemoCue**, measure the Hb.

3-7-3. Classification of anemia in pregnancy

3-7-3-1. Severe anemia

- **Hb<7.0g/dl** is defined as **severe** anemia.
- When a woman has severe anemia, she shows severe palmer and/or conjunctival pallor. The woman may also complain of dizziness, tiredness, or breathlessness, even at resting status[1].

3-7-3-2. Mild anemia

- **Hb7.0 -11.0g/dl**[2] is defined as mild anemia[1,2].
- When a woman has mild anemia, she shows palmer and and/or conjunctival pallor.

3-7-4. Complications from anemia

3-7-4-1. Severe palmer and/or conjunctival pallor, or Hb < 8.0 g/dl

- Anemia in pregnancy reduces the chance of survival when the woman bleeds at and after birth[1]. In case of PPH, women with severe anemia need further treatment such as **transfusions**.
- Severe anemia during pregnancy increases the risk of **low birth weight infants**.

3-7-4-2. Palmer and/or conjunctival pallor or Hb 8.0-11.0g/dl

- Even mild anemia leads to poor recovery from blood loss at delivery.
- Observe the conditions of bleeding routinely, to detect any abnormal bleeding and enable early referral.

Note: Reason behind the cut-off of Hb

- In this guide, the cut-off of Hb for referral is set as < 8.0g/dl which is higher than the definition of severe anemia (< 7.0g/dl) (See, *Safe Motherhood Protocol*[1], p.27), based on the discussion with core members of intrapartum care training.
- This is because Hb7.0 g/dl are still at risk of survival when the woman develops severe hemorrhages. At health center level, the woman should be referred in advance.

3-8-1. Infectious status - HIV

《**Summary**》

- HIV transmits from mother to child by (1) transplacental infection, (2) infection in the birth canal, or (3) lactational infection. The most common cause of pediatrics HIV infection is the mother-to-child transmission at the time of delivery.
- Check the results of an HIV test at ANC with *Mother's health record* (Pink book).
- If the HIV result is not written, test it immediately with dual HIV/syphilis rapid test.
- ART sites for Antiretroviral Therapy (ART).
- If the HIV status is unknown and delivery is imminent, refer the women and her baby to ART sites after delivery for ART.

3-8-1-1. What is HIV?

- The Human Immunodeficiency Virus (HIV) is a retrovirus that weakens an individuals' **immune system** making it difficult to respond to infection[9].

3-8-1-2. The way to know HIV status

- Check the page of *Test for HIV* and Ob*stetric Information* of *Mother's health record* (Pink book).
- If the status is unknown, offer counseling and get verbal consent, then provide **dual HIV/syphilis rapid test**[11].

3-8-1-3. Complications with an HIV-positive mother

3-8-1-3-1. HIV positive

- HIV transmits from mother to child by (1) transplacental infection, (2) infection in the birth canal, or (3) lactational infection. The most common cause of pediatrics HIV infection is the **mother-to-child transmission at the time of delivery**[6].
- HIV-infected pregnant women should deliver **at referral or provincial hospitals (ART sites)**, where they are able to provide appropriate ARV drugs to mother and baby[11].

3-8-1-3-2. Unknown HIV status

- For all women with an **unknown status**, offer the **dual HIV/syphilis rapid test** immediately. If delivery is imminent, offer the test as soon as possible after delivery.
- If the result is **'reactive'**, refer the mother to an ART site when delivery is not imminent. If delivery is imminent, refer her and her newborn baby to an ART site after delivery.

Note: When you assist the delivery of a mother with HIV '**positive**', '**reactive**' or unknown status, follow the **universal precautions** to protect providers from exposure of HIV infected blood, such as **wearing impermeable plastic apron, eye shields, mask, cap, and boot during delivery**.

Refer further information for *National Guidelines for the prevention of Mother-to-Child Transmission of HIV and Syphilis*[11], p. 33.

3-8-2. Infectious status - Syphilis

《**Summary**》

- Syphilis can transmit from mother to fetus via placenta. Adequate treatment with antibiotics (penicillin) in the first trimester is effective at preventing maternal transmission to the fetus.
- When syphilis is not treated by about 14 weeks of gestation, the risk of fetal infection increases with gestational age. Stillbirth, preterm delivery, or low birth weight due to growth restriction may occur.
- Check the result of syphilis test at ANC with the *Mother's health record* (Pink book).
- If the syphilis result is not written, test it immediately with a dual HIV/syphilis rapid test.
- If the syphilis status is 'reactive' and delivery is not imminent, refer the woman to a provincial hospital for treatment.
- If the syphilis status is unknown and delivery is imminent, refer the woman to a provincial hospital after delivery for treatment of both newborn baby and mother.

3-8-2-1. What is Syphilis?

Syphilis is a **sexually transmitted infection (STI)** caused by bacterium, "*Treponema pallidum".* Transmission occurs through contact with syphilis sores (chancre).

3-8-2-2. The way to know syphilis status

- Check the page of 'Obstetric Information' of the *Mother's health record* (Pink book).
- If the status is unknown, offer counseling and get consent, then provide dual HIV/syphilis rapid test.
- If the results of the test are **'reactive'**, the woman should be referred to the **provincial hospital** to confirm the results ('positive' or 'negative') with a RPR test.

3-8-2-3. Complication with a syphilis positive mother.

3-8-2-3-1. Risk from a syphilis positive

- Syphilis can be transmitted from mother to fetus **via placenta**. Adequate treatment with **antibiotics (penicillin) in the first trimester** is effective at preventing maternal transmission to the fetus.
- When syphilis is not treated **by about 14 weeks gestation**, the risk of fetal infection increases with gestational age[15], and **stillbirth and preterm delivery** may occur. The newborn baby may be a low birth weight due to growth restriction and may be born with **congenital syphilis**.
- If the mother is syphilis positive, she should deliver at a **provincial hospital** because all newborn babies need a treatment with antibiotics regardless of whether the mother got the syphilis treatment during pregnancy[1(p112)].

3-8-2-3-2. Unknown syphilis status

- For all women with unknown status, offer the dual HIV/syphilis rapid test immediately. If delivery is imminent, offer the test after delivery as soon as possible.
- When the result is **'reactive'**, refer the mother to a provincial hospital if the delivery is not imminent. If the delivery is imminent, refer her and her newborn baby to provincial hospital after delivery.

3-9-1. History of current pregnancy - Antepartum hemorrhage

《**Summary**》

- The woman who has bleeding during pregnancy may have marginal or partial placenta previa.
- Check the ANC record in the mother's health record (pink book) or ask the woman if she had abnormal bleeding in late pregnancy.

3-9-1-1. Check the history of current pregnancy

- Read carefully the *Mother's health record* (Pink book) for 'antenatal visit' for vaginal bleeding in late pregnancy.
- If there is no record, ask the mother if she had any abnormal bleeding in late pregnancy.

3-9-1-2. Possible reasons behind antepartum hemorrhage

- The mother with antepartum hemorrhage may **have marginal or partial placenta previa**, which may lead to bleeding during or after delivery.

3-9-2. History of current pregnancy – Hypertension

《**Summary**》

- If the mother has the history of hypertension during antenatal period, there is a possibility of pre-eclampsia or eclampsia, or other hypertensive disorders.
- Check the ANC record on the *Mother's health record* (Pink book) to know BP during pregnancy.

3-9-2-1. Check the history of current pregnancy

- Check the blood pressure (BP) in each ANC record in the *Mother's health record* (Pink book).

3-9-2-2. Possible reasons behind a history of hypertension

- If the mother has the history of hypertension during antenatal period, it may be **pre-eclampsia or eclampsia**, or other hypertensive disorders.
- If the BP at ANC is severe hypertension, immediately refer.
- If the BP at ANC is moderate hypertension, check the BP and other symptoms of eclampsia (See, *6. Observe maternal condition, 6-1 Blood pressure*, p. 95).

3-10. Outcome of previous delivery

《**Summary**》

- If there were any problems during previous pregnancies or deliveries, there is a chance of reoccurrence or that it could affect the current pregnancy and delivery progress.
- Check mother's health record (pink book) or ask if she had any problems with the previous delivery.

3-10-1. Check the outcome of previous delivery

- Check mother's health record (pink book), on the "Previous health problems" page.
- When there is any information as follows, collect more detailed information from mother or her family:
  (1) Used any instruments at previous birth such **as forceps or vacuum**
  (2) History of high blood pressure in previous pregnancies
  (3) The weight at birth of her children
  (4) Any children who died during delivery or on their birthday
- Check the **perineum** if there are any **warts, keloid tissue, or scars** in perineum.
- Check the abdomen if there is **Caesarean section scar**.

3-10-2. Complications from abnormality of previous delivery

- Previous delivery with **forceps or vacuum extraction** indicates there was a problem with mother, fetus or the delivery progress.
- **Warts, keloid tissue, or scars** in perineum may disturb the delivery progress when the fetal head comes out. If those warts, keloid tissues, or scars disturb the current delivery progress, perform an **episiotomy**.

- History of **convulsion, eclampsia, and pre-eclampsia** may reoccur.
- Prior delivery by **Caesarean section** indicates the uterus has an incision from the operation. It increases the risk of **placenta previa** and **retained placenta**. When the mother is in labor at the current pregnancy, **uterine rupture** may occur with the uterine incision.
- History of a small baby indicates the baby was born for some reason **premature or small for the term period**. **Stillbirth** or **death on birthday** also indicates there was a pregnancy or intrapartum problem.

3-11. Previous medical history

《**Summary**》

- Some previous medical conditions may affect the fetus, or the medical condition may get worse in pregnancy.
- Check mother's health record (pink book) or ask the woman if she has had any medical history before her current pregnancy.

3-11-1. Check the previous medical history

- Firstly, check *Mother's health record* (Pink book), on the page titled "Previous health problems".
- When there isn't any information, ask the mother or family if she has had any medical problems before current pregnancy.

3-11-2. Complications stemming from previous medical history

- History of **diabetes before pregnancy** should be managed as a pregnancy complicated with diabetes mellitus requires the management of blood sugar and/or further treatment. The fetus may become large, and it may cause **shoulder dystocia**.
- History of **respiratory or heart disease before pregnancy** may be worsened by pregnancy. When there are respiratory or heart problems, it may affect to fetus such as **growth restriction or preterm delivery.**

Section 4. Observe fetal condition

SUMMARY

- Objectives of this section are: (1) To identify the fetal lie, presentation, and position to prevent complication during labor and (2) To identify the condition of the fetus and if he/she is in emergency status or not.
- Fetal lie, presentation, and position should be in normal status for the normal progress of labor.
- The lie, presentation, and position can be examined by palpation and vaginal examination.
- Abnormality of fetus lie and presentation may result in obstructed or arrested labor, and a prolapsed cord more likely happens.
- Fetus condition during labor can be assessed by fetal heart rate, color of amniotic fluid, and fetal movement.
- During uterine contraction, fetus often experiences low oxygen status. Even during normal labor, it is not an easy event for the fetus.
- Therefore, it is important to confirm whether the fetus is fine or weak during labor.

4-1. Fetal lie, presentation, and position

4-1-1. Fetal lie and presentation

《**Summary**》

- Fetal lie is how the fetus lies inside of the uterus.
- Fetus should lie on the same axis as the uterus for normal progress of labor.
- Fetal presentation means which part of fetal body that is foremost in the birth canal.
- When fetal lies is on the same axis as the uterus, the fetus head (ideally occiput) should be foremost for normal progress of labor. Examine the fetal lie and presentation by palpation and vaginal examination.
- It can be assessed by where you touch the fetus head (hard and round shape) and back (one side with a hard and large smooth shape) on the maternal abdomen.
- Abnormality of fetal lie and presentation cannot be managed in a health center because it may result in obstructed and arrested labor, and a prolapsed cord more likely happens.

4-1-1-1. Definition of fetal lie

- The **lie** of the fetus is the relationship between the **fetal axis and the uterus axis**.

4-1-1-2. Definition of fetal presentation

- The **presentation** is the part of fetal body that presents **foremost in the birth canal**.

4-1-1-3. Classification of fetal lie and fetal presentation

4-1-1-3-1. Longitudinal, Transverse, and Oblique lie

- When the fetal axis is the same as the uterus axis, it refers to **longitudinal** lie (Figure 4A).

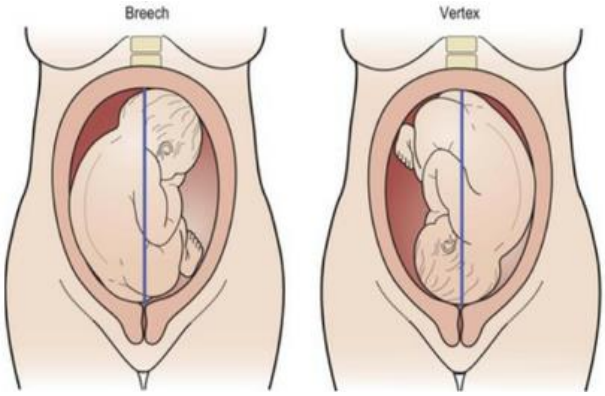


Figure 4A. Longitudinal lie
Source: *Myles Textbook for midwives*. 16th ed.

- When the fetal axis is transverse with the uterus axis, it refers to **transvers** lie. When the fetal axis is obliquely across the uterus axis, it refers to **oblique** axis (Figure 4B).

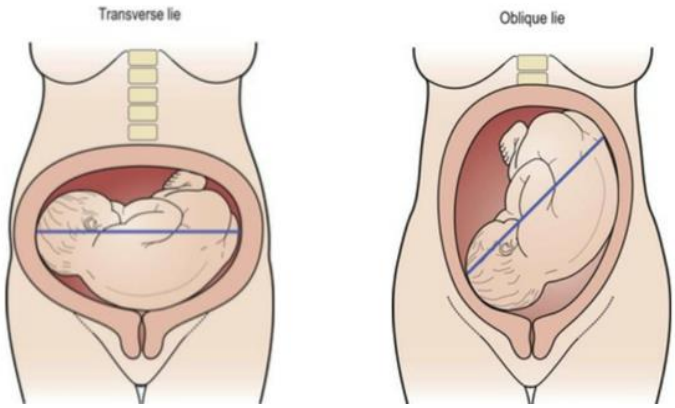


Figure 4B. Transverse and oblique lie
Source: *Myles Textbook for midwives.* 16th ed.

