Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 57 Issue: 11:2024
DOI: 10.5281/zenodo.14207838

IMPACT OF APPLYING QUEENSLAND CLINICAL GUIDELINES ON MATERNAL OUTCOMES AMONG WOMEN WITH PRETERM PRELABOUR RUPTURE OF MEMBRANES

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Abstract

Background: Preterm prelabour rupture of membranes (PPROM) is the spontaneous rupture of fetal membranes before 37 weeks of gestation but also before the onset of labor. PPROM can lead to significant maternal complications such as placental abruption, operative delivery, chorioamnionitis, primary postpartum haemorrhage, and puerperal infections. Therefore, the aim of this study is to examine the impact of applying Queensland Clinical Guidelines during the period of expectant management on maternal outcomes among women with preterm prelabour rupture of membranes. Design: A quasi-experimental design (Nonequivalent control group posttest- only design) was adopted. The study was conducted at inpatient department of antenatal care in El-Galaa Teaching Hospital, which is a governmental hospital affiliated to the General Organization for Teaching Hospitals & Institutions- Egyptian Ministry of Health and Population, Cairo. Sample: A total of 110 pregnant women having PPROM were recruited, a control group of 55 women were followed up first, and then 55 women of study group were enrolled to intervention. Tools: (A) Structured interview schedule; (B) Monitoring and follow up tool for PPROM based on Queensland Clinical Guidelines; and (C) Evaluation of pregnancy outcomes tool. Results: Initial assessment revealed no significant difference between the study and control groups in mean gestational age (p=0.602), amount of amniotic fluid (p=0.567), vital signs, WBCS count, and amniotic fluid color and odor. The rate of chorioamnionitis and emergency CS was lower among the study group than the control group with a significant difference between the two groups (p= 0.007& p= 0.004 respectively). The mean GA at delivery and latency period was higher among the study group than the control group with a significant difference between the two groups (p = 0.002, p = 0.021 respectively). Incidence of postpartum hemorrhage was 0:3 in the study group versus control group; also, puerperal sepsis was 0: 5 in the study group versus control group. Conclusion: Application of queensland clinical guidelines for women with PPROM that includes advise about: the risk of infection and how to prevent it, when to seek care from a health care professional, and the risk of cord prolapse and emergency management if occurs had a significant effect on reducing maternal complications (such as chorioamnionitis, emergency caesarean section delivery, primary post-partum hemorrhage, and puerperal sepsis). Recommendations: Integrating queensland clinical guidelines for PPROM as a main part of antenatal guidelines for care of women with PPROM.

Keywords: Preterm Prelabour Rupture of Membranes (PPROM), Queensland Clinical Guidelines, Maternal Outcomes.

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1. INTRODUCTION

Preterm prelabour rupture of membranes (PPROM) is the spontaneous rupture of the membranes before 37 weeks' gestation, and where there is at least an hour between membrane rupture and the onset of contractions [1]. It is further classified by gestational age: mid-trimester PPROM (before 24 weeks), early PPROM (24 to 34 weeks), and near-term PPROM (34 to 37 weeks). The magnitude of PPROM varies in different countries and populations. It affects 3–4.5% of pregnancies globally and is responsible for approximately one-third of all preterm births [2]. Evidences also discovered that PPROM accounts 13.7% in Ethiopia, 7.5 % in Uganda, 5.3% in Egypt, 3.3% in Nigeria, and 3.1% in Brazil [3].

PPROM arises from complex pathophysiological pathways that include inflammation and oxidative stress. Although many factors can increase the risk of PPROM, its cause is not fully understood [4], [5]. Among the socio-behavioral and demographic risk factors of PPROM are poor socio-economic status and low level of education, smoking, difficult working conditions, and African ethnicity. Other factors have been proposed, such as maternal age and increased or decreased body mass index (BMI) [6]. Other factors, such as nulliparity, the interval between pregnancies (<6 or >60 months), genital infections, and polyhydramnios, have also been reported [7].

The importance of the PPROM is given by the fact that it is the main cause of infant morbidity and mortality [8]. It may result in immediate risks such as cord prolapse, cord compression and placental abruption; and later problems such as maternal or neonatal infection, as well as the use of interventions including induction of labour, caesarean section and instrumental vaginal delivery. It is estimated that one-half of women with PPROM will go into labour within a week and three-quarters within a fortnight [9].

Prolonged rupture of membranes with lack of amniotic fluid around the fetus may have an impact on maternal outcomes. Mothers are at increased risk of placental abruption as well as postpartum infection. Maternal infection during pregnancy, chorioamnionitis, may lead to serious complications in newborns, including cerebral palsy and septicaemia [2]. It may be that managing PPROM expectantly by awaiting the spontaneous onset of labour increases the risk to the fetus of these complications. In particular prolonged exposure to intrauterine infection is of major concern for the neonate [9].

A recent practice bulletin from the American College of Obstetricians and Gynecologists (ACOG) supported the expectant management of viable PPROM, extending the suggested gestational age for delivery from 34 to 36 weeks and 6 days in a setting of shared decision-making with the patient [10]. A further prolongation of the pregnancy can expose the mother and the neonates to severe outcomes such as neonatal death and poor maternal outcomes, especially chorioamnionitis [1].

