ISSN 2618-1584 Vol. 3, Issue 1: 13-17, DOI: 10.25236/FMSR.2021.030103

Application Effect of Maternal Fall Risk Assessment Scale in Postpartum Fall Management

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Abstract: ***Objective****: To explore the application effect of maternal fall risk assessment scale for puerpera in postpartum fall management.* ***Methods****: Analyzing, summarizing and concluding the risk factors of maternal fall, we developed the obstetric fall assessment scale. Select the 400 puerpera who delivered via vagina in this hospital from August 2019 to November 2019, they were randomly divided into the observation group and the control group. Risk assessment scale of maternal fall was used in the observation group while Thomas fall assessment scale was used in the control group. ROC curve analysis was used to compare the reliability of the two scales. The incidence of maternal falls and the degree of falls injuries were compared between the two groups.* ***Results****: Risk assessment scale of maternal fall has high reliability. According to the risk degree of the risk assessment scale of maternal fall and adopting the corresponding nursing intervention can significantly reduce the occurrence of maternal fall and effectively prevent maternal fall.* ***Conclusion****: Risk assessment scale of maternal fall can accurately assess the risk of maternal fall, and targeted nursing intervention can effectively prevent and manage maternal fall, which has clinical application value.*

Keywords: *Postpartum fall; Risk assessment scale of maternal fall; Obstetric fall management; Nursing intervention*

1. Introduction

A fall occurs when a patient falls unintentional or suddenly lower than the initial position or falls on the ground. A fall in obstetrics will seriously affect the life safety of the mother and the fetus [1].Women in postpartum were more likely to fall, there were usually no obvious symptoms before occurrence. Women during pregnancy were more likely to fall due to different barycenter loads than normal adults. According to some scholars' statistics, about 25% of women have fallen during pregnancy, and even 10% have fallen for more than three times [2], and about 24% of pregnancy-related injuries resulted from falls [3-4]. According to the survey in the hospital, postpartum fall accounted for 75% of the maternal, and the phenomenon of postpartum fall was more serious. Our department adopted the risk assessment scale of maternal fall to evaluate the degree of fall risk of pregnant women, and adopted nursing intervention according to different fall risks, which significantly reduced the incidence of falls in pregnant women. The research results are now reported as follows.

2. Materials and Methods

2.1 Materials

This study was approved by the Ethics Committee of our hospital. Inclusion criteria: ①Vaginal delivery in our obstetrics department from May to November 2019; ②Single pregnancy, cephalic presentation; ③Fetal heart monitoring during labor without fetal distress phenomenon.

2.2 Methods

The method of consulting experts and literature review was adopted to analyze and summarize the specific reasons for unexpected falls in puerpera and the risk factors of falls. Combined with the relevant contents of the existing fall risk assessment scale for hospitalized patients, the fall risk assessment scale for pregnant women was developed, which was shown in Table 1.The test-retest

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reliability were used to test the reliability and validity of the scale. 5 experts were invited to make relevant evaluations on each item in the maternal fall risk assessment scale, and the scale was modified according to experts' opinions. After the modification, experts were invited again for evaluation and repeated until the scale passed. The correlation coefficient of test-retest reliability was 0.979.

Table 1. Maternal Fall Risk Assessment Scale

Fall factors		Score	
Environmental factor	Noisy and crowded, the light was dark, the ground was slippery	□yes	1'
Individual factors	Previous history of falls during pregnancy	□yes	1'
	Age ≥35 years old	□yes	1'
	Weight≥80kg	□yes	1'
	Visual disturbance	□yes	1'
	Physical weakness (more than 16 hours a day in bed or sitting)	□yes	2'
Prenatal factors	Hypertensive disorder complicating pregnancy	□yes	1'
	Pregnancy with anemia(Hb<100g/L)	□yes	1'
	(Hb<60g/L)	□yes	2'
	A history of mental illness/epilepsy	□yes	3'
	Gestational diabetes	□yes	1'
	Pregnancy with heart disease	□yes	1'
	Postural hypotension	□yes	1'
	Long-term use of sedatives, hypotensor or hypoglycemic drug	□yes	1'
Intrapartum factor	labor analgesia	□yes	1'
	The second stage of labor>2 hours	□yes	2'
	Total labor time >16 hours	□yes	2'
	Birth canal injury(Above II°laceration or lateral episiotomy)	□yes	2'
	Fetal macrosomia	□yes	1'
	2 hours postpartum bleeding volume >500ml	□yes	2'
	No eating for more than 4 hours during labor	□yes	1'
Postpartum factors	No urination after delivery more than 4 hours	□yes	2'
	Postpartum retention of urine	□yes	4'
	No eating more than 6 hours after delivery	□yes	2'
	Straight legs are difficult to raise	□yes	3'

Observation group used the Maternal Fall Risk Assessment Scale. The assessment time was within 2 hours after admission to hospital, 2-6 hours after delivery, and 6-24 hours after delivery. The total score of this scale is 40', and the score<15' is classified as low risk, ≥15 as high risk. The control group used the Thomas Fall Risk Assessment Scale. The evaluation time was the same as that in observation group. The scale has a total score of 14', ≥4' is classified as high risk of falling, and the higher the score, the greater the risk of falling.