4-1-1-3-2. Vertex, Sinciput, Brow and Face presentation (Figure 4C)

- When the fetal head is presenting, it refers **Cephalic** presentation.
- Cephalic presentation is further classified into **Vertex, Sinciput, Brow, and Face** presentation.
- When the back of fetal head (Occiput) is presenting, it refers to **Vertex** presentation.
- When the front of fetal head is presenting, it refers to **Sinciput** presentation.
- When the forehead is presenting, it refers to **Brow** presentation.
- When the face is presenting, it refers to **Face** presentation.

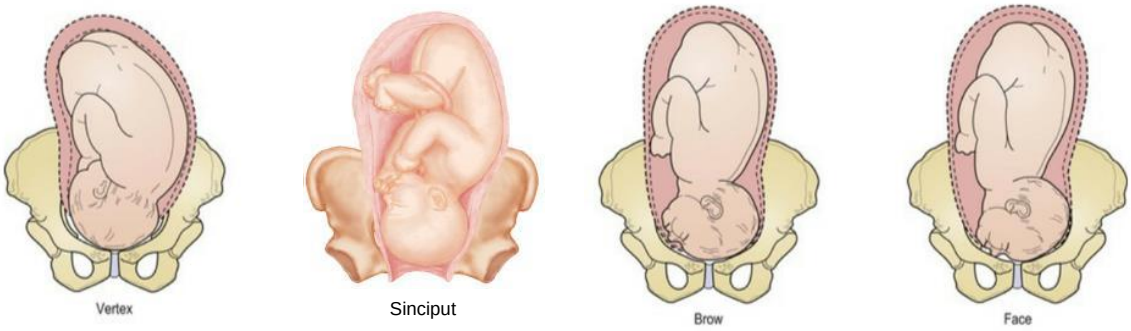


Figure 4C. Vertex, Sinciput, Brow and Face presentation
Source: Vertex, Blow, Face: *Myles Textbook for midwives*. 16th ed.
Sinciput: https://slideplayer.com/slide/7070627/

4-1-1-3-3. Breech and shoulder presentation (Figure 4D)

- When the fetal feet, knee, or hip are presenting, it refers **breech** presentation.
- When the shoulder is presenting, it refers **shoulder** presentation.

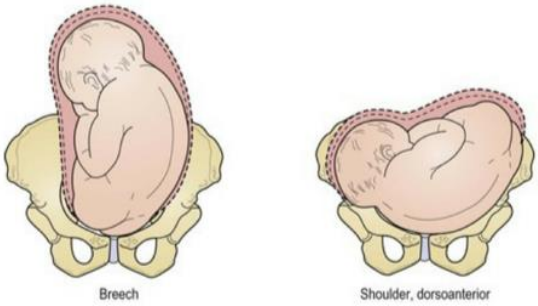


Figure 4D. Breech and shoulder presentation
Source: *Myles Textbook for midwives.* 16th ed.

4-1-1-3-4. Compound presentation and neglected transverse (Figure 4F)

- When a hand or arm is foremost alongside the presenting part[9], it refers to a **compound** presentation.
- When an arm is presenting outside of uterus, it refers to **neglected transverse**.

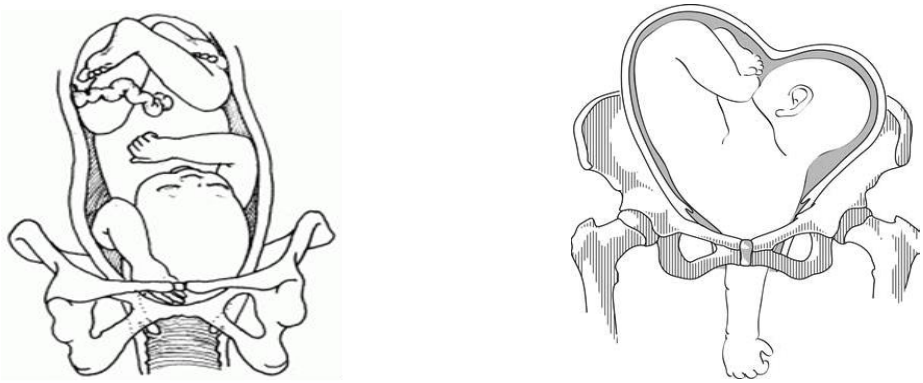


Figure 4F. Compound presentation and neglected transverse
Source: Compound presentation: *Integrated Management of Pregnancy and Childbirth, Pregnancy, Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors* (2017) WHO, S-91
Neglected transverse: https://medicalguidelines.msf.org/viewport/ONC/english/7-6-transverse-lie-and-shoulder-presentation-51417541.html

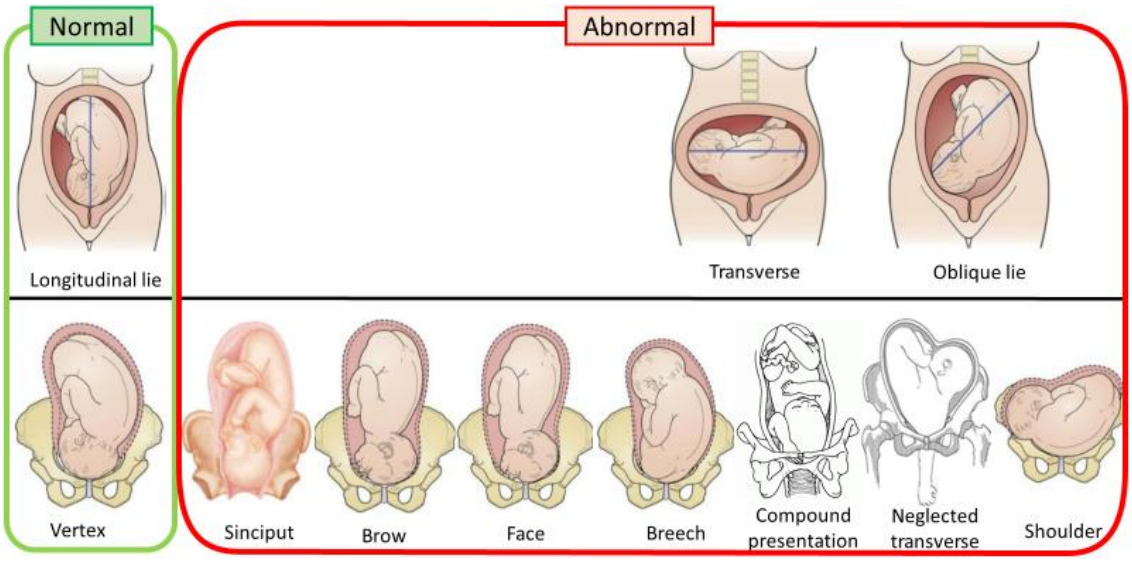


Figure 4G. Summary of fetal lie and presentation
Source: *Myles Textbook for midwives.* 16th ed.

4-1-1-4. The way to know the fetal lie and presentation

- First, find the fetal lie and presentation by palpation with Leopold's maneuvers. Then, listen to FHR on the spot identified by palpation.

4-1-1-4-1. Palpation with **Leopold's maneuvers**

Before starting palpation, ask the woman to empty her bladder. Then assist her to lie in a supine position with her knees bend. Palpation should be provided gently.

Table 4H. The procedure of Leopold's maneuvers

<table>
<tr><th>Place your palms on</th><th>Finding</th><th>Diagnosis</th></tr>
<tr><td colspan="3">First maneuver: Fundal palpation to determine the presence of the buttocks or the head in the fundus.
- Stand at the woman's side and facing her.
- Use two hands to palpate the top of the fundus to determine fetal condition.</td></tr>
<tr><td rowspan="3">  </td><td>Soft and irregular (buttocks)</td><td>Cephalic</td></tr>
<tr><td>Hard and round shape (head)</td><td>Breech</td></tr>
<tr><td>Feel nothing, empty</td><td>Transverse</td></tr>
<tr><td colspan="3">Second maneuver: Lateral (both sides of abdomen) palpation to find the location of the fetal back
- Use two hands to palpate both side of the abdomen from the top of the fundus toward the lower part of uterus to determine the fetal back.</td></tr>
<tr><td rowspan="3">  </td><td>One side with a firm and large smooth shape</td><td>Back</td></tr>
<tr><td>Another side with numerous small, irregular, mobile parts are felt</td><td>Extremities</td></tr>
<tr><td>Hard and round shape (head)</td><td>Transverse</td></tr>
</table>

<table>
<tr><th>Place your palms on</th><th>Finding</th><th>Diagnosis</th></tr>
<tr><td colspan="3">Third maneuver: Palpation of the lower abdomen just above the symphysis pubis to confirm the presenting part of fetus and its mobility.
- Put one hand on top of the fundus, then place fingers and thumb of another hand just above the symphysis pubis to grasp the part of the fetus presenting there. Give gentle pressure to confirm the presenting part of fetus and engagement.
- - If the part of fetus moves upward, it means not engaged.</td></tr>
<tr><td rowspan="2">  </td><td>Hard and round shape (head)</td><td>Cephalic</td></tr>
<tr><td>Softer and irregular (buttocks)</td><td>Breech</td></tr>
<tr><td colspan="3">Fourth maneuver: Palpation of the lower abdomen just above the symphysis pubis to determine degree of head decent and position.
- Stand facing the woman’s feet.
- Use two hands to palpate both sides of the lower part of the uterus and gently exert deep pressure in the direction of the axis of the pelvic inlet to determine degree of head decent and position.
- If fully engaged, only a small portion of the head will be identified.</td></tr>
<tr><td rowspan="2">  </td><td>Hard and round shape (head)</td><td>Cephalic</td></tr>
<tr><td>Softer and irregular (buttocks)</td><td>Breech</td></tr>
</table>

*During conducting Leopold’s maneuver, you can check the fetal movements at the same time.

Source: *Partograph for Labor Monitoring* shared by training unit in National Maternal and Health Center

4-1-1-4-2. FHR auscultation

- Listen to **FHR** to confirm your palpation finding of lie and presentation.
- If the spot where you can hear the loudest fetal heart beat sound is in the upper part of the abdomen, the fetus may be in breech presentation (Figure 4I).

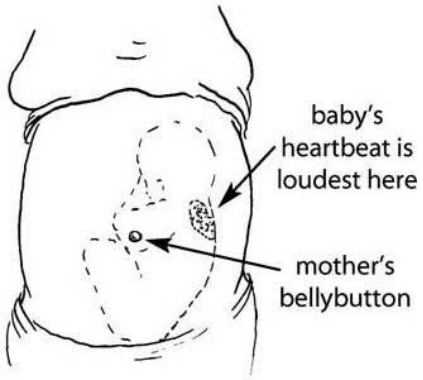


Figure 4I. The spot to listen to FHR in breech presentation
Source: http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=41&printable=1

4-1-1-4-3. Vaginal examination

- Vaginal examination is another way to confirm your palpation findings. When you feel fetal feet, knee or hip, it is in **breech** presentation. When you feel a round, smooth and hard shape with the sagittal suture, it is the head and **Cephalic** presentation.
- For **Cephalic** presentation, further classification is found by vaginal examination.
    (1) **Vertex presentation**: You feel the small fontanel.
    (2) **Sinciput presentation**: You feel the big fontanel.
    (3) **Brow presentation**: You feel the big fontanel and forehead or nose.
    (4) **Face presentation**: You feel the parts of face such as the mouth.

<The small and big fontanels of fetal head>

- The sutures are the born joint formed where two bones meet. The fontanelle is formed where two or more sutures meet (Figure 4J).

- The small (posterior) fontanel is located in the back of the fetal head **(Occiput).**
- The big (anterior) fontanel is located in the front of the fetal head **(Sinciput)**.

- These fontanels are landmarks to know the fetal **presentation** and **position**.

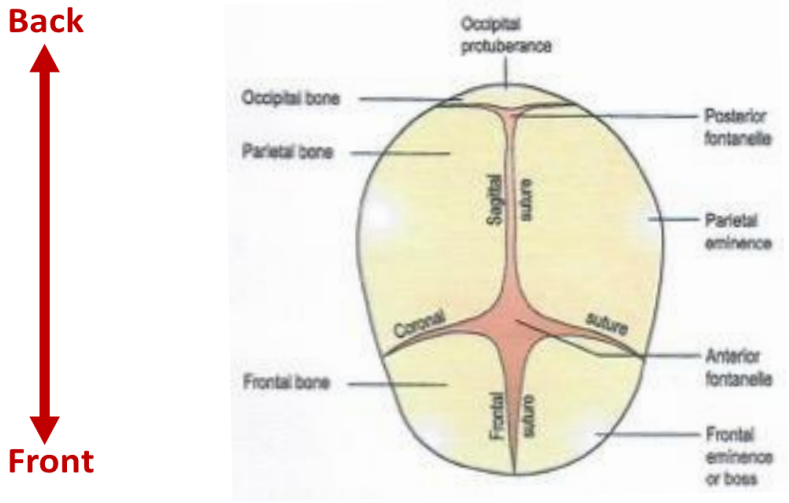


Figure 4J. The fetus skull (View from above of the head)
Source: Marshall, J. and Raynor, M. (2014). *Myles Textbook for midwives*. 16th ed. Elsevier.