Queensland Clinical Guidelines, [11] recommended that Self-care advice should be given to women who complain of PPROM, which includes Advise about the risk of infection and the importance of: Personal hygiene—change sanitary pad every four hours (or more frequently), wiping front to back after toileting, showering in preference to baths, Self-

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monitoring temperature daily and vaginal loss with each pad changed and Avoiding tampon use, vaginal creams/medications, vaginal intercourse, swimming/baths. Also, advise to seek care from a health care professional if: Concern about fetal movements, Changes in vaginal discharge (colour, odour, amount, presence of bleeding or meconium), Signs of early labour/abdominal tenderness or pain, Temperature 37.5 °C or above and Feeling unwell or other concerns.

Most of the studies have been conducted to investigate the effect of a specific type of medical treatment on the outcome of PPROM or compare expectant management in PPROM, versus immediate birth. Example, Bond, et al, [9] conducted a systematic review about planned early birth versus expectant management for women with preterm prelabour rupture of membranes prior to 37 weeks' gestation for improving pregnancy outcome. There are a scarce studies that have tested the impact of applying clinical guideline based Follow up which start from the occurrence of PPROM and continuing until delivery in order to maximize the benefits of further fetal maturity while avoiding the potential harms to the mother and her baby. Therefore, the aim of this study is to examine the impact of applying Queensland Clinical Guidelines during the period of expectant management on maternal outcomes among women with preterm prelabour rupture of membranes.

1.1 Significance of the study

The burden of PPROM ranges from maternal and neonatal mortality and morbidity to countrywide economic loss due to drug expense, hospitalization, absenteeism from the work, and expense to the health professionals. PPROM leads to significant maternal complications such as puerperal infections, disseminated intravascular coagulopathy, placental abruption, operative delivery, chorioamnionitis, and psychological and lactation problems [13].

The aim of planned expectant management is to maximize the benefits of further fetal maturity while avoiding the potential harms of remaining in utero. It involves observation of the mother and fetus for early signs of fetal or maternal infection while awaiting the spontaneous onset of labour [9]. Despite the benefits from the expectant management, there is no potential evidence to support the impact of applying queensland clinical guidelines for those women during the latency period in order to minimizing the potential complication from PPROM. So, the results of this study will add to the quality of evidence on the impact of applying Queensland Clinical Guidelines during the period of expectant management on maternal outcomes among women with preterm prelabour rupture of membranes.

1.2 Operational definitions

Chorioamnionitis: is an acute inflammation of the amnion and chorion of the placenta, It was diagnosed by the presence of maternal fever (temperature ≥37.5°C) plus two or more of the five following clinical signs: maternal tachycardia (heart rate >100 beats/min), fetal tachycardia (heart rate >160 beats/min), uterine tenderness, purulent or foul-smelling amniotic fluid or vaginal discharge, and increased maternal inflammatory markers without

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any other cause (CRP > 10 mg/L or elevation of white blood cell count > 15000 / µL).

Preterm prelabour rupture of membranes: is the spontaneous rupture of fetal membranes before 37 weeks of gestation but also before the onset of labor. It was diagnosed by a sterile speculum examination in a patient complaining of "watery vaginal discharge" and ultrasound to evaluate amniotic fluid index.

2. METHODS

2.1 Aim

The aim of the current study was to examine the impact of applying Queensland Clinical Guidelines during the period of expectant management on maternal outcomes among women with preterm prelabour rupture of membranes. To achieve the aim of the current study the following research hypothesis was formulated:

Women with preterm prelabour rupture of membranes who followed intervention using queensland clinical guidelines will have lower maternal complications (such as chorioamnionitis, caesarean section delivery, primary post-partum hemorrhage, puerperal sepsis) than those who receive the routine hospital care.

2.2 Design

A quasi-experimental design (Nonequivalent control group posttest- only design) was used to fulfill the aim of study. In this study, the investigator collected data from the control group first then the study group.

2.3 Setting

The study was conducted at inpatient department of antenatal care in El-Galaa Teaching Hospital, which is a governmental hospital affiliated to the General Organization for Teaching Hospitals & Institutions- Egyptian Ministry of Health and Population, Cairo.

2.4 Participants

A purposive sample of 110 pregnant women having PPROM was recruited for this study. A control group of 55 women were followed up first, then 55 women of study group were enrolled to intervention. Inclusion criteria were; pregnant women with PPROM and have no signs or symptoms of infection by lab investigation (e.g elevated WBCs) and no symptoms of clinical chorioamnionitis (e.g lower abdominal pain, abnormal vaginal discharge, fever, malaise and reduced fetal movements), have a single, viable over 30 weeks of gestation fetus, women’s age not exceeding 40 years, can read and write, body mass index (BMI) within normal 18.5-24.9 kg/m2 or overweight 25-29.9 kg/m2, not more than Para 3, free from any high risk condition which may be affecting the pregnancy outcomes (e.g., diabetes mellitus or hypertension).