According to the relevant guidelines of the National Database of Nursing Quality Indicators (NDNQI), the classification of injuries after falls is divided into the following 5 levels: ①No injury. ②Mitigated injuries: injuries that require little or no treatment and observation, such as bruises, small lacerations of the skin that do not require suture. ③Moderate injuries: injuries that require medical or nursing treatment and observation such as ice compress, bandage or suture, such as sprain, large or deep laceration.④Severe injuries: injuries that require medical treatment and consultation, such as fracture, loss of consciousness, mental or physical changes. ⑤Death: the direct cause of death is fall.

SPSS22.0 statistical software was used to conduct T test, Chi-square test, Fisher's exact test, ROC curve etc. on the data that obtained in the study. When $P<0.05$, the comparison difference was statistically significant.

3. Results

3.1 General information of the puerpera

A total of 400 puerpera who delivered via vagina in this hospital from August 2019 to November 2019, all of whom were female, participated in the survey, and their general information was shown in Table 2.

ISSN 2618-1584 Vol. 3, Issue 1: 13-17, DOI: 10.25236/FMSR.2021.030103

Table 2 Comparison of general information between the two groups

Group	Age/y	gestational age/w
Observation group	25.80±4.22	38.13±4.50
Control group	26.19±3.98	38.38±4.81
t	0.951	0.537
P	0.342	0.592

3.2 Comparison of the relationship between the degree of fall risk and assessment time of the two scales

The assessment time was within 2 hours after admission to hospital, 2-6 hours after delivery, and 6-24 hours after delivery ,the degree of fall risk of the two groups was shown in table 3.

Table 3 Risk assessment of maternal falls in different groups (n=400)

Assessment time	Group	The degree of fall risk		χ^2	P
		Low risk	High risk		
Within 2 hours after admission to hospital	Observation group	192(96%)	8(4%)	10.415	0.001
	Control group	174(87%)	26(13%)		
2-6 hours after delivery	Observation group	165(82.5%)	35(17.5%)	4.245	0.039
	Control group	148(74%)	52(26%)		
6-24 hours after delivery	Observation group	190(95%)	10(5%)	4.891	0.027
	Control group	178(89%)	22(11%)		

3.3 Comparison of the incidence of maternal syncope and falls between the two groups' puerpera at high risk

Compare the incidence of maternal falls between the two groups' puerpera that were at high risk of falling, it was shown in table 4.

Table 4 The incidence of maternal syncope and fall between the two groups' puerpera at high risk

Assessment time	Group	No syncope and fall	Syncope	Fall	χ^2	P
Within 2 hours after admission to hospital	Observation group(n=8)	2(25.00%)	6(75.00%)	0(0%)	3.433	0.180
	Control group(n=26)	14(53.85%)	10(38.46%)	2(7.69%)		
2-6 hours after delivery	Observation group(n=35)	8(22.86%)	26(74.28%)	1(2.86%)	6.819	0.033
	Control group(n=52)	24(46.15%)	24(46.15%)	4(7.70%)		
6-24 hours after delivery	Observation group(n=10)	2(20.00%)	7(70.00%)	1(10.00%)	12.940	0.002
	Control group(n=22)	17(68.18%)	2(18.18%)	3(13.64%)		

3.4 Comparison of the degree of fall injury between the two groups

Wilcoxon rank sum test was used for the two sample data, it was shown in table 5.

Table 5 The degree of fall injury between the two groups

Group	No injury	Mitigated injuries	Moderate injuries	Severe injuries	Death
Observation group(n=2)	1	1	0	0	0
Control group(n=9)	3	6	0	0	0
U	7.500				
P	0.673				

3.5 ROC curve of two fall risk assessment scale

ROC curve of Maternal Fall Risk Assessment Scale was shown in figure 1 and the area under the curve was 0.953(P=0.000) while ROC curve of Thomas Fall Risk Assessment Scale was shown in figure 2 and the area under the curve was 0.737(P=0.000).

