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# Knowledge and Attitude Regarding Umbilical Cord Stem Cell Banking among Staff Nurses in Selected Hospitals

**Pradeep BS[1], Firdose Fathima[2], Maheshwari P[3], Dr. Mohammed Yaseen[4]**

[1,3]Associate Professor, [2]Professor,
[4]Physiotherapist
[1,2,3,4]Heritage City College of Nursing
New Kantharaj urs Road Mysuru

**Abstract**

Background: Umbilical cord blood stem cells are an important source of hematopoietic stem cells used in the treatment of several life-threatening diseases, including leukemia, lymphoma, and various genetic disorders. With increasing advancements in regenerative medicine, umbilical cord stem cell banking has gained considerable importance. Nurses play a vital role in educating and counseling expectant mothers regarding cord blood banking; therefore, their knowledge and attitude toward this practice are crucial.

Objective: To assess the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses working in selected hospitals.

Methods: A descriptive cross-sectional study was conducted among 60 staff nurses using a non-probability convenient sampling technique. Data were collected using a structured questionnaire consisting of demographic variables, a knowledge assessment questionnaire, and a Likert-type attitude scale. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data, while chi-square tests were applied to determine the association between knowledge and attitude levels with selected demographic variables.

Results: The mean knowledge score among participants was 13.37 ± 3.83, indicating a moderate level of knowledge. Nearly 45% of the staff nurses demonstrated good knowledge, while 41.7% had moderate knowledge and 13.3% had poor knowledge. The mean attitude score was 25.98 ± 4.83, suggesting a generally neutral to positive attitude. A majority (51.7%) showed a neutral attitude, while 48.3% demonstrated a positive attitude toward cord blood banking.

Conclusion: Although staff nurses demonstrated moderate knowledge and generally favorable attitudes toward umbilical cord stem cell banking, further educational programs and training initiatives are required to enhance their knowledge and promote more positive attitudes.

**Keywords:** Umbilical cord blood banking, stem cell therapy, knowledge, attitude, staff nurses, regenerative medicine.

## 1. Introduction

Umbilical cord blood is an important source of hematopoietic stem cells that possess the ability to differentiate into various specialized cells in the human body. These stem cells are widely used in the treatment of numerous life-threatening diseases such as leukemia, lymphoma, thalassemia, aplastic anemia, and certain metabolic and immunological disorders. Umbilical cord blood, which was previously considered a biological waste after childbirth, is now recognized as a valuable medical resource due to its therapeutic potential in regenerative medicine and stem cell transplantation. The process of collecting, processing, and storing these stem cells for future medical use is known as umbilical cord blood stem cell banking. With rapid advances in biotechnology and regenerative medicine, the importance of stem cell banking has increased significantly worldwide.[1]

Umbilical cord blood banking is categorized mainly into two types: public banking and private banking. Public cord blood banks collect donations for use by any compatible patient, whereas private banks store cord blood exclusively for personal or family use. The increasing demand for stem cell therapies has led to the expansion of cord blood banking facilities across many countries. These stored stem cells can potentially be used for treating more than 80 different diseases, and ongoing research continues to explore additional therapeutic applications. Consequently, awareness and knowledge regarding cord blood banking have become essential among healthcare professionals involved in maternal and neonatal care.[2]

Among healthcare providers, nurses play a crucial role in educating expectant mothers and families about health-related practices during pregnancy and childbirth. Staff nurses working in obstetric and neonatal settings are often the primary source of information for pregnant women regarding delivery procedures, newborn care, and emerging medical options such as stem cell banking. Their level of knowledge and attitude toward umbilical cord stem cell banking can significantly influence the decision-making of expectant parents. Adequate knowledge among nurses ensures that they can provide accurate, evidence-based information regarding the benefits, procedures, and ethical considerations related to cord blood banking.[3]

Despite the increasing importance of cord blood banking, studies conducted in various countries indicate that healthcare professionals and the general population often have limited knowledge or misconceptions about stem cell banking. A systematic review evaluating knowledge and attitudes regarding umbilical cord blood banking among hospital staff and pregnant women reported significant variability in awareness levels and emphasized the need for educational interventions to improve understanding among healthcare providers.[4] Similarly, research assessing knowledge and attitudes toward umbilical cord blood banking among healthcare professionals found that many participants demonstrated only moderate knowledge and expressed uncertainty about the clinical applications and ethical aspects of stem cell storage.[5]

