

## NURSING CARE OF PREMATURE RUPTURE OF MEMBRANES IN PREGNANCY: ROY ADAPTATION MODEL

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### Abstract

Premature rupture of membranes (PROM) is a condition associated with spontaneous rupture of the amniotic membranes before any signs of the active labour. It increases the risk of complications on maternal and foetal health. In preventing various complications that would arise due to PROM, nurses should apply an appropriate nursing theories or models in developing the nursing care plan. Nursing theories and conceptual models are the nursing knowledge that organize nursing activities, and guide nurses in research, practice, education, and management. However, in Indonesia, nursing models have rarely been used by nurse practitioners and researchers including in the perinatal periods. The aim of this article was to determine the application of Roy's adaptation theory in the premature rupture of membranes cases. This study was a case study design. There were 5 pregnant women participate in this study. The results showed that the assessment based on the two adaptation model approaches applied in this study, six nursing diagnosis were identified, and all nursing care plan had implemented. The concept of adaptation was appropriate in helping patient with premature rupture of membranes. However, the social aspect related to the client's cultural practices were not describe clearly. Combining two or more theories in a nursing care plan would benefit to mothers and their babies' health and welfare.

**Keywords:** Nursing theories, Premature rupture of membranes, pregnancy, complications

### INTRODUCTION

Reducing maternal and infant mortality is the main target of health development worldwide including Indonesia. The 3rd target of the Sustainable Development Goals (SDGs) program is reducing the global maternal mortality ratio to less than 70 per 100,000 live births in 2030, preventing new-borns and children under 5 years of age deaths until 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births, and reducing one-third premature mortality on 2030 (World Health Organization, 2018). Maternal mortality rate (MMR) is one indicator of maternal health in a country. In Indonesia, the MMR is remained high, with 305 maternal deaths per 100,000 live births in 2015 (Kementerian Kesehatan Republik Indonesia, 2017). The maternal mortality causes occur throughout the perinatal periods: 22 completed weeks (154 days) of gestation and ends seven completed days

after birth. The perinatal period is a normal period for a woman, however it is a time of adaptation and change physically and psychologically for woman and husband who prepares for parenthood. This period is also a critical because health problems may arise during pregnancy, and would involve the mother's and the infant's health (Widiasih, Ermiami, & Setyawati, 2018).

The causes of maternal mortality in Indonesia include haemorrhage, preeclampsia, infection, prolonged labour, abortion, and other causes (Kementerian Kesehatan Republik Indonesia, 2015). Infection is one of the causes of maternal mortality that would occur during pregnancy, childbirth, or post-partum (Lowdermilk, Perry, & Cashion, 2010). In pregnancy, infection causes various health problems including abortion and premature rupture of membranes (PROM). PROM is the rupture of membranes that occur at preterm or term pregnancy, and before the onset of labour (Durham & Chapman, 2014; Johnson, 2016). Risk factors of premature rupture of membranes include low socioeconomic status, smokers, a history of sexually transmitted diseases, a history of preterm labour, vaginal bleeding, uterine distention because of abnormal amount of amniotic fluid or poly-hydramnios, and multiple gestations, and a specific procedure such as amniocentesis (Lowdermilk et al., 2010)

PROM cases in the perinatal period are reported by studies worldwide. Sirak and Mesfin (2014)'s study found that the prevalence of preterm premature rupture of membranes was 1.4%. Intra-amniotic infection (31.5%) was the most common maternal complication. The mean of rupture of membranes to delivery (the latent period) was 6.6 days. Twenty-six (23.2%) neonates were delivered by surgery, and 12 perinatal deaths. Another study revealed that 12% of all births in the United States were preterm deliveries, and it was the main factor that contributes to perinatal morbidity and mortality ("Practice bulletins No. 139: premature rupture of membranes," 2013). In Indonesia, several studies reported that the premature membrane rupture cases are increased every year (Iswati, 2017; Rahayu & Sari, 2017)

Various studies revealed that premature rupture of membranes causes various complications to mothers and fetal. The percentage of premature complications rupture of membranes include preterm labour within one week (50-70%), chorioamnionitis (13-60%), and placental abruption (4-12%), fetus respiratory distress syndrome (35%), cord compression (32-76%), and antepartum death (1-2%) (Medina, 2002). Suwiyoga and

Raka (2000) stated that there was a significant relationship between chorioamnionitis, length of rupture of membranes, and frequency of examination in the incidence of early neonatal sepsis.

Various physical and psychological changes should be adapted by the mother immediately when she has been diagnosed by premature rupture of membranes. Physical changes include sudden gush of fluid from the vagina, early uterus contractions, and an insufficient gestational age. These physical conditions would be affected the psychological condition of the mother, such as anxiety related to the safety of her baby and various types of equipment for fetal observations, fear of losing a baby, and also related to the hospital cost. The high risk in fetus includes the umbilical compression cord means oxygenation problems, fetal distress, infections, fetal growth and development problems, and premature baby (Lowdermilk et al., 2010).