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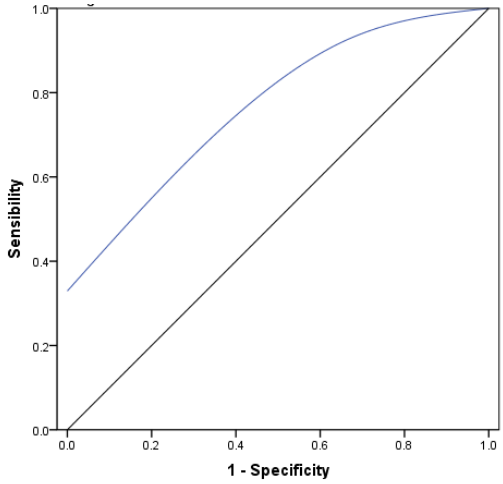

Fig.1 ROC curve of Maternal Fall Risk Assessment Scale

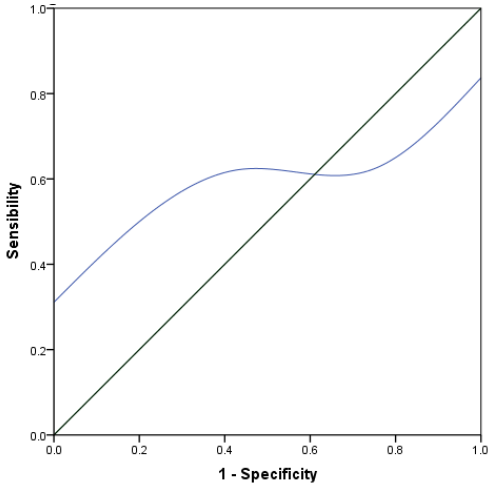

Fig.2 ROC curve of Thomas Fall Risk Assessment Scale

4. Discussion

4.1 Maternal falls mainly occurred after delivery

Studies have shown that the incidence of postpartum syncope was 10.3% [5]. Most of them recovered quickly, a few of them may cause soft tissue contusion or even fracture, causing disputes between doctors and patients. In this study, maternal falls mainly occurred in 2-6 hours after delivery the first time puerpera got out of bed to urinate, which did not cause serious injury, but had hidden dangers to maternal safety. When the puerpera changed from recumbent position to upright position, blood accumulated in the lower half of the body, together with the sudden drop of pressure in the abdominal cavity after urination, the blood returning to the heart reduced, and insufficient blood supplied to the brain, which was easy to appear dizziness and falls.

4.2 Maternal Fall Risk Assessment Scale had higher accuracy and sensitivity

The ROC curve area of the Maternal Fall Risk Assessment Scale was 0.953 which with high accuracy. The ROC curve area of Thomas Fall Risk Assessment Scale was 0.737 which with moderate accuracy. Changes in the anatomy and physiology of women during pregnancy, resulting in weight gain, ligament relaxation, spinal forward flexion, nerve control delay, muscle strength weakness, biomechanical changes and other physiological phenomena, are the causes of falls. In addition, habitually sedentary behavior, anxiety, and gestational diabetes increase the risk of falls. Besides, anesthesia and postures in the second stage of labor can lead to loss of sensation in the lower extremities and increase the risk of falls [6]. Maternal Fall Risk Assessment Scale integrated environmental factor, individual factors, prenatal factors, intrapartum factor and postpartum factors to strengthen the assessment of maternal falls risk, which was more sensitive to risk assessment of maternal falls.

4.3 Maternal Fall Risk Assessment Scale had guiding significance for preventing maternal falls

Maternal Fall Risk Assessment Scale can accurately assess the degree of maternal falls risk, and according to the degree of risk to take the corresponding nursing intervention, effectively reduced the incidence of maternal falls, which has clinical application value. Nursing intervention in low risk of fall: ①Nursing staff should strengthen health education when the puerpera were admitted to hospital, introduce the environment and safety facilities of the ward, guide the use of the call bell, and inform the effective methods of fall prevention and related matters needing attention.②kept the floor dry, the light bright, pedestrian paths clear of obstacles, bedrail erect when puerpera lying in bed, and strengthened relevant inspection work.③puerpera should be assisted when getting out of bed, and put on the non-slip shoes. Nursing intervention in high risk of fall: when puerpera were rated as high risk, basic care and health education should be provided, and a warning board should be placed at the bedside of the puerpera. At first, we should strengthen position change guidance for puerpera: sit up slowly for 30

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seconds, move legs and sit on the edge of the bed for 30 seconds, then stand up slowly and stand for 30 seconds until they don't feel dizzy. Next, the guidance of urination should be strengthened: inform them to drink more water and empty the bladder in time. When they go to the toilet, their family members should accompany them. During the urination if the puerpera appear cold sweat, chest tightness and palpitation, they should sit down or lie flat and call the nurse timely.

5. Conclusion

In the current fall risk assessment scale is widely used, but Maternal Fall Risk Assessment Scale has not developed and tested [7], this study integrated environmental factor, individual factors, prenatal factors, intrapartum factor and postpartum factors to develop a suitable for fall risk assessment scale in the maternal. The fall risk can be accurately estimated according to the fall scale score, and the corresponding nursing intervention can be provided timely for the puerpera to effectively reduce the occurrence of falls. However, there were some limitations in this study: since the patients of this study were only from a hospital in Zhejiang Province, the conclusion might be limited. The scope and objects of study need to be further expanded to determine applicability and universality in other areas.

Acknowledgment

This paper is supported by Wenzhou Science and Technology Bureau (Project Number: Y20180041).

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