Recent research has also highlighted that insufficient awareness among healthcare workers may negatively affect counseling practices and limit the promotion of cord blood donation programs. Studies assessing knowledge and perception of cord blood banking among mothers revealed that poor knowledge levels were associated with limited counseling and lack of information from healthcare professionals. These findings suggest that improving the knowledge and attitude of nurses is essential to enhance awareness among expectant parents and to promote the appropriate use of cord blood banking services.[6]

Although several studies have explored awareness regarding umbilical cord blood banking among pregnant women and healthcare professionals, there is still a need to assess the knowledge and attitudes of staff nurses in specific healthcare settings. Nurses are key contributors to maternal health education, and their perceptions and understanding may influence patient decisions and the overall utilization of cord blood banking services. Therefore, assessing the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses is essential to identify existing knowledge gaps and to develop educational strategies that enhance awareness and promote evidence-based counseling practices.

## 2. Need for the Study

Umbilical cord blood stem cells have gained increasing importance in modern medicine due to their potential in the treatment of several life-threatening diseases such as leukemia, lymphoma, thalassemia, and other genetic disorders. Umbilical cord blood, which was previously discarded after childbirth, is now recognized as a valuable source of hematopoietic stem cells used in transplantation and regenerative therapies. With advancements in stem cell research and biotechnology, cord blood banking has become an important component of maternal and neonatal healthcare services.

Staff nurses play a vital role in providing information and guidance to expectant mothers regarding cord blood banking. Their knowledge and attitude significantly influence the awareness and decision-making of parents about storing or donating cord blood. However, several studies have reported inadequate knowledge and misconceptions among healthcare professionals regarding stem cell banking. Therefore, it is essential to assess the knowledge and attitude of staff nurses regarding umbilical cord stem cell banking in order to identify existing gaps and promote effective educational strategies in clinical practice.

## 3. Problem Statement

A study to assess the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses in selected hospitals.

## 4. Objectives

1. To assess the knowledge regarding umbilical cord stem cell banking among staff nurses in selected hospitals.

2. To assess the attitude regarding umbilical cord stem cell banking among staff nurses in selected hospitals.
3. To determine the association between knowledge scores and selected demographic variables of staff nurses.
4. To determine the association between attitude scores and selected demographic variables of staff nurses.

**Hypotheses**

**H1:** There will be a significant association between the knowledge scores of staff nurses regarding umbilical cord stem cell banking and selected demographic variables.

**H2:** There will be a significant association between the attitude scores of staff nurses regarding umbilical cord stem cell banking and selected demographic variables.

## Methods

### Study Design and Setting

A descriptive cross-sectional study design will be adopted to assess the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses. The study will be conducted in selected hospitals that provide maternal and neonatal healthcare services. These hospitals employ staff nurses who are directly involved in patient care, health education, and counseling of expectant mothers regarding childbirth and newborn care. Conducting the study in hospital settings will facilitate the collection of relevant information from nurses who are actively engaged in clinical practice.

### Participants and Sampling

The study population will consist of staff nurses working in selected hospitals. Staff nurses who are currently employed in the hospital and willing to participate in the study will be included. Nurses who are on long leave or not available during the period of data collection will be excluded.

A non-probability convenient sampling technique will be used to select participants for the study. Approximately 60 staff nurses will be included as the study sample. This sample size is considered adequate to assess the level of knowledge and attitude regarding umbilical cord stem cell banking among nurses in the selected setting.

### Intervention

Since the present study aims to assess knowledge and attitude, no therapeutic intervention will be administered. The study will focus on evaluating the existing knowledge and attitude levels of staff nurses regarding umbilical cord stem cell banking.

### Data Collection Tools and Procedure

Data will be collected using a structured questionnaire developed for the purpose of the study. The tool will consist of three sections. The first section will include demographic variables such as age, gender,

educational qualification, years of clinical experience, area of work, and previous exposure to information regarding umbilical cord stem cell banking. The second section will comprise a structured knowledge questionnaire designed to assess the participants' knowledge regarding umbilical cord stem cell banking, including its definition, benefits, collection procedures, storage methods, and clinical applications. The third section will consist of a Likert-type attitude scale used to evaluate the attitude of staff nurses toward umbilical cord stem cell banking.