Pregnancy conditions are risky both physically and psychologically due to the PROM. Maternity nurses and other health professionals have responsibilities to anticipate various problems. Performing an appropriate and effective nursing care would help mothers and foetus in the period of PROM. Applying theories and nursing models in the nursing care plan that appropriate to mothers' needs are considered to minimize or prevent various complications that can arise due to premature rupture of membranes. It is expected that mothers can adapt and have adaptive coping in dealing with the stressor. Nursing theories and conceptual models already tested by multiple research methods. Nursing theories and conceptual models are the nursing knowledge that guides nursing activities, research, practices, education, and management (Fawcett, 2005). However, in Indonesia, nursing models have rarely been used by nurse practitioners and researchers. The aim of this study was to determine the application of Roy's adaptation theory in the premature rupture of membranes cases.

## **METHODS**

This case study involved 5 pregnant women who were diagnosed with the premature rupture of membranes in a national referral hospital. The case study is a research design with an intensive and detail approach focused on certain cases. The stages in this study applied 5 steps of nursing care including assessment, nursing diagnosis, nursing care plans, implementations, and evaluation. The guidelines for the nursing care

development was Roy's adaptation theory. The assessment divided into two stages, the first stage included physiological assessment, role function, self-concept, and interdependence. The second stage consists of the focal examination, contextual and residual stimuli. And then creating a nursing diagnosis, action plans, and applying nursing actions, and evaluations.

## RESULTS

This section presents the results of the application of Roy's adaptation theory in 5 cases of pregnant women with PROM including the characteristic of respondents, assessment stages, nursing diagnosis, interventions, implementations, and evaluation.

**Table 1 Characteristics of Respondents**

No	Characteristics	Participants				
		A	B	C	D	E
1	Age	21 years	20 years	25 years	26 years	25 years
2	Parity	G1P0A0	G1P1A0	G1P0A0	G1P0A0	G1P0A1
3	Education	Junior High School	Junior High School	University	Senior High School	Junior High School
4	Work	housewife	housewife	housewife	housewife	housewife
5	contraction	√	√	√	√	√
6	Fetal heart rate	150x/ minute	148 /minute	146 x/ minute	148 x/ minute	146 x/ minute
7	Index of amniotic fluid (ICA)	2	10	3	6	5
8	Ruptured membranes	(+)	(+)	(+)	(+)	(+)
9	CTG	Reactive	Reactive	Reactive	Reactive	Reactive
10	Health insurance	Subsidy	Subsidy	Private	Subsidy	Subsidy

Table 1 presents that all participants were primiparas, they attended various level of education, housewives, and had health insurances subsidy from the government. Respondents had premature rupture of membranes (n=5), the majority of them were oligo-hydramnion with ICA index less than 6, only one woman with the normal amount of amniotic fluid.

### *Assessment*

The first stage of assessment

#### **Physiological adaptation**

**Oxygenation:** During the assessment, none of mother and fetus had oxygenation problems, vital signs were within normal baselines: respiratory rates, pulse, blood pressure, temperatures. Respiration does not experience difficulties, regular rhythms, no Ronchi, wheezing, stridor, crackles, good reflexes, no secretions, no cyanosis. Palpation: TFU as the gestational age, no signs of labour, foetal heart rates 120-160 times/minutes. NST: Reactive Fetus, Ultrasound: Fetus is a single, head presentation

**Nutrition:** A good appetite, no nausea and vomiting, and all women experience a weight gain of 8-15 kg

Elimination: Defecation 1x a day, Urination: 5-6 times a day, do not feel sore, or hot when urinate. All clients complained sudden gush of fluid from the vagina.

Activity and Rest: There was not a problem with activities during pregnancy, including doing household tasks. Sometimes they feel tired, sleep and rest on average 6-8 hours per day. Since last week, patients felt uncomfortable, because of the amniotic fluid, and when they hospitalized they were difficult to sleep because of uterus contractions.

**Protection and sense:** good personal hygiene, sweaty, and moist skin. The client looks weak, the amniotic fluid (+), positive fluorine, irregular positive contraction, ICA 2-10, Oligohydramnion.-normal The baby's movements were positive

**Fluid and electrolytes:** There were no signs of dehydration. Laboratory test results of Hb 8.6, Ht 26, Leukocytes 14,800 Platelets 277,000. Intra vena infusion was lactated Ringer's fluid

**The function of neurology:** compos mentis, no nervous system disorder. Abdomen contraction Positive and normal patellar reflexes

**The function of endocrine:** Good mental status, there is no disruption of hormonal settings such as irritability. Blood sugar normal, approximately 90 mg/dl

#### **Self Esteem**

In the beginning, the majority of women felt the amniotic fluid was a normal sign, but after observation for a day, the fluid was not stopped, then they shared with the family.