4-1-1-5. Complication with abnormal lies and presentation

4-1-1-5-1. Abnormal fetal lies and presentation: Transverse or oblique lie, shoulder presentation, breech presentation, sinciput, brow and face presentation

- For these abnormal fetal lies and presentation, the presenting part of fetus is not accommodated by the maternal pelvis. Those cases can result in **obstructed or arrested labor**.
- **Umbilical cord prolapse** is more frequent for transverse or oblique lie and breech or shoulder presentation when membranes are ruptured.

4-1-1-5-2. Compound presentation and neglected transverse

- It may cause **obstructed labor** or **necrosis of the hands**.

4-1-2. Fetal position in vertex presentation

《**Summary**》

- Fetal position refers to the relationship between the fetal presenting part and maternal pelvis (posterior or front, right or left).
- Fetal position changes with fetal rotation.
- It can be assessed by where you touch the Occiput with small fontanel in the maternal pelvis during vaginal examination.
- In the normal process of fetal rotation, the fetal position changes from Occiput Transverse to Occiput Anterior.
- When the fetal position is abnormal, there is a possibility of obstructed labor.

4-1-2-1. Definition of fetal position

- Fetal **position** is the relationship between the **fetal presenting part and maternal pelvic (posterior, front, right, or left)**. Posterior is maternal spine, and front is maternal symphysis pubis. The fetal position changes with fetal rotation.

4-1-2-2. Definition of fetal rotation

- Fetal **rotation** is the movement of turning the fetal head through the birth canal.
- In the normal process of labor, the fetus occiput gradually moves from the maternal left/right side to the maternal symphysis pubis.

4-1-2-3. Classification of fetal position in vertex presentation

4-1-2-3-1. Occiput Transverse[6] (OT)

- When the Occiput points to transverse sides of maternal pelvis, it refers **Occiput Transverse (OT)**.
- Most commonly, the fetus enters the pelvic inlet in OT position to fit the shape of the pelvic inlet. It is classified into Left OT (LOT) or Right OT (ROT), depending on which side the Occiput points to.

-

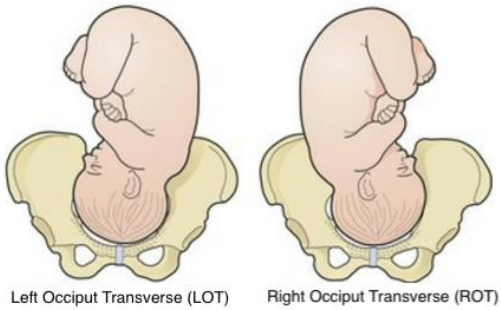


Figure 4K. Left Occiput Transverse (LOT) and Right Occiput Transverse (ROT)
Source: *Myles Textbook for midwives.* 16th ed.

4-1-2-3-2. Occiput Anterior (OA)

- When the Occiput locates at the maternal symphysis pubis (i.e. the anterior of maternal pelvis), it refers to **Occiput Anterior (OA)**.
- In the normal rotation process, the Occiput gradually moves toward the symphysis pubis anteriorly from the original position (left or right of maternal pelvis). The fetus head descends into the pelvis at the 45-degree angle of Left Occiput Anterior (LOA) or Right Occiput Anterior (ROA) position.

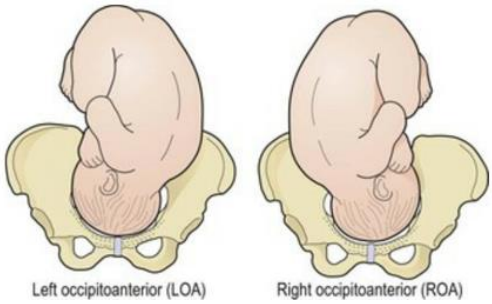


Figure 4L. Left Occiput Anterior (LOA) and Right Occiput Anterior (ROA)
Source: *Myles Textbook for midwives. 16th ed.*

4-1-2-3-3. Occiput Posterior (OP)

- When the Occiput is located at the maternal supine (i.e. the posterior of maternal pelvis), it refers to **Occiput Posterior (OP)**.
- The Occiput sometimes moves toward the maternal spine from the original position (left or right of maternal pelvis). The fetus descends into the pelvis at the 45-degree angle of **Left Occiput Posterior (LOP)** or **Right Occiput Posterior (ROP)** position.

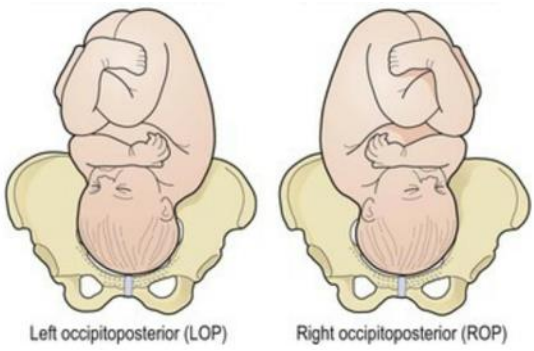


Figure 4M. Left Occiput Posterior (LOP) and Right Occiput Posterior (ROP)
Source: *Myles Textbook for midwives.* 16th ed.

4-1-2-4. The way to know the fetal position

4-1-2-4-1. Vaginal examination

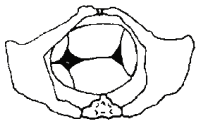
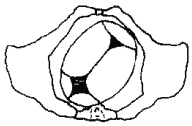
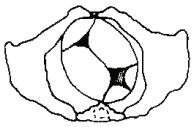
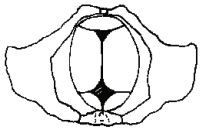
(1) Feel the direction of the sagittal suture and the small fontanel or big fontanel.

- When you touch the **small fontanel**, you may feel a small dip-like triangle or sharp angle like the **letter "Y"**. Confirm if it is formed by three born joints.
- On the other hand, when you touch the **big fontanel**, you may feel **bigger dip like a diamond shape (rhomboid)**. Confirm if it is formed by four born joints.

(2) Find the location of the small fontanel

- If you touch the big fontanel, the small fontanel is located on the opposite side (Table 4N)

Table 4N. Location of the small fontanel and fetal position

Location of the small fontanel		Fetal position
Maternal left side	 Left occiput transverse	LOT
Maternal right side	 Right occiput transverse	ROT
Between maternal left side and symphysis pubis	 Left occiput anterior	LOA
Between maternal right side and symphysis pubis	 Right occiput anterior	ROA
Maternal symphysis pubis	 Occiput anterior	OA
Between maternal left side and maternal spine	 Left occiput posterior	LOP
Between maternal right side and maternal spine	 Right occiput poterior	ROP
Maternal supine	 Occiput posterior	OP

Source:*Integrated Management of Pregnancy and Childbirth, Pregnancy, Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors (2017) WHO, S-91*

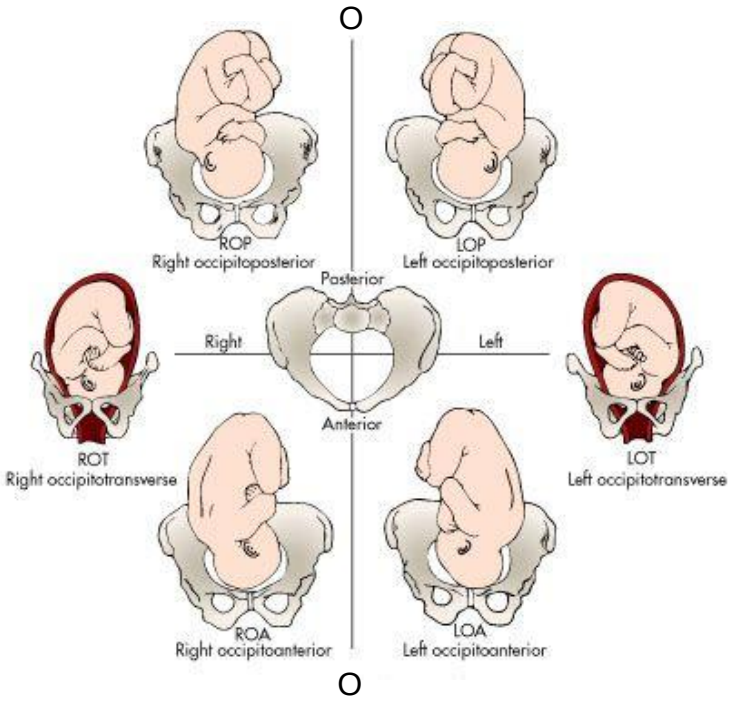


Table 4O. Location of the small fontanel and fetal position

Source:
http://intranet.tdmu.edu.ua/data/kafedra/internal/ginecology2/classes_stud/en/nurse/adn/ptn/2/Nursing%20Care%20of%20Childbearing%20Family/02.%20Unit%20test%20II.htm

<Points to measure by vaginal examination>

- Direction of the sagittal suture: Small (Posterior) fontanel
  or big (Anterior) fontanel.
- In **normal** process of fetal rotation, the fetal position changes from
  Occiput Transverse (OT) to Occiput Anterior (OA).
- When the fetal position is **abnormal**, there is a possibility of obstructed (prolonged or arrested **labor)**.
- **BUT** we cannot evaluate the progress of labor with a one-point assessment. **Continuous monitoring is essential**.

4-1-2-5. Complication with Occiput Posterior or Occiput Transverse position

4-1-2-5-1. Occiput Posterior (OP)

- OP is caused by a failure of fetal rotation[9]. It may interfere with the fetal descent through the pelvis and cause **prolonged labor** or result in **arrested labor**.

- In OP position, Occiput puts strong pressure on a woman's spine. The woman may complain of continuous and severe **backache** with contractions[9]. It may lead to maternal exhaustion and result in prolonged labor.
- Tell the woman to walk around or **change position (e.g. kneeling position, squatting)**, to reduce backache and encourage spontaneous rotation[5(S-91),9]. Observe the delivery progress routinely, particularly be aware of uterine contractions and fetal descent and monitor the location of the small fontanel.

4-1-2-5-2. Occiput Transverse (OT)

- OT is the position when the fetus enters the pelvis, so it may become to OA when the fetus head rotates normally.
- If OT persists, even if there are effective uterine contractions, it may indicate **transverse arrest**, in which the fetal head cannot pass through the pelvis.
- **Observe uterine contractions and fetal descent** with the location of the small fontanel routinely, to confirm if the fetal rotation normally happens.

4-2. Well-being of fetus

4-2-1. Fetal Heart Rate (FHR)/BCF

《**Summary**》

- FHR is the most important indicator to know the fetus condition during labor.
- Find the spot to listen to FHR by palpation and listen to FHR for one minute. Confirm if the FHR is within normal range.
- When FHR is slower than normal range, it may be caused by low oxygen and/or cord compression. Change the mother's position immediately and continue to listen to FHR.
- When the FHR is more rapid than normal range, it may be caused by infection or other causes. Continue to listen to FHR.
- If abnormal FHR persists, it may result in fetal death or neonatal asphyxia.
- For normal FHR, routine observation in recommended interval is important.

4-2-1-1. Definition of FHR

- **Fetal Heart Rate (FHR)** is the **speed of fetal heart beat** measured by the number of beats per unit of time, usually per minute.

4-2-1-2. The way to auscultate FHR

(1) Find the fetal **presentation and position** by abdominal **palpation** (See, *4-1. Fetal lie, presentation, position*, p.57).

(2) Find the **spot to listen to FHR**. The upper chest or upper back of fetus is where the fetal heart beat is loudest (Figure 4P). Therefore, when the fetus is facing mother's left, the spot to listen FHR is right down (Figure 4Q).

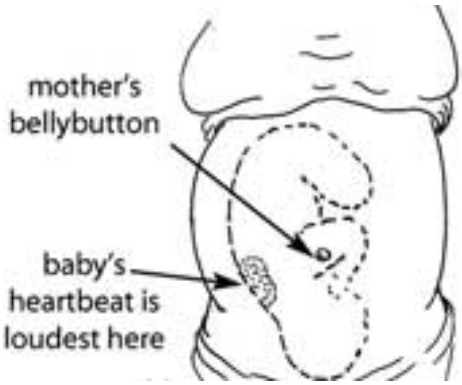


Figure 4P. The spot where the heartbeat is loudest **Figure 4Q. In the case fetus is facing to mother's left**
Source: http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=41&printable=1

- The spot to listen FHR is moving down with fetal descent. The spot comes down with fetal descent and moves towards center as fetal rotation (Figure 4R).

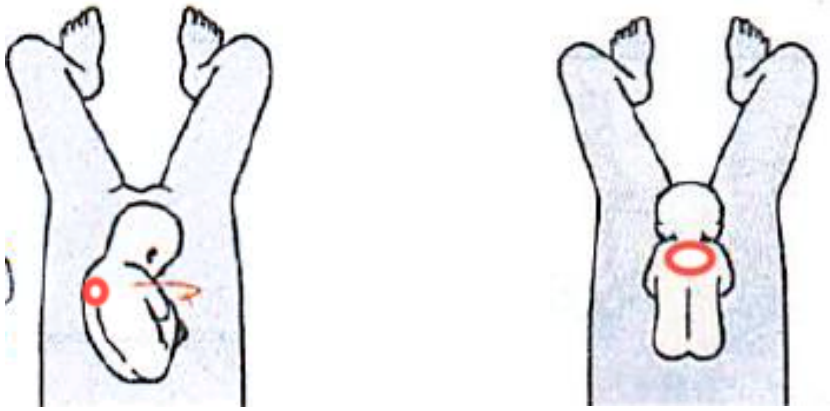


Figure 4R. The changes of spot to listen to FHR during the 2nd stage of labor
Source: http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=41&printable=1

<False heart beat sounds>

- If you hear a **'swishy' sound (shee-oo, shee-oo, shee-oo)**, you may be hearing the **pulse in the umbilical cord**. Cord sounds cannot tell the actual FHR.
- You also may hear the **mother's radial pulse**. Feel the maternal pulse together with listening to FHR, to establish that what is being heard is the fetal, not maternal, heart rate[10].