2.5 Data Collection Tools

Three tools were used to collect the necessary data: I) Structured interview schedule; II) Monitoring and follow up tool for PPROM based on Queensland Clinical Guidelines; and

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III) Evaluation of pregnancy outcomes tool. The 3 tools were designed by the investigator and revised by 3 experts in maternity and newborn health nursing department.

Tool (I) Structured Interview Schedule: This tool included four sections:

The first section (socio-demographic data): included five items to assess women's demographic data such as age, residence, educational level, BMI, occupation.

The second section (obstetric history): included seven items to assess women's past obstetric history such as TPAL, Inter-pregnancy interval, is there a previous PPROM, GA at time of PPROM, latency period, maternal complications as a result of the PPROM, fetal and neonatal complications.

The third section (current obstetric profile): included three items to assess women's current obstetric history (e.g., last menstrual period, expected date of delivery, gestational age).

The fourth section (assessment of PPROM): included seven items to exclude the presence of infection from the PPROM (e.g., GA at time of PPROM, assessment of amniotic fluid for color, odor, amount, presence of blood and presence of meconium, measurement of vital signs, fetal heart rate, white blood cell count, and check if the woman take medications such as antibiotics and corticosteroids).

Tool (II) Queensland Clinical Guidelines for Monitoring and follow up of PPROM:

Queensland Clinical Guidelines, (2022): Included advice about risk of cord prolapse and emergency management if occurs, advice about the risk of infection and the importance of: Personal hygiene—change sanitary pad every four hours (or more frequently), wiping front to back after toileting, showering in preference to baths, Self-monitoring temperature daily and vaginal loss with each pad changed and Avoiding tampon use, vaginal creams/medications, vaginal intercourse, swimming/baths. Also, advice to seek care from a health care professional if: Concern about fetal movements, Changes in vaginal discharge (colour, odour, amount, presence of bleeding or meconium), Signs of early labour/abdominal tenderness or pain, Temperature 37.5 °C or above and Feeling unwell or other concerns.

This tool was designed based on the Queensland Clinical Guidelines and included five items related to daily self-monitoring of any complications from PPROM that require going to the hospital (e.g; elevation of body temperature >37.5C, decreased fetal movement, cord prolapse, Changes in vaginal discharge, and Signs of early labour/abdominal tenderness or pain.

Tool (III) Maternal outcomes tool: This tool was designed by investigator based on review of literature about maternal outcomes of PPROM and included three sections:

The first section: included six items to assess the outcomes of PPROM during the antenatal period such as "Did any complications occur during pregnancy?", maternal complications. In case of chorioamnionitis, signs and symptoms of chorioamnionitis, duration between PPROM and chorioamnionitis, length of stay in the hospital as a result

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of chorioamnionitis. The second section: included four items to assess the outcomes of PPROM during delivery (e.g; GA at delivery, type of delivery, In the case of an emergency caesarean section, what is the reason?).

The third section: included five items to assess the maternal outcomes of PPROM during postpartum period such as postpartum hemorrhage, puerperal sepsis, maternal death, admission to the intensive care unit, and Days of postnatal hospitalization due to post-partum complications.

2.6 Validity and Reliability

Unstandardized tools were submitted to three experts in the field of maternity nursing to test content validity, clarity of sentences, and appropriateness of content. Modifications were carried out according to the expert's judgment before seeking the approval of the ethical committee while reliability of the study tools were tested by using Cronbach's α (alpha); the calculated reliability score was 0.91.

2.7 Procedure

First, the primary official permission was obtained from the research ethics committee of the Faculty of Nursing at Cairo University to approve the tools and the study. An official letter was sent to the administrative authorities of El-Galaa Teaching Hospital and the General Organization for Teaching Hospitals & Institutions- Egyptian Ministry of Health and Population to grant approval for conducting the present study. Data were collected during all days of the week, over a period of six months, beginning in October 2023 and ending in March 2024. The researcher spent between three and four hours with each case in order to collect the data for the present study.

Women who met the eligibility criteria were recruited either to study or control, as the control group was taken at the beginning followed by the study group. The aim of study was explained to the women in both groups (study & control group) to gain their acceptance to participate in the study then data related to socio-demographic status and obstetric history were collected from both groups.

For control group, Initial assessment for women was carried out in relation to body mass index (BMI), obstetric history such as (TPAL), presence of a previous PPROM and its complications), last menstrual period, expected date of delivery, current gestational age (GA), and GA at time of PPROM. Also, the necessary data were taken to exclude the presence of infection as a result of PPROM such as (assessment of amniotic fluid for (color, odor, amount, presence of blood, presence of meconium), Measurement of vital signs, assessment of fetal heart rate, White blood cell count, and check if the woman took medications such as antibiotics and corticosteroids). This assessment took about 20-30 minutes for each woman. The control group received only routine hospital care that include antibiotic (Biomox) 500 mg tablet every 8 hours for one week, feroglobin tablet once daily, calcium tablet once daily and follow-up in the hospital every week. Also, before discharge from hospital the investigator took data from the woman and performed the required lab investigations to rule out the presence of infection as previously explained

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and gave her the follow-up sheet to record daily if or not the following occur: high temperature 37.5C or more, decreased in fetal movement, cord prolapse, Changes in vaginal loss (colour, odour, amount, new bleeding or meconium), Signs of early labour/abdominal tenderness or pain. For study group, Initial assessment for women was carried out in relation to body mass index (BMI), obstetric history such as (TPAL), presence of a previous PPROM and its complications), last menstrual period, expected date of delivery, current gestational age (GA), and GA at time of PPROM. Also, the necessary data were taken to exclude the presence of infection as a result of PPROM such as (assessment of amniotic fluid for (color, odor, amount, presence of blood, presence of meconium), Measurement of vital signs, assessment of fetal heart rate, White blood cell count, and check if the woman took medications such as antibiotics and corticosteroids). This assessment took about 20-30 minutes for each woman.