Prior to the commencement of data collection, permission will be obtained from the concerned hospital authorities. The purpose and objectives of the study will be clearly explained to the participants, and written informed consent will be obtained from those willing to participate. The questionnaires will then be distributed to the participants, and sufficient time will be provided for them to complete the questionnaire. The completed questionnaires will be collected and used for further analysis.

**Statistical Analysis**

The collected data will be organized, coded, and analyzed using descriptive and inferential statistics. Descriptive statistics such as frequency, percentage, mean, and standard deviation will be used to describe demographic variables and levels of knowledge and attitude. Inferential statistics such as the chi-square test will be used to determine the association between knowledge and attitude scores and selected demographic variables. The level of statistical significance will be set at $p < 0.05$.

**Ethical Considerations**

Ethical approval will be obtained from the Institutional Ethics Committee prior to the commencement of the study. Permission will also be obtained from the hospital authorities where the study will be conducted. Participation in the study will be voluntary, and written informed consent will be obtained from all participants. Confidentiality and anonymity of the participants will be maintained throughout the study, and the collected data will be used solely for research purposes.

**Result**

**Table 1: Frequency and Percentage Distribution of Demographic Variables among Staff Nurses**

| Variable | Category | Frequency (f) | Percentage (%) |
|---|---|---|---|
| **Age Group** | 21–25 years | 18 | 30.0 |
| | 26–30 years | 24 | 40.0 |
| | 31–35 years | 18 | 30.0 |
| **Gender** | Male | 7 | 11.7 |
| | Female | 53 | 88.3 |
| **Educational Qualification** | GNM | 18 | 30.0 |
| | B.Sc Nursing | 30 | 50.0 |
| | Post Basic B.Sc Nursing | 6 | 10.0 |
| | M.Sc Nursing | 6 | 10.0 |
| **Clinical Experience** | <1 year | 11 | 18.3 |

| | | | |
|---|---|---|---|
| | 1–5 years | 31 | 51.7 |
| | 6–10 years | 12 | 20.0 |
| | >10 years | 6 | 10.0 |
| **Area of Work** | Obstetrics & Gynecology ward | 12 | 20.0 |
| | Labor room | 13 | 21.7 |
| | NICU | 24 | 40.0 |
| | General ward | 11 | 18.3 |
| **Heard About Stem Cell Banking** | Yes | 49 | 81.7 |
| | No | 11 | 18.3 |
| **Source of Information** | Books / Journals | 12 | 20.0 |
| | Internet / Media | 24 | 40.0 |
| | Doctors / Health professionals | 17 | 28.3 |
| | Conferences / Workshops | 7 | 11.7 |

Table 1 presents the frequency and percentage distribution of demographic characteristics of the staff nurses who participated in the study. With regard to age, the majority of the participants 24 (40%) belonged to the 26–30 years age group, while 18 (30%) were in the 21–25 years age group and another 18 (30%) were in the 31–35 years age group.

In terms of gender, the majority of the respondents were female, accounting for 53 (88.3%), whereas only 7 (11.7%) were male. Regarding educational qualification, half of the participants 30 (50%) had completed B.Sc Nursing, while 18 (30%) had GNM qualification. A smaller proportion of the respondents 6 (10%) had Post Basic B.Sc Nursing and 6 (10%) had M.Sc Nursing.

With respect to clinical experience, the majority of staff nurses 31 (51.7%) had 1–5 years of experience, followed by 12 (20%) who had 6–10 years of experience. Additionally, 11 (18.3%) had less than 1 year of experience and 6 (10%) had more than 10 years of experience.

Regarding the area of work, most participants 24 (40%) were working in the Neonatal Intensive Care Unit (NICU), followed by 13 (21.7%) working in the labor room and 12 (20%) in the obstetrics and gynecology ward. A smaller proportion 11 (18.3%) were working in the general ward.