(3) Listen to the FHR as follows:

Duration: For 1 full minute **Timing: Immediately following uterine contraction1** **Frequency: [1st stage] Every 30 minutes, [2nd stage] Every 5 mins**

(4) Record the FHR on the **Initial Assessment Record Sheet**, **partograph** and **delivery record**[1]

4-2-1-3. Classification of normal and abnormal FHR

- Normal FHR at term pregnancy is **110 to 160 beats per minute**[1].
- FHR may be abnormal when it deviates from this range, either decreasing or increasing.

4-2-1-4. Complication from a FHR deviated from normal range

4-2-1-4-1 . FHR <110

- The fetus receives oxygen from mother through placenta and umbilical cord. When the fetal heart rate decreases during labor, uterine contraction may **(1) Reduce placental blood flow** or **(2) Cause compression of the umbilical cord**.

  (1) Reduce placental blood flow:

  - During contraction, blood vessels in the uterus are compressed by the uterine muscle. Then, the placental blood flow decreases and the **oxygen supply from mother to fetus reduces.**
  - In a result, the fetus cannot receive enough oxygen and the FHR decreases as a response to the **low oxygen status.**
  - When the fetus is strong enough to tolerate the insufficient oxygen supply, FHR does not change or severely decrease. However, if the fetus is weak or placental dysfunction is present, FHR becomes slow repeatedly or severely, even with mild contractions[6], and it may lead to **fetal death** or **neonatal asphyxia**.

(2) Compression of the umbilical cord:

- During contraction, the umbilical cord is compressed by pressure between the fetus and the uterus. Then the blood flow reduces, and it makes the FHR decrease**.**
- Umbilical cord compression is likely to happen when: the cord is wrapping around the fetus body or neck, a knotted or looped umbilical cord, or less amniotic fluid.
- If it occurs repeatedly or persistently, the fetus may **be in low oxygen status** and so it should be referred.
- Possible intervention for lower FHR <110 is to **change the maternal position to release the pressure to the umbilical cord.**
- When the membranes are ruptured, check if there is a prolapsed cord and thick-meconium stained amniotic fluid.

4-2-1-4-2. FHR >160

- A rapid FHR may be a response to maternal **fever, infection, drugs** causing rapid maternal heart rate (e.g. tocolytic drug), or **hypertension**. In the absence of a rapid maternal heart rate, a rapid FHR should be considered a sign of **fetal distress**[6, 1(p87),5(S109)].

Note: If FHR is abnormal (<110bpm or >160bpm), place mother on left side and check FHR again.

4-2-2. Amniotic fluid

《**Summary**》

- Color of amniotic fluid is another indicator of fetus condition during labor or internal bleeding from placenta.
- If the membranes are ruptured, check the color in a vaginal examination.
- If the thick meconium-stained fluid is found, check FHR. If the FHR is abnormal, it indicates fetal distress.

4-2-2-1. Normal characteristics of amniotic fluid

- Amniotic fluid is a clear liquid surrounding the fetus.

4-2-2-2. The way to observe amniotic fluid

- When the membranes are ruptured, the midwife should check the following characteristics:
  - Thickness (viscous or watery)
  - Color (yellow, slight/light green, dark green or dark)
  - Smell (odorless or foul-smelling)
  - Volume (check whether the fluid draining is absent or not)

4-2-2-3. Complications from abnormal characteristics of amniotic fluid

4-2-2-3-1. Blood-stained fluid

(See, *6. Observe maternal condition, 6-6-3. Complication with abnormal bleeding,* p.108)

4-2-2-3-2. Thick meconium-stained amniotic fluid

- **Meconium** is the **stool of fetus**.
- Sometimes the fetus passes meconium into the amniotic fluid during labor when the fetus has **low oxygen status**.
- Meconium-stained amniotic fluid is seen frequently among **term** fetus, so slight meconium-stained fluid is not an indicator of fetal distress[5,6].

- However, **thick meconium-stained amniotic fluid** is one of the signs of **fetal distress,** especially if FHR abnormality is present[1].
- **Meconium Aspiration Syndrome (MAS)**, which is a respiratory problem with inhalation of meconium stained-fluid may be indicated.

4-2-2-3-3. Foul smelling amniotic fluid

- It may indicate intra-amniotic **infection** and needs further treatment with referral.

4-2-2-3-4. Absence of amniotic fluid with rupture of membranes

- An absence of fluid draining after rupture of membranes is an indication of reduced volume of amniotic fluid[5].
- It indicates that the **cord compression** most likely happened. Listen to the FHR properly and observe closely when an abnormal FHR is heard.

Section 5. Assess the delivery progress

SUMMARY

- The objectives of this section are: (1) To assess the delivery progress by the condition of **4Ps (Power, Passage, Passenger, and Psychology)**, and (2) To identify the stage of labor.
- Assessment of the delivery progress requires understanding the **4Ps – Power, Passage, Passenger, and Psychology**.
- The delivery process is divided into **four stages**. The first and second stages are focused in this section. The criterion to distinguish the stages is **'cervical dilatation'**.
- **4Ps – Power, Passage, Passenger, and Psychology** – should be assessed at **every stage** (and phase) of labor.

5-1. 4Ps – Power, Passage, Passenger, and Psychology

《**Summary**》

- - Nice delivery progress depends on four components, which are called the 4Ps: **(1) Power, (2) Passage, (3) Passenger, and (4) Psychology.**
- **(1) Power** is a force to deliver the baby. Therefore, it is **'uterine contraction'** or **'labor pain'**.
- **(2) Passage** means the way from uterus to outside of the maternal body. It consists of **uterine cervix, pelvis (bone), vagina,** and **perineum**.
- **(3) Passenger** is the **baby** her/himself (shape and size).
- **(4) Psychology** of mother strongly affects entire process of labor, especially uterine contractions.

5-1-1. Power

- **Power** means a force to push out the baby from uterus to our world. It is **uterine contraction** or **labor pain**.
- **Uterine contraction** has several aspects, which are **'duration'** of each contraction, **'frequency'** (usually measured as times during 10 minutes), and **strength** (though it is often subjective indicator). These three aspects should be assessed separately.
- Uterine contractions should be strong enough, otherwise the delivery will not progress. However, it should also be noted that strong uterine contractions themselves will compromise the baby in the uterus because strong contractions decrease blood flow in the uterus which results in a decrease in oxygen supply to the baby.
- Therefore, careful monitoring of uterine contractions with baby's condition is essential in delivery care.

5-1-2. Passage

- **Passage** means the way from the uterus to outside of maternal body. It consists of **pelvis (bone), uterine cervix, vagina, and perineum**.
- Soft and fully dilated cervix, sufficient form and size of the pelvic bone, soft vagina and perineum are required for smooth delivery.
- **Cervical dilatation** continuously changes, so regular monitoring is required.
- The **Pelvic bone** does not change, but an important thing is the balance between the bone size and the baby (the passenger). Even if the size of the pelvic bone is sufficiently large, if the baby is very large the passage (pelvic bone) will block the baby. On the other hand, a small baby can pass through a small pelvis.
- Therefore, we always have to examine the **balance between the passage and the passenger**.

5-1-3. Passenger

- **Passenger** is **the baby (shape and size)**. The **largest** part of the baby is **the head**. So **how the head is going into the pelvis** is very important for normal birth. (See, *4. Observe fetal condition, 4-1. Fetal lie, presentation and position,* p.57)
- As mentioned above, **proportion between the passage and the passenger** is important.
- For normal birth, it is necessary to assess **'descent'** of baby's **head**. It can be measured as the **degree to enter fetal head into pelvis**.

5-1-4. Psychology

- **Psychology** (mental status) of the mother is also an important factor in delivery progress. If the mother has fear or anxiety, it definitely decreases important internal hormones (i.e. **oxytocin**, endorphins) which facilitate labor. (See, *6. Observe maternal condition, 6-7. Psychological state*, p.110)

5-2. Decide the stage of labor

《**Summary**》

- Stages of labor consist of four: first, second, third, and fourth.
- The first stage of labor is divided into two phases: **latent** and **active**.
- Cervical dilatation (in centimeters) is an indicator to determine the stage and phase. However, regular uterine contraction (labor pain) should accompany the dilatation.
- Cervical dilatation itself does not indicate the onset of labor.

5-2-1. Definition of the stage of labor

- The delivery is classified into **four stages**. Only the **first stage** of labor is divided into **latent** and **active phases** (see Table 5A).
  (1) The latent phase of the first stage is defined as cervical dilatation '3cm or less' in Cambodia.
  (2) The active phase of the first stage is defined as cervical dilatation more than 3cm (i.e. 4cm+) until full dilatation of the cervix.
- The second stage of labor is defined as from the full dilatation of the cervix until delivery of the baby.

Table 5A. Definition of stages and phases of labor

Stage	Phase	Definition
First	Latent	From the onset of labor, until 3 cm of cervical dilatation
	Active	From more than 3cm of cervical dilatation, until full dilatation of cervix
Second	-	From full dilatation of cervix, until birth of baby (expulsion of fetus)
Third	-	From birth of baby, until expulsion (delivery) of placenta
Fourth		From expulsion of placenta, until two hours

Note: Different definitions of latent and active phases in the first stage of labor

- World Health Organization (WHO) has updated the definition of active phase in the year 2018. The new definition of active phase is from 5 cm until full dilatation.[13]
- Because accumulated scientific evidence shows that rapid progress of delivery (cervical dilatation and effacement) is observed from 5 cm of dilatation. It also shows that duration of latent phase is varies by each pregnant woman, therefore, it is not necessary to put a cut-off at eight hours.
- This threshold considers reducing an early referral and unnecessary obstetrical intervention for woman with slower but normal progress.
- However, the core members for this guide has decided to use same definition in the previous version of WHO recommendations. Therefore, we keep the definition of **active phase** is from **3 cm until full dilatation of cervix**. It is along with the Cambodian national protocol.
- Our intention to keep the previous threshold is **to prevent delayed referral of prolonged labor** from health centers, especially in rural areas. Therefore, we should not immediately apply the old recommendation of active phase and definition of prolonged labor in the level of referral hospital. The new WHO recommendation will be examined in another discussion for higher level of health facilities.

5-3. Practice of assessment of delivery progress

《**Summary**》

- It is necessary to assess the delivery progress comprehensively by observation of the 4Ps.
- Condition of the components of 4Ps (Power, Passage, Passenger, and Psychology) change gradually according to the stage of labor.

5-3-1. Power

- **'Power'** is the **uterine contraction**. It is a power to push the baby out from the uterus through the birth canal. Thanks to the power, there will be changes in **passage (uterine cervix and vagina)** and **passenger (fetus, especially head molding and rotation)**.
- Several components of the uterine contractions should be measured and assessed. The components are **duration** of contraction, **frequency** of contractions, and **intensity (strength)** of contraction. How to measure each is as follows.
  - **Duration:** count the duration of **one contraction in seconds**
  - **Frequency:** count **the number of uterine contractions in 10 minutes**
  - **Intensity (strength):** observe the woman's **reaction** to uterine contraction and feel the **firmness of abdomen**.
- The characteristics of each component changes gradually according to the stage of labor. It is shown in Table 5B.

Table 5B. Changes of characteristics of uterine contraction

Stage of labor	Duration	Frequency	Intensity (strength)
(Pre-labor)	Up to 30 seconds	Once in 15-20 minutes	Weak (sometimes subtle), no constant pain and having time to rest
1st stage / Latent phase	Between 20 and 40 seconds	Gradually increases: from 1 or 2 contractions, to 4 or 5 per 10 minutes	Weak to moderate, no constant pain and having time to rest
1st stage / Active phase	Up to 60 seconds	Up to 5 contractions per 10 minutes	Moderate to intense, no constant pain and having time to rest
2nd stage	Around 60 seconds	*ditto*	Intense, no constant pain and having time to rest

- As it is shown in Table 5B, uterine contraction usually starts from 'short and less frequent'. It gradually becomes longer, more frequent, and stronger. However, please note that **its progress varies by every pregnant woman**. Even if the duration is shorter and the frequency is less than expected, you can continue to observe the woman as long as labor progress (cervical dilatation and fetal descent) is confirmed.

<Cautions in observation of **uterine contraction**>

- If the contraction is **'too weak'** or **'too strong'**, it can indicate **abnormality**.
- **'Too weak'** can be evaluated if the **duration is short (up to 30 seconds)**; frequency is less than twice per 10 minutes; and intensity is weak. It can be a **false-labor (pre-labor)** stage. If it is a false labor, the contractions will disappear without any change

in the uterine cervix. So **continuous observation** is necessary. Please do not confuse this false-labor with 'prolonged latent phase' (described afterwards).

- **'Too strong'** can be evaluated if the duration of contraction is **more than one minute or continuous**; frequent uterine contractions **(6 times or more per 10 minutes)**; or the woman complaints that the contraction is **too strong**. Too strong contractions can be a sign of **placental abruption (DPPNI)**; **uterine rupture or pre-rupture**; or **inappropriate use of medicine** (oxytocin, misoprostol, traditional herbal medicine, etc.) that stimulates uterine contractions. Immediate evaluation of the fetal and maternal status is required if you find this type of abnormal contractions.

5-3-2. Passage

- **'Passage'** means the **pathway** from the uterus to outside of the maternal body.
- **The pelvis** is the most important part of 'passage'. It consists of bones and has a canal inside. Examine the shape and size of the pelvis carefully because normal birth is not possible if there is a severe deformity in the pelvis. Deformities in hip joints may also be a barrier to normal birth.
- **The uterine cervix** is **dilated and effaced** by uterine contractions and by internal pressure of uterus. **Dilatation** can be measured by the fingers when you touch the cervix. It is better to practice the measurement by using a model of cervical dilatation. Cross-checking vaginal examination by supervisors (trainers) is also an effective method of learning for trainees.
- **Effacement** can be also measured by the finger. It is the **length of the cervix**. If the dilatation is small (e.g. 2 or 3 cm), you may feel the cervix is long. However, when the cervix is fully dilated, the length itself usually disappears. It means that the cervix is fully effaced. Since the dilatation is caused **passively**, monitoring other components – power, passage passenger, and psychology – is essential, especially if you think that the dilatation is not sufficient.