Then the investigator gave the intervention for the study group: the investigator provided a clear and concise information for each woman through oral and written instructions (by using a booklet) based on Queensland Clinical Guidelines about the following; 1) Advise about risk of cord prolapse and emergency management if occurs, 2) Advise about the risk of infection and how to reduce it through, Personal hygiene—change sanitary pad every four hours (or more frequently), wipe front to back after toileting, shower in preference to baths, Self-monitor temperature daily and vaginal loss with each pad change, Avoid tampon use, vaginal creams/medications, vaginal intercourse, swimming/baths, Attend all review appointments, 3) Advise to seek care from a health care professional if: Concern about fetal movements, Changes in vaginal loss (colour, odour, amount, new bleeding or meconium), Signs of early labour/abdominal tenderness or pain, Temperature 37.5 °C or above, Feeling unwell or other concerns. This session took 30-40 minutes for each woman. Then, the woman was given a follow-up sheet to record daily if or not the following occur: high temperature 37.5C or more, decreased in fetal movement, cord prolapse, Changes in vaginal loss (colour, odour, amount, new bleeding or meconium), Signs of early labour/abdominal tenderness or pain.

After that, the investigator followed up the intervention and control group every week in El- Galaa teaching hospital, and also at home by telephone calls. Follow up by telephone call was done day by day to assess presence of any complications. Also, the investigator informed the woman if any complications occur, contact the investigator and go to the hospital, and the investigator went to the hospital and identify the complications that occurred. In case of the presence of any signs and symptoms of infection the investigator measures the temperature, pulse, white blood cells count, CRP, fetal heart rate, and check the amniotic fluid, as well as knowing whether there was signs of early labour/abdominal tenderness or pain. Then, the investigator followed up both groups after delivery; woman who delivered in El-Galaa teaching Hospital, the investigator went to woman to assess the labor and postpartum outcomes for her. But in the case of delivery of the woman in a place that was difficult to reach, the investigator followed her by telephone. Also, after the woman was discharged from the hospital, the investigator followed her for 6 weeks after delivery to identify any complications occurred during the postpartum period.

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2.8 Statistical Analysis

Statistical Package for the Social Science (SPSS) IBM v25 computer software package was used for statistical analysis of data, as it contains the test of significance given in the standard statistical books. Collected data was summarized and tabulated by using descriptive statistics. Parametric inferential statistics (T-test & Chi-square) were used to examine the differences between the study and control group.

3. RESULTS

3.1 Section1: Description of the Sample by Socio-Demographic Characteristics, and Assessment of PPROM

Table 1: ***Socio-Demographic Characteristics of Pregnant Women among the Study Group and the Control Group*** **(N= 110)**

Items	Study group (n=55)		Control group (n=55)		X^2	p-value
	N	%	N	%		
Age						
18-20	4	7.3%	8	14.5%	2.061	0.357
21- 30	38	69.1%	38	69.1%		
31- 40	13	23.6%	9	16.4%		
Mean± SD	27.073±5.058		26.127±4.702			
Education level						
Read &Write	8	14.5%	8	14.5%		
Primary School	0	0.0%	1	1.8%		
Preparatory School	22	40.0%	16	29.1%	4.161	0.385
Secondary School	15	27.3%	23	41.8%		
University School	10	18.2%	7	12.7%		
Occupation						
House wife	48	87.3%	46	83.6%	0.293	0.589
Working	7	12.7%	9	16.4%		
Residence						
Rural	19	34.5%	13	23.6%	1.587	0.208
Urban	36	65.5%	42	76.4%		
Degree of BMI						
Normal	10	18.2%	12	21.8%	0.227	0.634
Over weight	45	81.8%	43	78.2%		
Mean± SD	26.818±2.289		26.498±2.163			

*Significant at p-value <0.05.

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Table (1) describes the sample by their sociodemographic characteristics. Most of the women in the study and control groups, 69.1% were between 21 and 30 years old. The mean age of the study group was 27.073±5.058 years, as compared to 26.127±4.702 years among the control group, with no statistically significant differences between both groups (X^2 = 2.061, P = 0.357). Fourteen and a half percent of the study group and 14.5% of the control group can read and write only. Twenty seven point three percent of women in the study group, as compared with 41.8% in the control group, received secondary education, while 18.2% and 12.7% of women received university education in the study and control groups, respectively, with no statistically significant differences between both groups (X^2 =4.161, P= 0.385).