They went to a health service, because abdomen contraction, and the output is getting worse. Actually, all participants are happy with their pregnancy, hence they confused with this condition. Participants and families were worried about the condition of the fetus. Currently, they surrender everything to God, but they expected everything will be fine for mother and fetal.

### **Adaptation of women's roles**

During pregnancy, women said they did their roles normally as a wife, mother, or partner. They did household tasks, took care of children, and accompanied the husband. Being hospitalized changed their roles, however, their family and husbands provide full support to them.

### **Adaptation of Interdependency**

Relationships among wives, husbands, families and other people are good. The families are cooperative and active to communicate with health professionals about patients' conditions.

The second stage of assessment

### **The focal stimuli**

Uterus contractions and the amniotic fluid. Fetal movements (+), they asked about baby delivery methods: spontaneous or surgery. Feeling confused, anxious, because limited information about their condition from health workers. Family and husband also felt the same with pregnant women.

### **The contextual stimuli**

The gestational age and estimated births were different because of PROM, there were signs of onset labour, positive irregular contractions, fetal heart rates 120-160 x / min, vaginal observations: running water, smell a characteristic odor of amniotic, no a foul odor, clear NST: Reactive, had a chance at tachycardia, USG: ICA 2-10, headaches, bladder full, vital signs were normal, there were no signs of infection, the blood leukocyte was higher than the normal amount, and HB below baselines.

**The residual stimuli**

Their pregnancy was good and going well. This vaginal discharge was the first experience. All participants were primigravidas, they mostly had limited experience of PROM.

*Nursing Diagnosis and Interventions*

No	Adaptation aspects	Nursing Diagnosis	Nursing Care Plan
1	<b>Physiological adaptation</b>	(1) A high risk of infection  (2) A high risk of changes in tissue perfusion	Monitor maternal vital signs: increasing in body's temperature or pulse indicate infection, Routine blood monitor: increasing the leukocyte values more than 18,000 indicates an infection, Observation of smell and purulence of amniotic fluid, Observation of output of other vaginal fluids: purulence or unpleasant odor indicates infection, Monitor Fetus: observation of tachycardia, Monitor uterine activity: contraction, Palpation of the abdomen to assess uterine hardness, Avoid vaginal examination, Collaboration and record antibiotic administration  Bed rest, monitor fetal heart rates every 4 hours. Perform NST continuously every 4 hours. Evaluating fetal position with Leopold. Positioning the Trendelenburg for patients to reduce the risk of prolapse. Observation of possible compression: decelerations usually appear on NST results. signs of prolapse

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			of the umbilical cord, pulmonary therapy, lung maturation, and tocolysis, monitor maternal vital signs, helping in fulfilling client's basic needs
2	<b>Self-esteem</b>	Anxiety	Providing sufficient information to clients' needs. Provide comfort measures such as preparing an underpad, to improve comfort as well as to observing the amount of fluid, involving the family in nursing care, providing flexible visit hour adequate rest and improves relaxation.
3	<b>Adaptation of women's roles</b>	Anticipation of grieving	Providing sufficient information to patients about premature rupture of membranes, discussing growth and development and focus on the current gestational age, explaining the possibility of intensive care in infants, such as the NICU room to prepare clients or families for an intensive care environment, involving clients in care planning and decision making, Encouraging patients to verbally express what is being felt at this time, Identification of coping mechanisms that useful to help during stressful conditions
4	<b>Adaptation of Interdependency</b>	Activity limitations	Assessing patients, partners, and family's feeling about this situations, Identification of the support system, such as family, friends or other relatives who would help clients adjust to the situation,

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		Encourage clients, couples express feelings including prior events or current events, Discuss normal feelings of sadness or grieving because feelings of role failure often and can have a negative impact. Review information about events and discuss possibilities for future pregnancies.
5	Learning needs	Explain the physiological anatomy of the amniotic membrane and its function, discuss the danger signs in pregnancy, involve the family in the discussion, and make sure that the family understands the dangerous conditions that are happening to the mother, discuss the risks of complications and treatment to be done: the possibility of infection, explain that the baby and mother will be monitored continuously: heart rates and NST, or maybe ultrasound, Explain about the possible ways of delivery, such as labour spontaneous or surgery, Explain the signs of labour, and Explain the preparation of labour

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### ***Implementation and Evaluation***

The Nursing Care Plan (NCP) has developed and implemented for 3-5 days. 4 out of 5 participants were deliver their baby earlier than the estimation date, it because of the fetal health was getting worse. There was no indication of occurrence complications of the mother, such as infections. Mother and family have understood risks conditions of PROM including daily normal movement of foetus, and sign and symptoms of labour. One of five foetuses passed away after vital signs continued to decline.