5-3-3. Passenger

5-3-3-1. Monitoring items

- The main passenger is the **fetus**, who is going to come through the narrow pathway. The fetus (or baby) tries to adapt her/his head to the shape of mother's pelvis. This adaption consists of **'flexion', 'rotation', and 'molding'**.
- During this adaption process, the baby's head is going into pelvis and descending towards outside. It is necessary to know anatomy of pelvis and fetal head in three-dimensional manner in order to understand the process.

What we have to monitor and assess is **the entire process of descent of the fetal head**, **rotation,** and **molding**.

5-3-3-2. Anatomical background

- **Flexion** means **bending a head forward**. It enables the head to go into the pelvis with its smallest circumference. However, if the fetal head is too small, or the maternal pelvis is too large, this flexion may be only in little degree or even not happen.
- **Rotation** is **a process to adapt the form of the head inside of the pelvic canal**. Fetal head is an **ellipse (oval) shape** if we see it from the top. Shapes of the pelvic inlet and outlet are also ellipses, but the directions of the long-axis and short-axis are different. Anteroposterior distance is shorter than transverse distance at the inlet. On the other hand, transverse is shorter than anteroposterior at the outlet. This is the reason why the baby's head should rotate in the pelvis.
- **Molding** is **another mechanism to make the fetal head smaller**. The baby's head consists of two frontal bones, two **parietal bones** and one **occipital bone**. The borders of each bone have small openings, which is called as **suture** and **fontanelle**. Molding is **an anatomical alteration in shape**, which is characterized by an **overriding of head bones at the sutures**. It allows a considerable reduction in the size of the presenting diameters.

- **Caput succedaneum** is **a swelling (edematous) of the scalp** at the presenting part of head. It is caused by external pressure on the fetal head from the birth canal.

5-3-3-3. Measurement of fetal head descent

- It is the abdominal method to assess descent of the fetal head. The level of the head is measured by **abdominal palpation with fingers** by placing the radial margin of finger above the symphysis pubis (which is anterior brim of pelvis) and expressed in terms of **fifths above the brim like 5/5, 4/5, 3/5, 2/5, 1/5, or 0/5** (Figure 5C).
- The points to be confirmed are the entire head, **'sinciput'** and **'occiput'**. Several images of the measurement are shown below (Figure 5D, 5E). The picture below shows an image of head and two points of the head (sinciput and occiput). The picture with actual photo (Figure 5D) also indicates how baby's head rotates according to the fetal descent. You can understand that the rotation starts when the baby's head comes near to the pelvic floor.

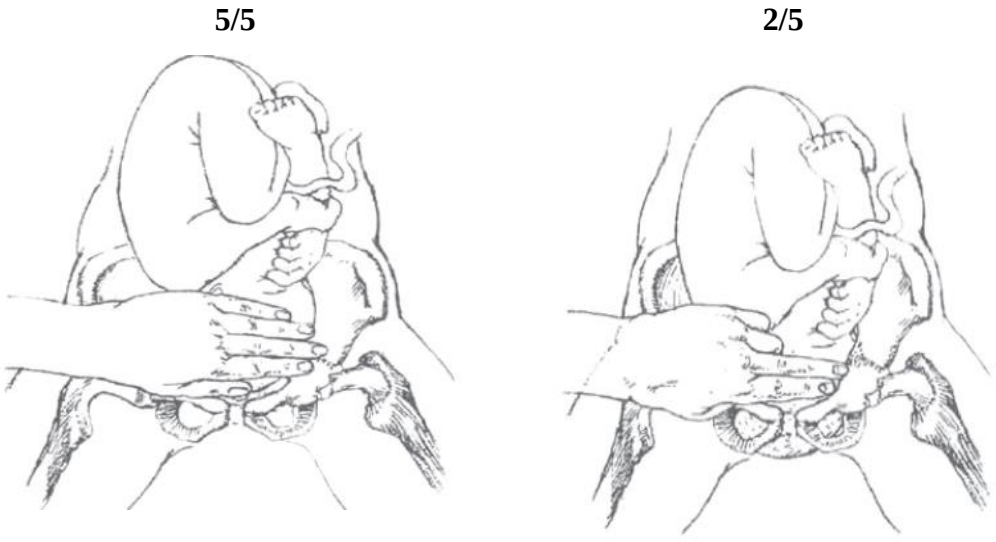


Figure 5C. The level of head measured by abdominal palpation with finger
Source: *Partograph for Labor Monitoring* shared by training unit in National Maternal and Health Center

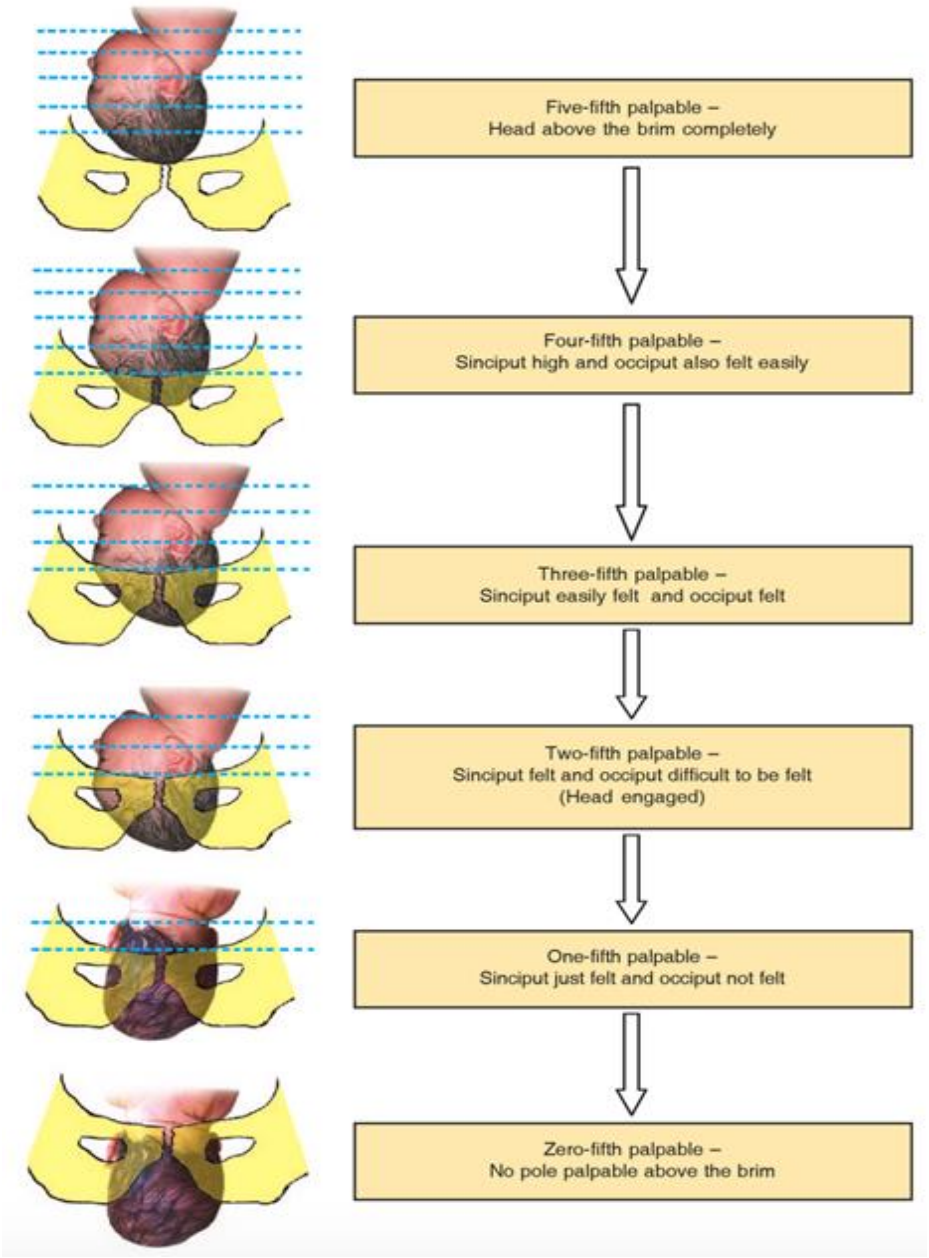
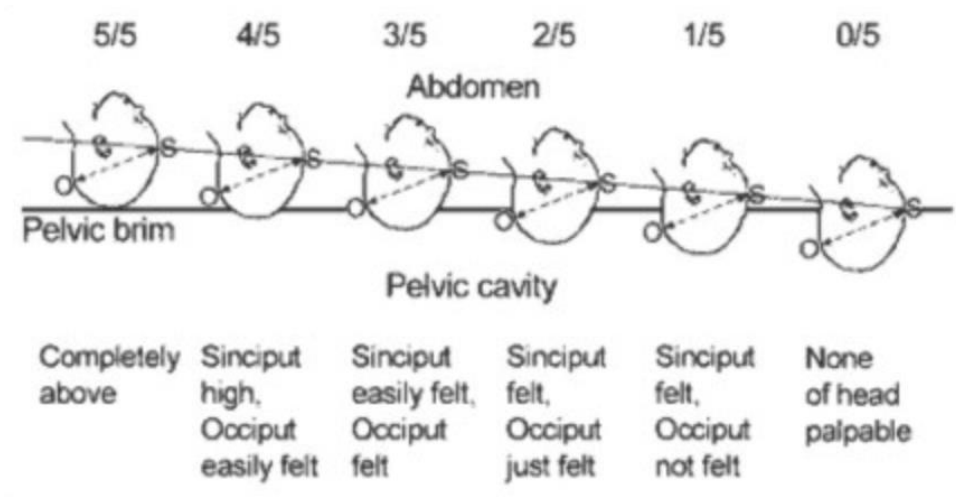


Figure 5D. Fetal head decent and rotation



S: Sinciput - O: Occiput

Figure 5E. Fetal head decent
Source: *https://www.madeformums.com/pregnancy/what-does-it-mean-when-your-babys-head-is-engaged/*

5-3-3-4. Measurement of molding and Caput succedaneum

《**Summary**》

- Molding and Caput Succedaneum can be one of the indicators of cephalopelvic disproportion (CPD) or prolonged labor.
- In a vaginal examination, touch the fetal head if there is the overlap of the parietal bones (Molding) and a swelling of the scalp at the presenting part (Caput Succedaneum).
- Those fetal head changes are formed by strong pressure from the birth canal.
- Severe molding may indicate the possibility of CPD.

5-3-3-4-1. Molding

- The level of molding is measured as **changes in the fetus's skull bones**. It is classified into four degrees as follows:

0 The bones are separate and head joints are easy to feel.

\+ The bones on the top of the head touch each other only.

++ The bones on the top of the head slightly overlap (one over the other)

+++ The bones on the top of the head are predominantly on top of the other (overlap each other to a significant degree)

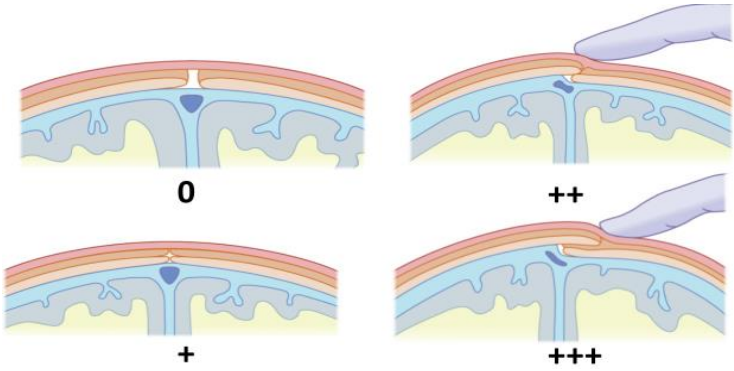


Figure 5F. The level of molding
Source: https://elearning.rcog.org.uk//easi-resource/maternal-and-fetal-assessment/examination/moulding

- Please remember that this level of molding depends on **the relative relationship between the fetal head size (passenger) and pelvic bone size (passage)**.
- Significant level of molding **(+++)** indicates that the pelvis is narrow to the fetal head. But it does not always mean Cephalopelvic disproportion (CPD). Because the molding itself is a strategy for the fetus to pass through the narrow canal. As long as the progress of labor is observed, for example, nice descent of the fetal head with appropriate uterine contractions can indicate that the process will be normal.
- In other words, **DO NOT** make a diagnosis of CPD with only the findings of molding.
- However, if you feel that molding is significant and fetal head is still floating (not engaged), it is a sign to suggest CPD.

5-3-3-4-2. Caput Succedaneum

- It is difficult to 'standardize' the measurement of Caput Succedaneum, because only vaginal examination is the way to know it and it is frequently difficult to touch all the part of fetal head.

- However, Caput sometimes hampers evaluation of molding due to **thick edema** in the head skin, which prevents to feel the overlapping of the bone.
- Therefore, you should consult to your colleagues to evaluate it together.

5-4. Assessment of duration of labor

5-4-1. Criteria for the assessment

The criteria are defined only for the first stage of labor, but for the latent and active phases separately.

> **Note:** The core members of this guide decided to use a previous version of WHO partograph. Therefore, the criteria to evaluate the duration of labor depend on it.

Table 5G. Criteria of duration of labor in the latent and active phases in the first stage.

Phase	Duration of labor	Prolonged labor
Latent	8 hours (Confirm if real labor pain **OR** false labor pain!)	More than 8 hours in the latent phase (Confirm if real labor pain **OR** false labor pain!)
Active	At least 1 cm of cervical dilatation per hour	Less than 1 cm of dilatation during the active phase

5-5. Conditions to be considered

As it is explained in *5-1. **4Ps – Power, Passage, Passenger, and Psychology***, there are **four important factors** for progress of labor.