Majority of women in the study and control groups (87.3% & 83.6% respectively) were house wives and chi square test revealed that there was no statistical significant differences between both groups (X^2 = 0.293, P = 0.589). Majority of women in the study and control groups (65.5% & 76.4% respectively) lived in urban areas, with no statistical significant differences between groups (X^2 = 1.587, P= 0.208).

the mean body mass index (BMI) for the women in the study group was 26.818±2.289 as compared with 26.498±2.163 for the control group with no statistical significant differences between both groups (t=0.754, P=0.453). Moreover, 81.8% of the women in the study group compared with 78.2% of the control group were overweight, while 18.2% of the women in study group as compared with 21.8% of the control group had normal body weight, and chi square test showed no statistical significant differences between both groups (X^2 = 0.227, P=0.634).

The mean gestational age (GA) for the women in the study group was 33.057± 1.836 as compared with 32.867± 1.955 for the control group with no statistical significant differences between both groups (t= 0.523, P= 0.602).

Table 2: Distribution of the Pregnant Women among the Study Group and the Control Group in Relation to Assessment of Women at Time of PPROM (N= 110)

Items	Study group (n=55) x̄± SD	Control group (n=55) x̄± SD	t	p-value
GA at time of PPROM/ weeks	32.547±1.796	32.367± 1.919	0.508	0.613
Vital signs				
Temperature	36.818± 0.195	36.784± 0.186	0.949	0.345
Pulse	80.782± 5.206	82.055± 6.159	-1.170	0.244
Respiration	19.982±1.254	19.691±1.464	1.119	0.266
Systolic BP	113.909± 6.918	114.636±6.995	-0.548	0.585
Diastolic BP	72.091± 6.062	70.909± 5.781	1.046	0.298
White blood cell count	8.053± 1.335	8.580± 1.452	-1.983	0.050
Fetal heart rate	142.327±6.947	141.182±6.435	0.897	0.372

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This table shows that there was no statistically significant difference in mean GA at time of PPROM between the study and control groups (t = 0.508and P = 0.613). Also, there was no statistically significant difference between two groups at the time of the initial assessment in mean temperature (t = 0.949and P = 0.345), pulse (t = -1.170and P = 0.244), respiration (t = 1.119and P = 0.266), systolic BP(t = -0.548and P = 0.585) , diastolic BP (t = 1.046and P = 0.298), white blood cell count (t = -1.983and P = 0.050) and fetal heart rate (t = 0.897and P = 0.372).

Table 3: Distribution of the Pregnant Women among the Study Group and the Control Group in Relation to Assessment of PPROM (N= 110)

Item	Study group (n=55)		Control group (n=55)		X^2	p-value
	N	%	N	%		
Color						
Clear	55	100%	55	100%	-	-
Yellow	0	0.0%	0	0.0%		
Odor						
No odor	55	100%	55	100%	-	-
Offensive	0	0.0%	0	0.0%		
Amount						
normal >= 5cm	8	14.5%	6	10.9%	0.327	0.567
Oligohydramnios <5cm	47	85.5%	49	89.1%		
Presence of blood						
Yes	0	0.0%	0	0.0%	-	-
No	55	100%	55	100%		
presence of meconium						
Yes	0	0.0%	0	0.0%	-	-
No	55	100%	55	100%		
Woman take antibiotics						
Yes	55	100%	55	100%	-	-
No	0	0.0%	0	0.0%		
Woman take corticosteroids						
Yes	55	100%	54	98.2%	1.009	.315
No	0	0.0%	1	1.8%		

*Significant at p-value <0.05.

Table (3) shows that all of the women in the study group and control group had a clear amniotic fluid without offensive odor and without the presence of blood or meconium at the time of initial assessment. Also, 14.5% of women in the study group as compared with 10.9% in the control group had normal >= 5cm amount of amniotic fluid and (85.5% and 89.1%) of the study and control group respectively had Oligohydramnios <5cm, with no statistical significant differences between groups (X^2 = 0.190, P=0.663). All of the women in the study and control groups took antibiotic before discharge from the hospital. Also, (100% and 98.2%) of the study and control group respectively took corticosteroids before discharge from the hospital, with no statistical significant differences between groups (X^2 = 1.009, P= 0.315).

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3.2 Section II: Evaluation of maternal outcomes

A- Maternal outcomes of PPROM during the antenatal period:

Table 4: Distribution of the Pregnant Women among the Study Group after Intervention and the Control Group in Relation to Maternal Complications of PPROM during Pregnancy (N= 110)

Item	Study group (n=55)		Control group (n=55)		X^2	p-value
	N	%	N	%		
Maternal complications						
Yes	31	56.4%	45	81.8%	8.344	0.004
No	24	43.6%	10	18.2%		
If yes,						
Chorioamnionitis	7	12.7%	19	34.5%	7.253	0.007
Placenta abruption	2	3.6%	3	5.5%	.210	0.647
Anhydramnios	21	38.2%	31	56.4%	3.647	0.056
Cord prolapse	0	0%	0	0%		
Preterm contraction	15	27.3%	26	47.3%	4.705	0.030
Sudden gush fluid with preterm contraction	8	14.5%	22	40.0%	8.983	0.003

*Significant at p-value <0.05.