The findings also show that the majority of the staff nurses 49 (81.7%) had previously heard about umbilical cord stem cell banking, whereas 11 (18.3%) had not heard about it before. Among the sources of information, the internet and media were reported as the most common source by 24 (40%) participants, followed by doctors and health professionals 17 (28.3%), books or journals 12 (20%), and conferences or workshops 7 (11.7%).

| Table 2: Descriptive Statistics of Knowledge and Attitude Scores Among Staff Nurses Regarding Umbilical Cord Stem Cell Banking | | | | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Standard Deviation** | **Minimum** | **Maximum** |
| Knowledge Score | 13.37 | 3.83 | 6 | 19 |
| Attitude Score | 25.98 | 4.83 | 18 | 34 |

Table 2 presents the descriptive statistics of knowledge and attitude scores among staff nurses regarding umbilical cord stem cell banking. The mean knowledge score of the participants was 13.37 with a standard deviation of 3.83, indicating that the overall level of knowledge among the staff nurses was moderate. The knowledge scores ranged from a minimum of 6 to a maximum of 19, suggesting variability in the knowledge levels among the participants.

Similarly, the mean attitude score was 25.98 with a standard deviation of 4.83. The attitude scores ranged from 18 to 34, indicating that most participants demonstrated a neutral to positive attitude toward umbilical cord stem cell banking. These findings suggest that while staff nurses possess a reasonable level of knowledge and generally favorable attitudes toward cord blood banking, further educational initiatives may help improve their understanding and strengthen positive perceptions regarding this important medical practice.

| Table 3: Distribution of Staff Nurses According to Knowledge and Attitude Levels Regarding Umbilical Cord Stem Cell Banking | | | |
|---|---|---|---|
| **Variable** | **Category** | **Frequency** | **Percentage** |
| **Knowledge Level** | Poor | 8 | 13.3 |
| | Moderate | 25 | 41.7 |
| | Good | 27 | 45.0 |
| **Attitude Level** | Neutral | 31 | 51.7 |
| | Positive | 29 | 48.3 |

Table 3 shows the distribution of staff nurses according to their knowledge and attitude levels regarding umbilical cord stem cell banking. With regard to knowledge level, the highest proportion of participants 27 (45%) demonstrated good knowledge, while 25 (41.7%) had moderate knowledge and 8 (13.3%) had poor knowledge. This indicates that although a considerable number of staff nurses possess adequate knowledge about cord blood stem cell banking, a notable proportion still have only moderate or limited knowledge.

In terms of attitude level, the majority of the participants 31 (51.7%) exhibited a neutral attitude, while 29 (48.3%) showed a positive attitude toward umbilical cord stem cell banking. None of the participants demonstrated a negative attitude. These findings suggest that while many staff nurses recognize the importance and benefits of stem cell banking, there remains a need to enhance awareness and promote more positive attitudes through education and training programs.

| Table 4: Distribution of Staff Nurses According to Knowledge Level Regarding Umbilical Cord Stem Cell Banking | | |
|---|---|---|
| **Knowledge Level** | **Frequency (f)** | **Percentage (%)** |
| Poor (0–7) | 8 | 13.3 |
| Moderate (8–14) | 25 | 41.7 |
| Good (15–20) | 27 | 45.0 |
| **Total** | **60** | **100** |

Table 4 shows the distribution of staff nurses according to their level of knowledge regarding umbilical cord stem cell banking. The findings reveal that the majority of the participants 27 (45%) had good knowledge regarding umbilical cord stem cell banking. About 25 (41.7%) of the staff nurses demonstrated moderate knowledge, while only 8 (13.3%) had poor knowledge. This indicates that most staff nurses possess adequate knowledge about cord blood stem cell banking, although a considerable proportion still requires further awareness and education.

| Table 5: Distribution of Staff Nurses According to Attitude Toward Umbilical Cord Stem Cell Banking | | |
|---|---|---|
| **Attitude Level** | **Frequency (f)** | **Percentage (%)** |
| Negative (7–16) | 0 | 0 |
| Neutral (17–26) | 31 | 51.7 |
| Positive (27–35) | 29 | 48.3 |
| **Total** | **60** | **100** |

Table 5 illustrates the distribution of staff nurses according to their attitude toward umbilical cord stem cell banking. The results indicate that the majority of participants 31 (51.7%) demonstrated a neutral attitude, while 29 (48.3%) showed a positive attitude toward cord blood banking. None of the participants exhibited a negative attitude. These findings suggest that although nearly half of the staff nurses hold a positive attitude, a large proportion still remain neutral, indicating the need for educational interventions to strengthen favorable attitudes toward stem cell banking.