- **'Power'**, it is **'labor' or 'uterine contraction'**, is an essential component of delivery. If you think power is not sufficient during latent phase, please consider the possibility of **'false labor'**.
- Inappropriate power in active phase may suggest **'weak pain'.**
- There are several important causes of 'weak pain', therefore, careful investigation of the cause and appropriate management are required.
- **'Passenger'** and **'Passage'** are always in their relative **relationship**. In other words, their conditions and relationship **should be evaluated together**. Suppose there is a car at very slow speed. Guess the reason why. It may be due to bad road condition, which is 'Passage' factor. It may be due to the bad condition of the car itself, which is the 'Passenger' factor. It may be due to big size of the car in a narrow road, which is caused by both 'Passenger' and 'Passage' factors.
- Please remember the **4Ps (Power, Passage, Passenger, and Psychology)** and their relationships when you record the **partograph**.
- The timing of continuous monitoring is shown in 'Annex 2 Observation Time chart'.
- We cannot evaluate the progress of labor with one-point assessment. After initial assessment, please continue regular monitoring according to Annex 2.

Section 6. Observe maternal condition

SUMMARY

- Objectives of this section are: (1) To identify any abnormal status in maternal condition, and (2) To provide immediate initial treatment to the case before referral.
- It's necessary to check the vital signs (BP, pulse, body temperature), urinalysis and bleeding to confirm if there is any abnormal status in maternal condition during labor.
- Pre-eclampsia, intra-uterine infection, bleeding are most fatal complications during labor both for the woman and fetus.

6-1. Blood pressure

《**Summary**》

- Maternal hypertension affects several organs and leads to dysfunctions. It can result in fetal distress and maternal complications. It may develop to eclampsia.
- Measure BP in a resting state and interval of uterine contraction.
- When the Systolic or Diastolic BP is severe hypertension, refer the woman.
- When the Systolic or Diastolic BP is moderate hypertension, let the woman rest and measure BP 15 minutes later. Also check the symptoms with hypertension (headache, blurred vision, and epigastric pain).

6-1-1. Definition of Blood pressure and proteinuria

6-1-1-1. Blood Pressure (BP)

When a heart beats, the blood is pushed out from the heart to the body. BP is the pressure of the circulating blood against the blood vessels. Two kinds of BP are measured:

- **Systolic** BP: **highest** BP during the heart beat
- **Diastolic** BP: **lowest** BP between the heart beat

6-1-1-2. The way to measure

6-1-1-2-1. Blood pressure

- Measure BP in a resting state and at intervals of uterine contraction. This is because that BP is elevated by body activity, uterine contractions, and the pain and psychological factors, such as distress or nervous.
- When the Systolic **BP ≥140-160mmHg OR Diastolic BP ≥90-110mmHg**:
  (1) Let the woman rest and measure BP **15 minutes later**.
  (2) Check the **symptoms with hypertension**. (See, *6-2. Symptoms with hypertension,* p.98)

6-1-1-3. Classification of BP

	Normal BP	Moderate Hypertension	Severe hypertension
Systolic BP	< 140 mmHg	≥ 140mmHg	≥ 160mmHg
	AND	**OR**	**OR**
Diastolic BP	< 90mmHg	≥ 90mmHg	≥ 110mmHg

6-1-1-4. Complication with hypertension

6-1-1-4-1. Systolic BP ≥ 160 mmHg OR Diastolic BP ≥ 110 mmHg

- It is said **pre-eclampsia** is caused by an abnormal placenta implantation affecting the placenta blood flow, and the poor placenta dysfunction may lead to hypertension. The Maternal hypertension damages the vessels of several organs and leads to dysfunctions (See, *1. Immediate response to emergency for pregnant woman, 1-4. Abnormal vital signs – Elevated Diastolic Blood Pressure*, p. 13).
- Especially, it may affect **kidney, brain, eyes, liver, and lung** and contribute to the following complications:
- Placental dysfunction causes in sufficient supply of oxygen and nutrients. As a result, **fetus growth is restricted** during pregnancy and there is high possibility of low birth weight infants. FHR easily decreases during labor due to insufficient supply of oxygen.
- Placental dysfunction may cause **placental abruption**.
- Kidney dysfunction may cause **proteinuria** (See, *6-5. Urinalysis*, p. 104).
- Liver dysfunction may cause **epigastric pain, nausea, or vomiting** (See, *6-2. Symptoms with hypertension*, p. 98).
- Damaged brain vessels may cause **headaches**. When the damage is severe or persisted, it may develop the onset of **convulsions** (See, *6-2. Symptoms with hypertension*, p. 98).

- Damaged eyes vessels may cause **visual symptom (blurred vision)** (See, *6-2. Symptoms with hypertension*, p. 98).
- Lung dysfunction may cause an increase of respiratory rate or **breathing difficulty**.

6-1-1-4-2. Systolic BP ≥ 140 mmHg OR Diastolic BP ≥ 90 mmHg

- Even moderate hypertension has risk of above complication and risk to elevate BP during labor. BP must be closely observed **every hour**[1(p22)] and check whether the woman has any signs with hypertension (See, *6-2. Symptoms with hypertension*, p.98).
- FHR should be monitored closely, every 15 mins at the first stage and every 5 mins at the second stage.

6-2. Symptoms with hypertension

《**Summary**》

- Some symptoms may occur as BP elevates or hypertension persists. Those symptoms can be an indicator of the severity of hypertension.
- When the woman has hypertension, check the major three symptoms: severe headache, blurred vision, and epigastric pain. Because those symptoms indicate the brain and the liver are damaged by maternal hypertension.
- When she has those symptoms with hypertension, she may be pre-eclampsia or eclampsia.

6-2-1. Symptoms with hypertension

Some symptoms may occur as BP elevates or hypertension persists. Those symptoms can be an indicator of the severity of hypertension.

6-2-2. Confirm the symptoms with measuring BP

- Ask if she has:

  (1) Severe headache

  (2) Blurred vision

  (3) Epigastric pain

6-2-3. Complications with hypertension accompanied with symptoms

6-2-3-1. Severe head ache, blurred vision, and epigastric pain

- These symptoms may indicate that the brain and liver are damaged by hypertension. The woman may be **severe pre-eclampsia**, and there is a risk to develop to **eclampsia**.
- Even she does not have those symptoms, when the woman starts to complain, you must check BP immediately.

6-3. Pulse

《**Summary**》

- The rapid pulse is affected by bleeding, fever, dehydration, anemia, heart disease, etc.
- The slower pulse is affected by heart disease or may be caused by heart failure.
- When rapid pulse is accompanied by low Systolic BP, it may indicate the shock due to bleeding.
- Count the pulse in a resting state and interval of uterine contraction.

6-3-1. Pulse rate in pregnancy

- The normal range of adult pulse is 60-100 bpm.
- For pregnant women, the resting pulse rate increases approximately 10-20 bpm[6,9] more than non-pregnant period.
- Physiologically, pulse becomes rapid with exercise, pain, or emotional status and becomes slow during sleeping or relaxed status.

6-3-2. The way to measure adult pulse

- The pulse is normally measured in **wrist (radial artery)**.
- When you cannot find a pulse, check at another place such as neck (carotid artery) or **between the lower abdomen and upper thigh (inguinal artery)**. Measure it in a resting state and interval of uterine contraction.

6-3-3. Complication with abnormal adult pulse

6-3-3-1. Tachycardia > 100 bpm

- When the woman is not bleeding and has no abnormal pain, which may indicate

internal bleeding, or the rapid pulse may be caused by other reason such as fever, dehydration, anemia, heart disease, etc.

- If the rhythm of heart beat does not normal, refer the woman.
- Check the fever and other infectious symptoms (See, *6-4. Body temperature*, p.101).
- If the woman does not drink enough water, encourage her to drink more.

6-4. Body temperature

《**Summary**》

- When the body temperature is >38.0℃, any infection can be considered.
- Measure the body temperature in an armpit
- If the fever is due to infection, there must be other infection signs
- Intrauterine and fetus infection is most common infection during labor, especially after rupture of membranes. Check for other symptoms such as foul-smelling discharge or amniotic fluid, or tenderness of the lower abdomen.

6-4-1. Body temperature in pregnancy

- The body temperature in pregnancy rises at first trimester due to a hormonal action, but it falls to same level as non-pregnancy at second trimester.

6-4-2. The way to measure temperature

- The body temperature of an adult is normally measured in an **armpit**.
- The censer of the thermometer should be put in the center of the armpit. When the armpit is too sweaty, wipe it first.

6-4-3. Classification of body temperature in pregnancy

- An abnormally high body temperature is **>38.0℃.**

6-4-4. Complications of high temperature

- When the woman has an infection, the body temperature usually rises because it tries to fight with the cause of infection.
- In addition to the high body temperature, there must be various infection signs.

6-4-4-1. > 38.0℃

Four major causes of infection are (1) Intrauterine and fetus infection, (2) Urinary tract infection, (3) Respiratory infection, and (4) Malaria.

(1) Intra-uterine and fetus infection

- Vaginal bacterial infection sometimes goes up to cervix and reaches to the membranes. The membranes' infection further expands to amniotic fluid, umbilical cord, and finally reaches the fetus.
- If the membranes are ruptured, the infection expands more quickly. The woman may show maternal rapid pulse, foul-smelling discharge and tenderness of lower abdomen. Fetal heart rate may increase, and amniotic fluid may smell foul. (See, *1. Immediate response to emergency for pregnant woman, 1-5. Abnormal vital signs –Fever*, p.15).

(2) Urinary tract infection

When the urinary tract is infected, the woman may complain of burning, pain or difficulties urinating, increased frequency and urgency of urination, and abdominal pain or spiking fever and chills.[1] (See *1. Immediate response to emergency for pregnant woman, 1-5. Abnormal vital signs –Fever*, p.15)

(3) Respiratory infection

When lungs are infected, the woman may complain of difficulty breathing, or cough with sputum. In this condition, pneumonia or tuberculosis can be suspected.

(4) Malaria:

When the woman comes from a malarial area, she may be infected with malaria. She may complain of fever with chills, sweating, headache, or muscle joint pain.

6-4-4-2. > 37.5℃

- First of all, check for infection signs mentioned above. If there are any of the signs, the woman should be referred.
- If there are no infection signs, the body temperature must be closely observed every

hour.[1(p22)] Encourage the woman to drink more, and confirm that the room temperature is comfortable for the woman, although it should be at over 25℃ for a newborn baby.

6-5. Urinalysis

《**Summary**》

- If there is proteinuria, it may indicate the decline in kidney function due to hypertension.
- Test the proteinuria at admission with dipstick.
- Proteinuria of (+/-) or (+) is normal as physiological pregnancy changes.
- Proteinuria of (++) or (+++) is one of the indicators to diagnose pre-eclampsia.
- In case you do not have urinary dipstick, judge the referral with only BP.

6-5-1. Definition of Proteinuria in pregnancy

- **Proteinuria** is the presence of **excess protein in the urine**. A normal kidney does not allow much protein to pass through, therefore protein in urine is of very little amount.
- During pregnancy, the amount of protein in urine increase. This is because the burden on the kidneys increases due to increased blood volume. However, if the amount of protein in urine is abnormally high, it may indicate the decline in kidney function.

6-5-2. Definition of pre-eclampsia and eclampsia

- **Pre-eclampsia** is a condition of pregnancy characterized by **hypertension and proteinuria presenting after 20 weeks**[9]. The presence of proteinuria changes the diagnosis from hypertension to pre-eclampsia[5].
- **Eclampsia** is a condition characterized by the onset of **convulsions in a pregnant woman with pre-eclampsia**. The onset of convulsion changes the diagnosis from pre-eclampsia to eclampsia.

6-5-3. The way to measure proteinuria

- Dip the coated side of a **dipstick in urine sample** and wait the specified time (see the instructions on the container of dipstick).
- Compare the result with the color chart on the container, and determine the result with symbol of (–) and (+).

6-5-4. Classification of Proteinuria

Normal: (-), (+/-) , (+)

Proteinuria: (++)

Severe proteinuria: (+++)

6-5-5. Complication with proteinuria accompanied by hypertension

(See, *1. Immediate response to emergency for pregnant woman, 1-4. Abnormal vital signs – Elevated Diastolic Blood Pressure,* p.13 and *6-1. Blood pressure,* p.95)

6-5-5-1. Proteinuria (+++)

When the kidney function declines, protein leaks into urine. It indicates **severe pre-eclampsia** and causes several complications. It may develop into **eclampsia** with the onset of convulsion.

6-5-5-2. Proteinuria (++)

- If BP is normal, it may be normal proteinuria as pregnancy. BP should be observed routinely.
- If hypertension is present, it indicates pre-eclampsia and causes several complications.
- If hypertension and symptoms with **hypertension** are present, it indicated severe **pre-eclampsia**. It may develop **eclampsia**.
- If the woman does not take enough fluid, encourage to drink.

6-5-5-3. Table of pre-eclampsia, severe pre-eclampsia and eclampsia

	Diastolic Blood Pressure	Proteinurea	Any signs of hypertension	Convulsions
High Blood pressure	≥ 90mmHg on two readings (15 min apart)			No
Pre- eclampsia	90 – 110 mmHg on two readings (15 min apart)	++		No
Severe pre-eclampsia	1) ≥ 110mmHg	+++		No
	2) ≥ 90mmHg on two readings (15 min apart)	++	- Severe headache - Blurred vision - Epigastric pain	No
Eclampsia	≥ 90mmHg	++ or +++		**Yes**

6-6. Bleeding

《**Summary**》

- When the bleeding is more than a show, some complications can be considered.
- Check the bleeding condition when the woman complains of any bleeding. It also should be observed when you conduct a vaginal examination.
- Observe or measure the napkins or cloths a woman wears.
- Other signs of complications (abnormal pain and uterine contraction) should be observed together.