Table (4) shows that 56.4% of women in the study group and 81.8% of women in the control group had maternal complications during pregnancy with statistical significant differences between both groups (X^2 =8.344, P=0.004).

Only 12.7% of women in the study group, as compared with 34.5% in the control group had Chorioamnionitis with statistical significant differences between both groups (X^2 =7.253, 0.007). Also, 38.2% of women in the study group and 56.4% in the control group had Anhydramnios with statistical significant differences between both groups (X^2 =3.647, 0.056). Moreover, 27.3% of women in the study group, as compared with 47.3% in the control group had Preterm contraction with statistical significant differences between both groups (X^2 =4.705, 0.030). While only 3.6% of the study group and 5.5% in the control group had Placenta abruption, and no one in the study group and control group had cord prolapse.

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Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 57 Issue: 11:2024
DOI: 10.5281/zenodo.14207838

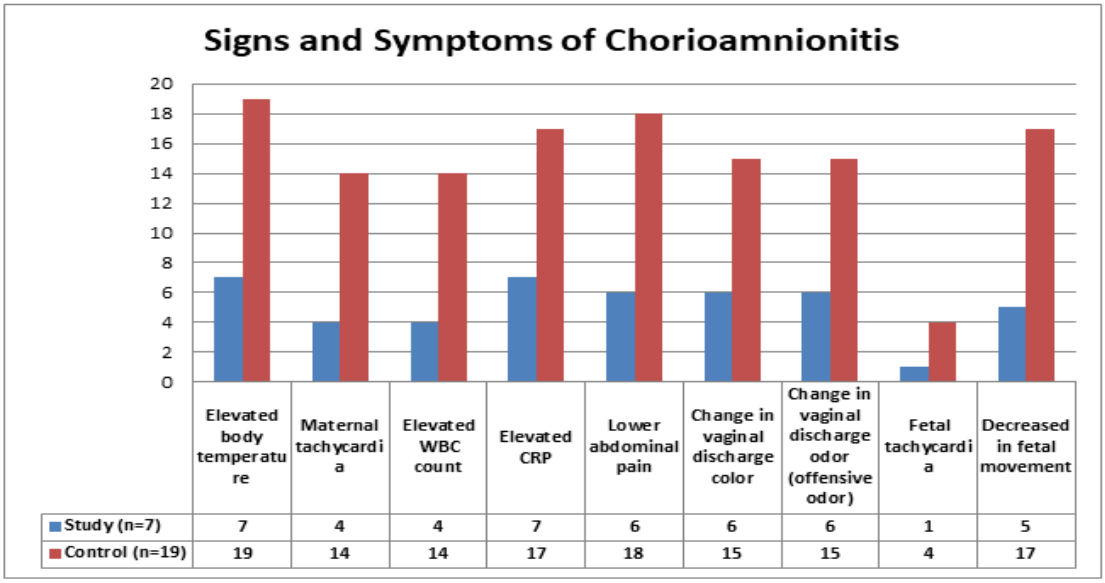

Figure1. **Comparison between the number of signs and symptoms of Chorioamnionitis among the study group after intervention (n=7) and control group (n= 19)**

Figure (1) shows that the clinical signs and symptoms of chorioamnionitis, all cases of chorioamnionitis in the study group and control group complained of elevated body temperature. Also, 4 women in the study group, as compared with 14 women in the control group had maternal tachycardia and 6 women in the study group, as compared with 18 women in the control group had a lower abdominal pain. Moreover, (6 and 15) women in the study and control group respectively had change in color of vaginal discharge and change in odor of vaginal discharge to offensive odor.

B- Maternal outcomes of PPROM during current delivery :

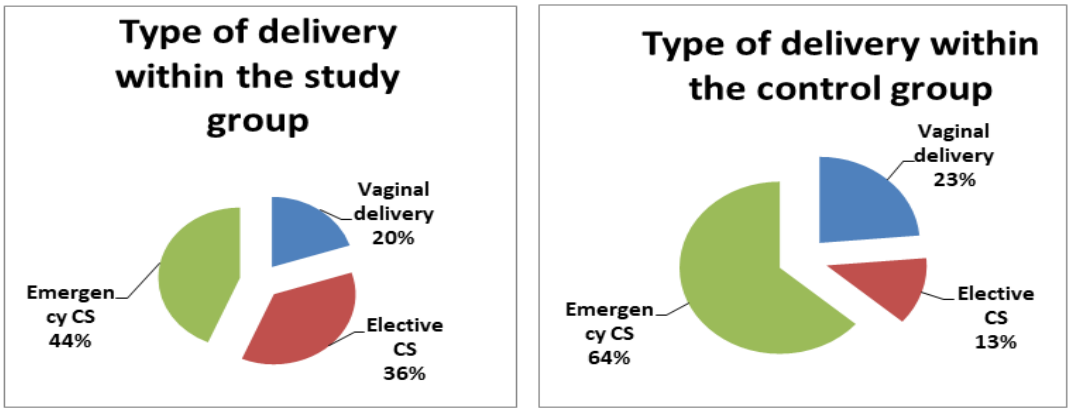

Figure2. **Comparison between the study and control groups in relation to type of delivery**

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Figure (2) shows that 20% of the women in the study group compared to 23.6% of the control group gave birth by vaginal delivery, and 80% in the study group compared to 76.4% of the control group gave birth by CS delivery, and the chi square test revealed no statistically significant differences between the two groups (X^2 =.213 and p =.644). However, there was a statistical significant differences in the type of CS delivery between both groups, as the rate of emergency CS in the study group was 44% compared to 64% in the control group (X^2 =*8.268*and p=0.004). Among the causes of emergency Cs is Chorioamnionitis, which occurred in 12.5% of the women in the study group, compared to 28.6% of the control group, and this is not the highest cause of emergency CS. Other causes include anhydramnios, fetal distress, preterm contraction, vaginal bleeding and placenta abruption.