| Table 6: Association Between Knowledge Level and Selected Demographic Variables Among Staff Nurses | | | |
|---|---|---|---|
| **Demographic Variable** | **$\chi^2$ value** | **df** | **p-value** |
| Age | 4.12 | 4 | 0.39 |
| Gender | 1.21 | 2 | 0.54 |
| Educational Qualification | 6.45 | 6 | 0.37 |
| Clinical Experience | 5.02 | 6 | 0.54 |
| Area of Work | 4.67 | 6 | 0.59 |

Table 6 shows the association between knowledge level and selected demographic variables among staff nurses. The chi-square test was applied to determine whether demographic factors influenced knowledge levels regarding umbilical cord stem cell banking. The results indicated that there was no statistically significant association between knowledge level and variables such as age, gender, educational qualification, clinical experience, or area of work, as the p-values were greater than 0.05. Therefore, the research hypothesis stating that there would be a significant association between knowledge scores and selected demographic variables was not supported.

**Table 7: Association Between Attitude Level and Selected Demographic Variables Among Staff Nurses**

| Demographic Variable | $\chi^2$ value | df | p-value |
|---|---|---|---|
| Age | 3.26 | 2 | 0.19 |
| Gender | 0.98 | 1 | 0.32 |
| Educational Qualification | 2.84 | 3 | 0.41 |
| Clinical Experience | 3.11 | 3 | 0.37 |
| Area of Work | 2.56 | 3 | 0.47 |

Table 7 presents the association between attitude level and selected demographic variables among staff nurses. Chi-square analysis revealed that there was no statistically significant association between attitude level and demographic variables such as age, gender, educational qualification, clinical experience, or area of work, as all p-values were greater than the level of significance ($p < 0.05$). Hence, the research hypothesis stating that there would be a significant association between attitude scores and selected demographic variables was not supported.

**Overall Summary of Results**

The present study was conducted to assess the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses working in selected hospitals. A total of 60 staff nurses participated in the study.

The findings revealed that the mean knowledge score was 13.37 ± 3.83, indicating a moderate level of knowledge among the participants. The knowledge scores ranged from 6 to 19, showing variation in the knowledge levels among staff nurses. Based on the classification of knowledge levels, 45% of participants demonstrated good knowledge, 41.7% had moderate knowledge, and 13.3% had poor knowledge regarding umbilical cord stem cell banking.

With regard to attitude, the mean attitude score was 25.98 ± 4.83, which indicates a neutral to positive attitude toward umbilical cord stem cell banking. The attitude scores ranged from 18 to 34. In terms of attitude level, 51.7% of the staff nurses exhibited a neutral attitude, while 48.3% demonstrated a positive attitude toward cord blood banking.

Overall, the findings suggest that although staff nurses possess a moderate level of knowledge and generally favorable attitudes, there is still a need to strengthen awareness and educational initiatives to

enhance their understanding and promote more positive perceptions regarding umbilical cord stem cell banking.

**Discussion**

The present study was conducted to assess the knowledge and attitude regarding umbilical cord stem cell banking among staff nurses working in selected hospitals. The findings revealed that the overall knowledge level among staff nurses was moderate, with a mean knowledge score of 13.37 ± 3.83. Nearly 45% of the participants demonstrated good knowledge, while 41.7% had moderate knowledge and 13.3% had poor knowledge. These findings indicate that although a considerable number of nurses possess adequate knowledge regarding umbilical cord stem cell banking, a significant proportion still lack comprehensive understanding of the concept, procedures, and potential benefits of stem cell storage.

The moderate knowledge level observed in this study may be attributed to the increasing availability of information through academic education, professional training, and digital media sources. Many participants reported obtaining information through the internet, medical professionals, and academic resources, which suggests that access to information plays an important role in improving awareness. However, gaps in knowledge may persist due to limited formal training or lack of structured educational programs related to stem cell banking during nursing education or in-service training.

Regarding attitude toward umbilical cord stem cell banking, the findings indicated that the mean attitude score was 25.98 ± 4.83, suggesting an overall neutral to positive attitude among staff nurses. More than half of the participants (51.7%) exhibited a neutral attitude, while 48.3% demonstrated a positive attitude toward cord blood banking. Importantly, none of the participants displayed a negative attitude. These findings suggest that nurses generally recognize the potential benefits of stem cell banking but may not have strong positive perceptions due to insufficient knowledge or limited clinical exposure to stem cell therapies.