## **DISCUSSION**

The characteristic of participants in this study varied. The ages ranged from 20-26 years, a minimum level of education was junior high school and a maximum was Bachelor, most of whom come from the low economy level as 4 out of 5 obtained the health insurance subsidy from the Indonesian government. Socio-economic conditions are identified as an influencing factor of premature rupture of membranes. Although the exact causes of PROM are not clearly find yet, the decrease in antibacterial activity in amniotic fluid in low socioeconomic groups is possible to be one of the PROM causes (Hackenhaar, Albernaz, & da Fonseca, 2014).

The five pregnant women visited the hospital because of some symptoms including sudden gush of fluid from the vagina, contractions, heavy or foul-smelling vaginal discharge, and the colour of the vaginal discharge. The signs above were signs and symptoms of the occurrence of premature rupture of membranes. The ultrasound examinations or observing output through inspection were actions to confirm the diagnosis of PROM. Observation and examination of the characteristics of amniotic fluid were important to the client. The colour of amniotic fluid describes the condition of the foetus and mother, such as the greenish-brown means a sign that the foetus has experienced a hypoxic episode, yellowish amniotic fluid illustrated that hypoxia foetus over 36 hours, wine-red amniotic fluid means the placenta has been damaged, and amniotic fluid mixed with meconium can be used to describe the incidence of prolonged labour or the breech presentation (Durham & Chapman, 2014).

The gestational age of participants varied: 3 cases between 32-36 weeks, the most risk complication in this age was the occurrence of chorioamnionitis. The incidence of chorioamnionitis was around 4.2% - 10.5% of PROM cases. Furthermore, 1 participant had 32 weeks of the foetus. The foetus had a risk of a syndrome of respiratory distress, the client should be hospitalized, foetus monitoring (NST), administering tocolytic to prolong the latent period, surfactant treatments, and antibiotic (Kenyon , Boulvain, & Neilson, 2013; Kwak et al., 2013). Preterm labour is a risky situation because it may be increased perinatal mortality by 65% -75%, it also associated with low birth weight, neonatal infection, and mortality (Malloy, 2013)

Each participant had a history of vaginal discharge during pregnancy and increased the blood leukocytes. In the PROM, microorganisms from the vagina would rise into the amniotic sacs and fluid, and placenta. The infection would be detected by observation of the leukocytes or white blood cells in the blood. In pregnant women, the number of leukocytes increased more than 18,000 thousand, it indicates an infection (Mattson & Smith, 2011). There was two fetus detected with fetal distress in this study. After 3 days observation, the fetal distress signs were detected, including irregular fetal heartrates, tachycardia and bradycardia, and non-stress test results appearing of deceleration. Health professionals decided an immediate termination of pregnancy by section caesarian. The termination of pregnancy can be done by labour induction, or cesarean section depending on the condition of the fetus.

The Roy's Concept Model assessed the physiological function adaptation including oxygenation: There was 2 fetuses experienced respiratory fetal distress, after 3 days of treatment, nutrition: participants' current appetite was good compared the first trimester. Adapting the function of self-concept, participants and family confused with this situation. They were felt anxious about the condition of the baby, and fear of losing the baby. Psychological conditions of pregnant women who experience premature rupture of membranes include anxiety, fear of losing a baby, feeling unprepared for childbirth, feeling sad, showing facial expressions of fear, difficulty communicating, showing various coping mechanisms (Mattson & Smith, 2011). Those psychological conditions had occurred in all respondents and their families.

Nursing diagnosis is formulated by observing the client's behavior towards environmental influences, sign, and symptoms, and also the existing theories. Nursing care plan (NCP) has developed based on client' needs, theories, and their ability in adaptation. This NCP aimed to help clients in adapting their changes related to PROM including physiological, psychological, functional roles and interdependencies during healthy or sick (Tomey, 2006). The majority of the NCP was implemented. Evaluation, the state goals in the NCP were achieved. Participants had been able to adapt well to this health issue conditions.

## CONCLUSION

The concept of adaptation was very appropriate to be applied to clients with premature rupture of membranes. In the PROM, the amniotic condition that suddenly breaks prematurely is a high stressor for mother, family, and the foetus physically and psychologically. The nurse would help participants, family, and community to adapt to these drastic changes. In Roy's adaptation model, the social aspects related to the client's lack of practice culture were not described clearly. There is needs to develop the practical nursing care plans that combined two or more theories in improving nursing care for primigravida with premature rupture of membranes.

Promoting and improving mothers and infant's welfare is important in the premature rupture of membranes cases. Nurses as the frontline of health services should develop an affective nursing care plans by combining nursing theories as guidelines in helping patients and families to deal with their health issues including PROM.

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