C- Maternal outcomes of PPROM during post- partum period:

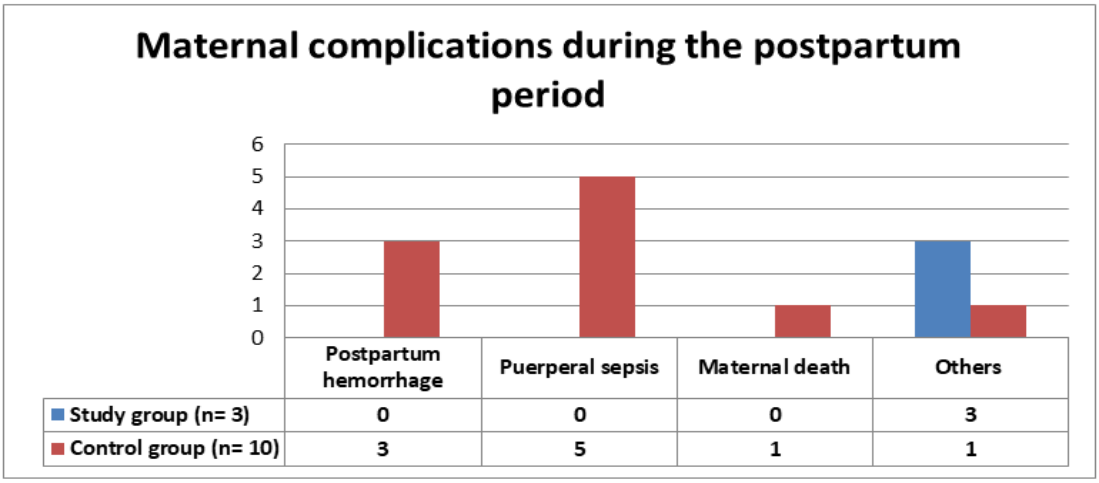

Figure3. Comparison between the study group (n= 3) and control group (n= 10) in relation to maternal complications during the postpartum period

Figure (3) shows that only 5.5% (3) of study group compared to 18.2% (10) of control group had maternal complications during the postpartum period. The highest cause of maternal complications during the postpartum period was puerperal sepsis; there were no women in the study group compared to 5 women in the control group who had a puerperal sepsis among these women 4 women within the Chorioamnionitis group. Also there were no women in the study group compared to 3 women in the control group who had a postpartum hemorrhage, and only one woman in the control group who died during the postpartum period due to pulmonary embolism.

4. DISCUSSION

This study aimed to examine the impact of applying Queensland Clinical Guidelines during the period of expectant management on maternal outcomes among women with preterm prelabour rupture of membranes. Queensland Clinical Guidelines for PPROM is composed of the following: 1) Advise about risk of cord prolapse and emergency

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management if occurs, 2) Advise about the risk of infection and how to reduce it through, personal hygiene, self-monitor temperature daily and vaginal loss with each pad change, Avoid tampon use, vaginal creams/medications, vaginal intercourse, swimming/baths, Attend all review appointments, 3) Advise to seek care from a health care professional if: Concern about fetal movements, Changes in vaginal loss (colour, odour, amount, new bleeding or meconium), Signs of early labour/abdominal tenderness or pain, Temperature 37.5 °C or above, Feeling unwell or other concerns. The study's findings supported the research hypothesis that women with preterm prelabour rupture of membranes who were followed up daily using queensland clinical guidelines during the period of expectant management had better maternal outcomes than those who received routine hospital care. The current study showed that women in the study group, who receive care using queensland clinical guidelines, had a marked decrease in the rate of chorioamnionitis than women in the control group who receive the routine hospital care (12.7%& 34.5% respectively), with a statistical significant difference between the two groups ($p<0.05$& $p<0.05$) respectively. These findings are supported by the results of a recent study entitled “planned domiciliary versus hospital care provided for women with premature rupture of membranes”. The study was conducted in Egypt on 100 women divided into two equal groups, who will undergo delivery following home or hospital care following PROM. The study revealed that the rate of chorioamnionitis within home care group was 12% [14].