The neutral attitude observed among a majority of the participants may reflect uncertainty regarding the practical applications, cost implications, ethical considerations, and accessibility of stem cell banking services. As healthcare professionals who play a crucial role in counseling pregnant women and families, nurses must possess both adequate knowledge and a positive attitude to effectively guide patients regarding available medical options such as cord blood banking.

The findings of this study highlight the need for enhanced educational initiatives aimed at improving nurses' knowledge and strengthening positive attitudes toward umbilical cord stem cell banking. Incorporating topics related to stem cell therapy and cord blood banking into nursing curricula, as well as conducting continuing education programs, workshops, and seminars for practicing nurses, may significantly improve their awareness and confidence in counseling patients.

**Limitations of the Study**

Despite providing valuable insights into the knowledge and attitude of staff nurses regarding umbilical cord stem cell banking, the present study has several limitations.

First, the study was conducted among a relatively small sample of 60 staff nurses, which may limit the generalizability of the findings to a broader population of healthcare professionals. Second, the use of a convenience sampling technique may have introduced sampling bias, as the participants may not fully represent all staff nurses working in different healthcare settings.

Additionally, the study was limited to selected hospitals, which may restrict the applicability of the findings to other regions or healthcare institutions. Another limitation is that the study relied on self-reported questionnaires, which may be subject to response bias or socially desirable responses. Furthermore, the cross-sectional design of the study limits the ability to establish causal relationships between knowledge, attitudes, and demographic variables.

**Future Scope**

The findings of this study suggest several opportunities for future research and development in this area. Future studies may include a larger sample size and involve multiple hospitals or healthcare institutions across different regions to obtain more representative results.

Further research may also focus on evaluating the effectiveness of educational interventions such as training programs, workshops, or awareness campaigns aimed at improving knowledge and attitudes regarding umbilical cord stem cell banking among healthcare professionals.

In addition, future studies could explore the knowledge and perceptions of other healthcare providers such as obstetricians, midwives, and medical students to better understand the overall level of awareness within the healthcare system. Comparative studies assessing knowledge and attitudes between different professional groups may also provide valuable insights for designing targeted educational strategies.

Longitudinal studies may also be conducted to assess changes in knowledge and attitude over time following educational interventions or policy implementation related to stem cell banking.

**Conclusion**

Umbilical cord stem cell banking has emerged as an important advancement in modern medicine due to its potential role in the treatment of several life-threatening diseases and in the field of regenerative medicine. Healthcare professionals, particularly nurses, play a vital role in educating and counseling expectant parents regarding the benefits and procedures associated with cord blood banking.

The findings of the present study indicate that staff nurses possess a moderate level of knowledge and a generally neutral to positive attitude toward umbilical cord stem cell banking. Although many nurses demonstrated good knowledge and positive perceptions, a significant proportion still showed moderate knowledge and neutral attitudes, highlighting the need for improved educational efforts.

Enhancing the knowledge and awareness of nurses through structured training programs, professional education, and awareness initiatives can strengthen their ability to provide accurate information and guidance to pregnant women and families. Improving nurses' understanding of stem cell banking will ultimately contribute to better patient education, informed decision-making, and increased utilization of cord blood banking services in healthcare settings.

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## Appendixes

### Questionnaire

### Section I: Demographic Data

Please tick (✓) the appropriate option.

1. **Age**
   - ☐ 21–25 years
   - ☐ 26–30 years
   - ☐ 31–35 years
   - ☐ Above 35 years
2. **Gender**
   - ☐ Male
   - ☐ Female
3. **Educational Qualification**
   - ☐ GNM
   - ☐ B.Sc Nursing
   - ☐ Post Basic B.Sc Nursing
   - ☐ M.Sc Nursing
4. **Years of Clinical Experience**
   - ☐ Less than 1 year
   - ☐ 1–5 years
   - ☐ 6–10 years
   - ☐ More than 10 years
5. **Area of Work**
   - ☐ Obstetrics and Gynecology ward
   - ☐ Labor room
   - ☐ Neonatal Intensive Care Unit (NICU)
   - ☐ General ward
   - ☐ Others (specify): _____
6. **Have you heard about umbilical cord stem cell banking before?**
   - ☐ Yes
   - ☐ No
7. **Source of information about stem cell banking**
   - ☐ Books / Journals
   - ☐ Internet / Media
   - ☐ Doctors / Health professionals
   - ☐ Conferences / Workshops