6-6-1. Physiological bleeding during labor

6-6-1-1. A show

- A **show** is **a small amount of blood or blood-stained mucus**, which are shown before or after a few hours from labor starts. It is caused by the detachment of the membranes from cervix when the cervix starts to dilate.

6-6-1-2. Bleeding from birth canal

- During labor, bleeding more than a show is often observed. This is from cracks or scratches in cervix or vagina when the fetus passes the birth canal.
- Amount of bleeding may seem to be increased when the membranes are already ruptured, and certain amount of amniotic fluid is leaked.

6-6-2. The way to know/measure the bleeding during labor

- When woman complaints the bleeding, you must check the bleeding condition. In addition, the bleeding should be always observed and recorded when you conduct vaginal examination.
- If woman use sanitary napkins during labor, observe the pad or measure it if bleeding

looks increasing. You need to know the weight of the original napkin.

- In the case woman does not use napkins, observe how the woman's cloths is soaked.

6-6-3. Complications with abnormal bleeding

6-6-3-1. Bleeding more than 100 ml since labor began/Pad or cloth soaked in < 5 min.

- **Three possible causes** of abnormal bleeding during labor are: **(1) placental abruption, (2) ruptured uterus, and (3) placenta previa.** Bleeding should be always checked with **abnormal labor pain** (See, *2. Listen to woman's complaint, 2.1 Bleeding*, p.20). Fetal heart rate severely decreases in the case of bleeding due to these causes.

  (1) Placental abruption is the separation of the placenta which is located in the middle or upper part of uterus.

  - Bleeding comes out of uterus as vaginal bleeding or blood-stained amniotic fluid, but sometimes there is internal bleeding inside of uterus.
  - The woman often has severe abdominal pain or tenderness, and the firmness of uterus is quite hard. (See, *2. Listen to woman's complaint, 2-3-4. Complications with abnormal pain*, p.26).

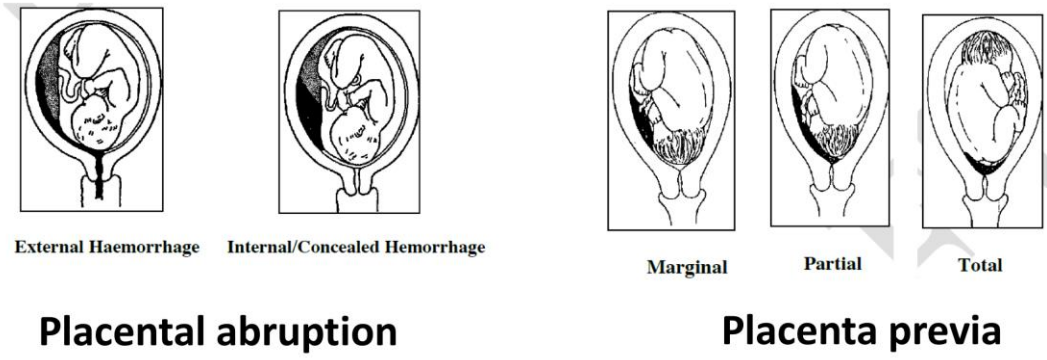
  (2) Ruptured uterus is a rupture of the uterine wall or muscle at the previous uterine incision or scar.

  - Vaginal bleeding may be not so severe, despite heavy intra-abdominal haemorrhage[5].
  - The woman complains severe abdominal pain (See, *2. Listen to woman's complaint, 2-3-4. Complications with abnormal pain*, p.26).

  (3) Placenta previa is a condition the placenta is located in the lower part of uterine, and the placenta covers the cervix partially or totally.

  - Severe bleeding occurs when the cervix starts to dilate due to the separation of placenta.

- Normally a woman does not complain of severe pain. (See, *2. Listen to woman's complaint, 2-1. Bleeding*, p.20).



6-6-3-2. Bleeding more than usual

- If there is any **abnormal labor pain** and **abnormal FHR**, it may be bleeding from birth canal.
- Continue to observe the **quantities of bleeding** with monitoring FHR and abnormal pain. If fetal distress or abnormal labor pain accompanies with bleeding, it may indicate **placental abruption** or **ruptured uterus** (See, *2. Listen to the woman, 2-3. Uterine contraction and labor pain,* p.25).

6-7. Psychological state

《**Summary**》

- Distress or strong anxiety can affect the delivery progress.
- Always care about the woman's mood and facial expression and listen to her complaints during labor.
- Avoid leaving the woman alone and make a comfortable environment.

6-7-1. Psychological state during labor

- When a woman is in labor, it is normal to have mixture emotions of excitement, hope, anxiety or fear[9].
- The psychological state is also influenced by external environment, such as birth companion, the environment of the delivery place and the attitude of the care giver.

6-7-2. Observation of psychological state[14]

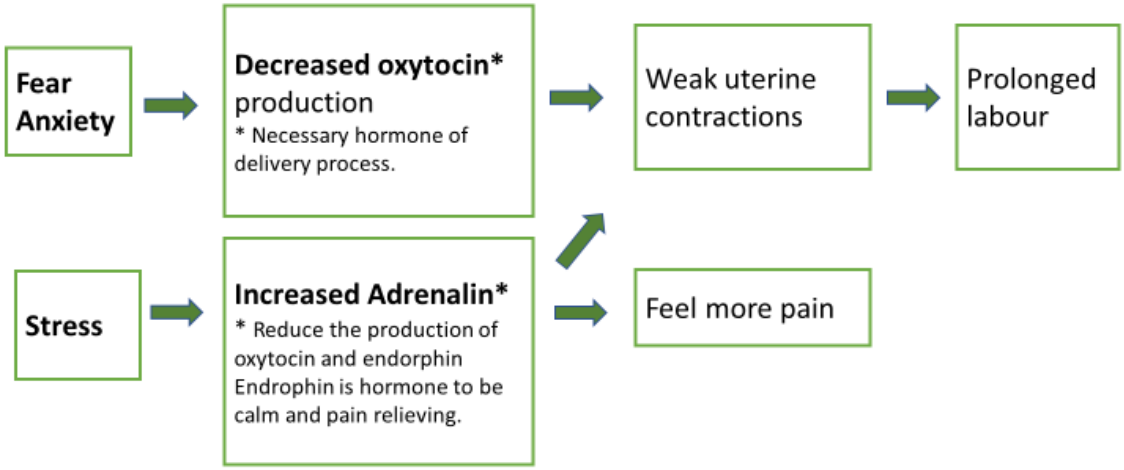
- Look at the woman's facial expression, mood, and listen to her complaints well. Panic or shouting is often caused by excessive stress and anxiety.

6-7-3. Influence of distress and anxiety during labor[14]

- Fear or anxiety disturb **oxytocin** production, that is **necessary hormone of delivery process**. It may result in slowing labor and slower dilatation of the cervix due to weak uterine contractions.
- When the woman has excessive stress, **adrenalin** is released. Adrenalin reduces the production of oxytocin and endorphin (that is another hormone to be calm and pain relieving). The delivery progress may be disturbed due to low oxytocin level, and woman feels more pain due to low endorphin level.

- Do not leave the woman alone and ask the companion to stay with her. Make a comfortable environment such as with silent and dim light (low-lighted).
- Refer to *The Guide to Individualized Midwifery Care for Normal Pregnancy and Birth*[14] for more possible psychological supports for women.

＜Influence of distress and anxiety during labor＞



Annex 1

Initial assessment sheet

1. Immediate response to an emergency for pregnant women

Symptom/Sign	Abnormal / complicated / emergency	Reason for referral
1) Consciousness	Unconscious 1(p13, 18, 23) Convulsions 1(p18, 23, 24)	Suspected eclampsia, epilepsy, severe malaria, meningitis 1(p18), 2(B6), 5(S53-54)
2) Airway and Breathing	Difficulty breathing, shallow and rapid breathing (>30 times/min) Central cyanosis (around lips)1(p14)	Pneumonia, asthma, severe anemia, heart failure, APO (Acute Pulmonary Oedema), obstructed breathing, 2(B3), 5(S-150)
3) Signs of shock	Rapid pulse (>100times/min) and cold sweat 1(p14) Low Systolic Blood pressure (<90mmHg) 1(p14)	Shock 2 (B3)
4) Sign of pre-eclampsia / eclampsia	Diastolic Blood pressure ≥110mmHg and Proteinuria (+++) Diastolic Blood pressure ≥90mmHg and Proteinuria (++) or more and any of symptoms(Severe headache, Blurred vision, Epigastric pain) 1(p24)	Severe pre-eclampsia
5) Fever	Body temparature >38.0℃	Uterine and fetal infection
6) Bleeding	Soaked pad or wet cloth in <5 minutes	Severe hemorrhage
7) Dystocia presentation	Brow, Sinciput, Face, Transverse, Oblique lie, Neglected transverse, Breech, Compound presentation, Cord prolapse	Abnormal presentation

**** Refer immediately to comprehensive emergency obstetric facility (CEmONC / CPA 2 or CPA3) if she has any reason for referral.**
Before referring, please provide first aid properly and check Gestational Age,Onset of labour (antepartum, intrapartum, postpartum).

ASK!

2. Listen to a woman's complaint

2.1. Bleeding	Check 4.2. Well-being of fetus and 6. Observe maternal condition			
	Normal sign	**Risk of complications**	**Abnormal / complicated / emergency**	**Reason for referral**
1) Quantity of bleeding	No bleeding Sticky blood (a show) 1(p47)	Bleeding more than usual [4(p22)]	Soaked pad or wet cloth in < 5 minutes 2(B4) →DO NOT perform vaginal examination if it is active bleeding! 1(p54)	Suspected abruptio placenta1 (p35) Suspected placenta previa1 (p36) Suspected ruptured uterus1 (p36)

2.2 Fluid leakage from vagina	Confirm whether membranes are ruptured (A) or intact (B)			

A. Rupture of membranes: Check 4.2.2. colour of amniotic fluid, 6.4. body temperature

	Normal sign	**Risk of complications**	**Abnormal / complicated / emergency**	**Reason for referral**
1) The time from ruptured membranes	No rupture of membrane	Pre-labour rupture of membranes (PROM)	>18 hours after the ruptured membranes 1(p130, 139)	Risk of uterine infection and fetal infection[1(p130)]

B. Membranes intact: Ask the woman to report fluid leakage from the vagina

2.3 Uterine contraction, labor pain	Check 5.2. Uterine contraction			
	Normal sign	**Risk of complications**	**Abnormal / complicated / emergency**	**Reason for referral**
1) Uterine contraction, labor pain	Regular contraction	Irregular uterine contraction No uterine contraction	Constant pain between contractions 1(p36-37, 55) Sudden and severe abdominal pain Horizontal ridge across lower abdomen 1(p53, 55) The pain reported by the woman differs from the pain normally associated with contractions 4(p22)	Suspected abruptio placenta[1(p36)] Suspected imminent ruptured uterus[1(p36)] Suspected excessive strong pain Suspected appendicitis and other causes[5(S-142,143)]

2.4 Fetal movement	Check 4.2 Well-being of fetus			
	Normal sign	**Risk of complications**	**Abnormal / complicated / emergency**	**Reason for referral**
1) Fetal movement	As usual, moving well	No or less fetal movement 1(p40) →Check FHR		Suspected fetal distress or death 5(S-155)

ASK! CHECK Mother Health Record (pink card)!

3. Women's general information and obstetrical history

	Normal sign	Risk of complications	Abnormal / complicated / emergency	Reason for referral
1) Gestational age at admission	Term delivery (37 weeks 0 days to 41 weeks 6 days)	Unknown	Preterm delivery (≤36 weeks 6 days) 1(p40), 3(p81) Post term (≥42weeks 0days)	Premature birth Postterm birth
2) Fundal height at admission	29 - 32cm	33 - 34cm	≥35cm ≤28cm	Single large fetus and suspected Cephalopelvic Disproportion (CPD) 5(S-83) Multiple pregnancies Excess of amniotic fluid 5(S-101, 102) Preterm delivery or small fetus
3) Age	18 - 34 years old	16, 17 years old ≥35 years old with multipara	≤15 years old ≥35 years old or older with primipara	
4) a. Gravida			≥5 gravidas	Suspected grand multipara
b. Parity	≤3 parities	4 parities4 (p15, 68)	≥5 parities	Grand multipara, Risk of PPH 4(p68)
c. Abortion or miscarriage	No abortion or miscarriage	≥1 abortion or miscarriage		Suspected history of surgical abortion (MVA, Curettage, Dilatation & Evacuation) and risk of PPH
5) Number of fetuses	Single		Multiple 1(p91)	Multiple pregnancies 5(S-105)
6) Height of woman	>150	145 - 150cm	<145cm	Suspected CPD
7) Anemia	Hemoglobin >11.0 g/dl 2(C4) No pallor 2(C4)	Hemoglobin 8.0 - 11.0 g/dl 1(p28) Palmar or conjunctival pallor 1(p28)	Hemoglobin <8.0g/dl 1(p27, 56) Severe palmar and conjunctival pallor 1(p27)	Sever anemia 1(p100)
8) Infection status - HIV	HIV negative	Unknown HIV status 1(p31,54) →Provide HIV test	HIV reactive or positive 1(p54)	Risk of vertical HIV transmission 1(p107)
- Syphilis	Syphilis negative	Unknown Syphilis status 1(p54) →Provide Syphilis test	Syphilis reactive or positive 1(p28)	Risk of congenital syphilis 1(p130, 142)
9) History of current pregnancy	No history of complication		Antepartum hemorrhage 4(p68) History of hypertension 4(p12), 5(S-50)	Suspected placenta previa (marginal, partial or total) 1(p36) Hypertensive disorders 5(S-50)
10) Outcome of previous delivery	No history of complication	Forceps and vacuum extraction 1(p22) Prior 3rd degree tear 1(p53), 2(D5), 4(p15) Warts, keloid tissue or scars in perineum that may interfere with delivery 1(p54, 69), 2(D5)	History of pre-eclampsia, eclampsia 2(C2, C3), convulsion 1(p22), 2(C2), PPH 1(p22, 53) Prior delivery by caesarean section (Caesarean section scar) 1(p22, 53) History of small baby for gestation age, still birth or death first day 1(p22)	Risk of recurrence of eclampsia, convulsion and PPH Risk of uterine ruptures 5(S-107)
11) Medical history	No history of complication		History of diabetes, respiratory disease, heart disease	For appropriate management 1(p159), 5(S-152, 153)

LOOK! LISTEN!CHECK!