Also, Zizzo, et al, [15] supported these findings in their study about Home management by remote self-monitoring in intermediate- and high-risk pregnancies: A retrospective study of 400 consecutive women. In their study, 85 singleton pregnancies complicated by preterm premature rupture of membranes (PPROM) were recruited. Remote self-monitoring was performed by pregnant women and included C-reactive protein, non-stress test by cardiotocography, temperature, blood pressure, heart rate, and a questionnaire concerning maternal and fetal wellbeing. The result of the study showed that the rate of chorioamnionitis was 16.1%. The study concluded that home-monitoring including remote self-monitoring of fetal and maternal well-being in intermediate- and high-risk pregnancies seems to be a safe alternative to inpatient or frequent outpatient care, which sets the stage for a new way of thinking.

Furthermore, these findings are consistent with those of, Sreedhar, Rathore, Benjamin, Gowri& Mathews, [16], who conducted a Retrospective cohort study to compare women with PPROM between 34 and 35 $^{+6}$ weeks, managed expectantly with women who were delivered immediately. The women managed expectantly were given broad-spectrum antibiotics for duration of 5 days, clinical features suggestive of chorioamnionitis were looked for twice daily in the antenatal ward. Results revealed that the rate of chorioamnionitis within the expectant management group was 10.7%.

This rate is close to the rate of chorioamnionitis in the study group of the current study, even though the researcher took women between 34 and 35 $^{+6}$ weeks, and in the current study, women were recruited between 30 and 36 $^{+6}$ weeks of gestation, also, women were admitted and close surveillance of the mother and fetus was ensured in the antenatal wards. The current study showed that women in the study group, who receive care using

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queensland clinical guidelines, had a marked decrease in the rate of emergency cesarean section than women in the control group who receive the routine hospital care, with a statistical significant difference between the two groups ($p<0.05$& $p<0.05$) respectively. These results are supported by a study entitled “Home management by remote self-monitoring in intermediate- and high-risk pregnancies: A retrospective study of 400 consecutive women”. The study revealed that the rate of emergency SC was 43.8% and this rate is the same as the rate of emergency CS in study group of the current study [15].

The current study showed that women in the study group, who receive care using queensland clinical guidelines, had a marked decrease in the postpartum complications such as, primary post-partum hemorrhage, and puerperal sepsis than women in the control group who receive the routine hospital care. These results are supported by with an early study entitled “perinatal outcomes of pregnancies with Preterm Premature Rupture of Membranes after 34 Weeks of Gestation”, a prospective case control study included 82 women comprised 41 with PPROM (group I) and 41 without ROM, at Zagazig University Hospitals. The study revealed that with appropriate care, the maternal risks of expectant management after 34 weeks of gestation are generally accepted to be minimal; there were three cases 4 (9.8%) cases with primary postpartum hemorrhage and 2 cases (4.9%) with puerperal sepsis after delivery [17]. All the previous studies were conducted to compare planned home care versus hospital care or to compare the expectant management versus immediate delivery for women with PPROM. No studies had examined the impact of applying Queensland Clinical Guidelines on maternal outcomes among women with PPROM. However, the current study declared that the application of Queensland Clinical Guidelines for PPROM had a positive effect on the maternal outcomes during antenatal, delivery and postpartum period. In conclusion, application of Queensland Clinical Guidelines for care of women with PPROM resulted in significant lower maternal complications.

5. CONCLUSION

It can be concluded from the current study that the Application of queensland clinical guidelines for women with PPROM that includes advise about: the risk of infection and how to prevent it, when to seek care from a health care professional, and the risk of cord prolapse and emergency management if occurs had a significant effect on reducing maternal complications (such as chorioamnionitis, emergency caesarean section delivery, primary post-partum hemorrhage, and puerperal sepsis).

6. RECOMMENDATIONS

Based on the findings of this study, the following are recommended:

1) Integrating queensland clinical guidelines for PPROM as a main part of antenatal guidelines for care of women with PPROM.
2) Raise awareness of health care providers regarding the importance and the effectiveness of queensland clinical guidelines for management of PPROM.

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3) Conduct educational program to raise women's awareness about management of PPROM and it is complications.
4) Replication of the same study using larger sample size and different populations.
5) Conduct a qualitative research study that assesses the lived experience of women with PPROM.

Abbreviations

PPROM	Preterm Prelabour Rupture of Membranes
WBCS	White Blood Cells
CRP	C-Reactive Protein
CS	Caesarean Section
GA	Gestational Age
ICU	Intensive Care Unit
BMI	Body Mass Index
SPSS	Statistical Package for the Social Sciences

Declarations

Ethical Considerations

A primary approval was obtained from the research ethics committee conducted at the Faculty of Nursing at Cairo University on July 30, 2023. An official permission was granted from the director of El-Galaa Teaching Hospital and the General Organization for Teaching Hospitals & Institutions- Egyptian Ministry of Health and Population. The investigator explained to the women the purpose and nature of the study and its importance. In addition, informed written consents were obtained from women who were willing to participate in the study after ensuring that their participation was voluntary and the trial posed no risk or hazards to them. In addition, each woman was assured that she has the right to withdraw from the study at any time with no consequences to her care. Then, confidentiality and anonymity was assured through the coding of data by the investigator and keeping the data in a secret place. Final approval was obtained after completing the data collection on April 29, 2024.

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgment

The authors would like to thank all the team in the inpatient department of antenatal care in El-Galaa Teaching Hospital, Cairo. and the patients who participated in this study.

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