4. Observe fetal condition

4.1 Fetal lie, presentation, position

	Normal sign	Risk to be complicated	Abnormal / complicated / emergency	Reason for referral
1) Fetal lie	Fetal lie parallels to uterus		Transverse, Oblique lie[1(p55,87)]	Abnormality of fetal lie, position and presentation, risk of obstructed labour
2) Fetal Presentation	Vertex presentation		Breech presentation, Shoulder presentation Brow, Face, Sinciput presentation, Compound presentation[1(p86)], Neglected transverse, Cord prolapse	
3) Fetal Position	Occiput anterior position	Occiput posterior position[1(p84)] Occiput transverse position		

4.2 Well-being of fetus

	Normal sign	Risk to be complicated	Abnormal / complicated / emergency	Reason for referral
1) Fetal Heart Rate	FHR 110 - 160bpm[1(p60) 7(P74)]	FHR 100 - 110bpm[1(p53,87) 3(p53)] FHR 180 - 160bpm[1(p53,87) 3(p53)] →Place mother on left side[1(p88)] →Continue observation within 15 mins	No fetal heart beat ≤100bpm[3(p53)] ≥180bpm [3(p53)]	Fetal death, Fetal distress Suspected maternal fever, drugs causing rapid maternal heart rate (e.g., tocolytic drugs), hypertension or uterine and fetal infection[1(p87)]
2) Amniotic fluid	Clear fluid[1(p60)]	Slight meconium-stained fluid without foul smelling[5(S-110)] Absence of amniotic fluid after ruptured membrane[3(p53),5(C81)]	Blood stained fluid[1] Thick meconium-stained[1(p87)] (dark green or black amniotic fluid, containing lumps of meconium)[4(p26)] Foul-Smelling[1(p41,54,56)]	Suspected abruptio placenta Risk of Meconium Aspiration Syndrome (MAS)[5(S-110)] Suspected fetal distress[1(p87)]

LOOK! LISTEN! FEEL!

5. Assess the delivery progress

5.1. Decide the stage of labour

Cervical dilatation	≤3cm	**Latent phase (5.2)**
	>3-10cm	**Active phase (5.3)**
	Full dilatation	**Second stage (5.4)**

5.2. Latent phase

	Normal sign	Risk to be complicated	Abnormal / complicated / emergency	Reason for referral
1) Fetal descent -Palpation	≤3/5	4/5 - 5/5[4(p22)] [floating]		
2) Uterine contraction				Excessively strong pain Suspected abruptio placenta[1(p36)], ruptured uterus[1(p36,37)]
a. Frequency	≤3 times in 10mins	4 - 5 times in 10 mins	≥6 times in 10mins	
b. Duration in seconds for each contraction	20 - 40 seconds	>40 seconds	Constant pain	
c. Strength	no constant pain, have a time to rest		Tenderness, quite hard	
3) Duration of latent phase	<8hours		≥8hours	Suspected prolonged latent phase

5.3. Active phase

	Normal sign	Risk of complications	Abnormal / complicated / emergency	Reason for referral
1) Fetal descent -Palpation	≤2/5 [start engagement]	3/5	4/5 - 5/5[4(p22)] [floating]	(Red) Suspected CPD, abnormality of rotation, malpresentation and malposition (Yellow) Risk of prolonged active phase
2) Uterine contraction				
a. Frequency	3 to 5 times in 10 mins		≥6 times in 10 mins	Excessively strong pain Suspected abruptio placenta[1(p36)], ruptured uterus[1(p36,37)]
b. Duration in seconds for each contraction	20 to 60 seconds	>60 seconds	Constant pain	
c. Strength	no constant pain, have a time to rest		Tenderness, quite hard	
3) Molding	(0) - (+)[1(P60)]	(++) with engagement	(++) without engagement (+++) OR Caput succedaneum without engagement	Suspected CPD[1(p60)], Risk of prolonged active phase

5.4 Second stage

	Normal sign	Risk of complications	Abnormal / complicated / emergency	Reason for referral
1) Fetal descent	Perineum begins to thin, stretch and bulge with contraction, head is visible[1(p67, 68)]	Caput succedaneum	Molding (+++)	Suspected CPD[1(p60)], Risk of prolonged labour
2) Uterine contraction				
a. Frequency	4 - 5 times in 10 mins		≥6 times in 10 mins	Excessively strong pain Risk of ruptured uterus
b. Duration in seconds for each contraction	around 60 seconds	>60 seconds	Constant pain	Excessively strong pain Risk of ruptured uterus
c. Strength	no constant pain, have a time to rest		Horizontal ridge across lower abdomen1(p37, 53, 55) quite hard	Risk of ruptured uterus
3) Duration of pushing before the admission	<45 mins (Primipara) <30 mins (Multipara)	45 mins (Primipara) 3(p46) 30 mins (Multipara) 3(p46)	>60 mins (Primipara)* 3(p46) >30 mins (Multipara)* 3(p46) *with poor fetal descent, severe molding, signs of fetal distress	Suspected obstructed labor and fetal distress

LOOK! LISTEN!

6. Observe maternal condition

	Normal sign	Risk to be complicated	Abnormal / complicated / emergency	Reason for referral
1) Blood Pressure	Systolic BP <140mmHg AND Diastolic BP <90mmHg	160mmHg>Systolic BP ≥ 140mmHg[4(p22),5(S-51)] OR 110mmHg>Diastolic BP ≥ 90mmHg →Please let woman take rest and measure BP 15mins later again	Systolic BP ≥160mmHg[4(p22), 5(S-51)] OR Diastolic BP≥110mmHg[1(p24)]	Pre-eclampsia, eclampsia, Gestational Hypertenion[5(S-51)]
2) Signs with hypertension	No signs of hypertension		Any of Severe head ache, Blurred vision or Epigastric pain [1(p24)]	Pre-eclampsia, eclampsia
3) Pulse	60 - 100 times/min	>100 times /min[1(p14)]		Shock[2(B3)]
4) Body Temperature	<37.5°C	37.5 - 38.0°C[4(p22)]	>38.0°C[1(p19,56,82)] with ruptured membranes[1(p56)], Foul-smelling vaginal discharge[1(p41,56)] with infection sign[1(p38-39,83)]	Suspected uterine and fetal infection[1(p56)], Lower/Upper urinary tract infection, Pneumonia, TB, Malaria[1(p38-39,83)]
5) Urinalysis	No proteinuria proteinuria (+)	Proteinuria (++)[1(p24,56)]	Proteinuria ≥ (+++) 1(p24, 56)	Pre-eclampsia, eclampsia
6) Bleeding	Sticky blood (a show) 1(p47)	Bleeding than usual[4(p22)]	Soaked pad or wet cloth in < 5 minutes [2(B4)]	Suspected abruptio placenta, placenta previa (marginal, partial or total), ruptured uterus 1(p35-37)
7) Psychological state	No complaint	Distressed, anxiety[1(p59)]		

Reference
1.Safe Motherhood Clinical Management National Protocol for health canter (2016) Ministry of Health, Kingdom of Cambodia
2. Integrated Management of Pregnancy and Childbirth, Pregnancy, Childbirth, Postpartum and Newborn care: A guide for essential practice (2015) WHO
3. Midwifery Curriculum for Health Centre (2016) NMCHC
4. Intrapartum care for health women and babies, Clinical guidelines190 (2014) NICE
5. Integrated Management of Pregnancy and Childbirth, Pregnancy, Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors (2017) WHO
6. Williams obstetrics 24th edition (2014)
7. WHO recommendations Intrapartum care for a positive childbirth experience (2018) WHO

Annex 2

Observation Time Chart

In Latent Phase

4. Observe fetal condition	**Normal**	**Risk to be complicated ***
Listen Fetal Heart Rate	Every 30 min[1(p59)]	Every 15 min[1(p88)]
Amniotic fluid (if rupture just now)	Check immediately	
Amniotic fluid (if ruptured)	Every 4 hours (At Vaginal examination) [1(p60)]	
5. Assess the delivery progress	**Normal**	**Risk to be complicated ***
Cervical dilatation by vaginal examination	Every 4 hours[1(p59)]	
Fetal descent	Every 4 hours (Before vaginal examination)	
Uterine contraction (frequency, duration, strength)	Every 1 hour[1(p59)]	
6. Observe maternal condition	**Normal**	**Risk to be complicated ***
Vital sign (Blood Pressure, Pulse, Body Temperature)	Every 2 hours[1(p59)]	Every 1 hour[4(p22), 1(p.22-24)]
Bleeding	Every 4 hours (At Vaginal examination) [6(p341)]	

*** Refer immediately to comprehensive emergency obstetric facility (CEmONC/ CPA 2 or CPA3) if she has any reason for refer. Before referring, please provide first aid properly and check Gestational Age, Onset of labor (antepartum, intrapartum, postpartum).**

In Active Phase

4. Observe fetal condition	**Normal**	**Risk to be complicated ***
Listen Fetal Heart Rate	Every 30 min[1(p60)]	Every 15 min[1(p88)]
Amniotic fluid (if rupture just now)	Check immediately	
Amniotic fluid (if ruptured)	Every 4 hours (At Vaginal examination) [1(p60)]	
5. Assess the delivery progress	**Normal**	**Risk to be complicated ***
Cervical dilatation by vaginal examination	Every 4 hours[1(p60)] + more according to woman's condition	
Fetal Descent	Every 4 hours (before vaginal examination) [1(p60)]	
Uterine contraction (frequency, duration, strength)	Every 30 min[1(p60)]	
Molding	Every 4 hours (At vaginal examination) [1(p60)]	
6. Observe maternal condition	**Normal**	**Risk to be complicated ***
Vital sign (Blood Pressure, Pulse, Body Temperature)	Every 2 hours[1(p61, 62)]	Every 1 hour [4(p22), 1(p.22-24),2(D23)]
Bleeding	Every 4 hours (At vaginal examination) [6(p341)]	

*** Refer immediately to comprehensive emergency obstetric facility (CEmONC/ CPA 2 or CPA3) if she has any reason for refer. Before referring, please provide first aid properly and check Gestational Age, Onset of labor (antepartum, intrapartum, postpartum).**

In Second Stage of Labor

4. Observe fetal condition	**Normal**	**Risk to be complicated ***
Listen Fetal Heart Rate	Every 5 min[1(p67)]	Every Interval of contraction [1(p88), 2(D14)]
5. Assess the delivery progress	**Normal**	**Risk to be complicated ***
Fetal Descent	Observe every pushing	
Uterine contraction (frequency, duration, strength)	Every 10 min[1(p67)]	
6. Observe maternal condition	**Normal**	**Risk to be complicated ***
Vital sign (Blood Pressure, Pulse, Body Temperature)	Every 5 min [7]	
Bleeding	Every 5 min	

*** Refer immediately to comprehensive emergency obstetric facility (CEmONC/ CPA 2 or CPA3) if she has any reason for refer. Before referring, please provide first aid properly and check Gestational Age, Onset of labor (antepartum, intrapartum, postpartum).**

Reference:

1. *Safe Motherhood Clinical Management National Protocol for health center* (2016) Ministry of Health, Kingdom of Cambodia
2. *Integrated Management of Pregnancy and Childbirth, Pregnancy, Childbirth, Postpartum and Newborn care: A guide for essential practice* (2015) WHO
3. *Midwifery Curriculum for Health Center* (2016) NMCHC
4. *Intrapartum core for health women and babies, Clinical* guidelines190 (2014) NICE
5. *Integrated Management of Pregnancy and Childbirth, Pregnancy, Managing Complications in Pregnancy and Childbirth: A guide for midwives and doctors* (2017) WHO
6. *Williams obstetrics* 24th edition (2014)
7. *Partograph Guideline for labor monitoring*

Annex 3

These inventories are necessary items for initial assessment and providing the necessary treatment.

Index	Inventory
1. Immediate response to emergency for pregnant women	
1-1. Level of consciousness	Magnesium sulphate 5g/10ml
	Normal Saline (for diluting)
	Normal Saline 1L (for infusion)
	25G scalp vein
	IV tubing (20 drops/1 ml)
	30ml syringe
	10ml syringe
1-2. Airway and breathing	Oxygen cylinder
	Oxygen mask or cannula
1-3. Signs of shock	Sphygmomanometer
	16G or 18G catheter
	Ringer's lactate or Normal Saline 1L
	IV tubing (20 drops/1 ml)
1-5. Fever	Thermometer
2. Listen to the woman's complaint	
2-2. Fluid leakage from vagina	Speculum (S/M)
	Ampicillin 1g (as sodium salt) in vial
	Gentamicin 80mg (as sulfate)/ml
3. Woman's general information and obstetrical history	
3-1. Gestational age at admission	Pregnancy wheel (calendar)
3-2. Fundal height	Tape measure
3-6. Height of woman	Stadiometer
3-7. Anemia	Hemocue
3-8. Infectious status – HIV/Syphilis	Rapid HIV test
	Rapid syphilis test
	Rapid HIV and syphilis test
4. Observe fetal condtion	
4-1-1. Fetal Heart Rate	Doppler
5. Assess the delivery progress	
5-2. Decide the stage of labour	Globes
5-3-1. Power (Uterine contraction)	Clock or list watch
6. Observe maternal condition	
6-1. Blood pressure	Sphygmomanometer
6-4. Body temperature	Thermometer
6-5. Urinalysis	Urine dipstick for proteinuria
6-6. Bleeding	Scale

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