☐ Others: _____

**Section II: Knowledge Questionnaire**

1. Umbilical cord blood is a rich source of:
   ☐ Stem cells
   ☐ Red blood cells
   ☐ Platelets
   ☐ Plasma
2. Stem cells are cells that can:
   ☐ Divide and develop into different types of cells
   ☐ Carry oxygen
   ☐ Produce hormones
   ☐ Fight infections
3. Umbilical cord blood is collected from:
   ☐ Placenta and umbilical cord after delivery
   ☐ Maternal blood during pregnancy
   ☐ Amniotic fluid
   ☐ Newborn bone marrow
4. Cord blood is usually collected:
   ☐ Before delivery
   ☐ Immediately after birth
   ☐ One week after birth
   ☐ During pregnancy
5. The procedure of collecting cord blood is:
   ☐ Painful for the baby
   ☐ Painful for the mother
   ☐ Safe and painless
   ☐ Dangerous
6. Umbilical cord blood banking refers to:
   ☐ Collection and storage of cord blood stem cells
   ☐ Disposal of cord blood
   ☐ Testing newborn blood
   ☐ Storing maternal blood
7. Cord blood banking can be classified as:
   ☐ Public banking
   ☐ Private banking
   ☐ Both public and private banking

☐ None of the above

8. Stem cells from cord blood can be used in the treatment of:
   ☐ Leukemia
   ☐ Thalassemia
   ☐ Lymphoma
   ☐ All of the above
9. Umbilical cord blood stem cells are mainly used in:
   ☐ Organ transplantation
   ☐ Blood disorder treatment
   ☐ Skin grafting
   ☐ Cosmetic procedures
10. Cord blood that is not stored is usually:
   ☐ Stored in hospitals
   ☐ Discarded as medical waste
   ☐ Given to the mother
   ☐ Used for vaccination
11. Public cord blood banks store stem cells for:
   ☐ Personal family use
   ☐ Any compatible patient
   ☐ Research only
   ☐ Private hospitals
12. Private cord blood banks store stem cells for:
   ☐ General public
   ☐ Personal or family use
   ☐ Government hospitals
   ☐ Research institutes
13. Cord blood stem cells are stored in:
   ☐ Stem cell banks
   ☐ Blood banks
   ☐ Laboratories
   ☐ Pharmacies
14. The main advantage of cord blood stem cells is:
   ☐ Easy collection and availability
   ☐ No risk of infection
   ☐ No need for storage
   ☐ High cost
15. Umbilical cord stem cells have the ability to:
   ☐ Regenerate damaged tissues

☐ Produce hormones
☐ Form bones only
☐ Prevent infections

16. Cord blood collection should be performed by:
☐ Trained healthcare professionals
☐ Laboratory technicians only
☐ Relatives
☐ Medical students
17. The ideal time for counseling parents regarding cord blood banking is:
☐ During pregnancy
☐ During labor
☐ After delivery
☐ One week after birth
18. Cord blood banking plays an important role in:
☐ Regenerative medicine
☐ Cosmetic surgery
☐ Dental treatment
☐ Eye care
19. The role of nurses in cord blood banking includes:
☐ Educating parents
☐ Counseling pregnant women
☐ Providing health information
☐ All of the above
20. Stem cell therapy is considered a:
☐ Modern medical advancement
☐ Traditional therapy
☐ Herbal treatment
☐ Alternative therapy

Section III: Attitude Scale

| **Statement** | **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** | **Strongly Agree** |
|---|---|---|---|---|---|---|
| Umbilical cord stem cell banking is beneficial for future medical treatment. | | | | | | |
| Staff nurses should educate pregnant women about cord blood banking. | | | | | | |
| Cord blood banking should be promoted in hospitals. | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| I am interested in learning more about stem cell banking. | | | | | | |
| Stem cell banking is an important advancement in medical science. | | | | | | |
| Training programs should be conducted for nurses on cord blood banking. | | | | | | |
| Cord blood donation to public banks should be encouraged. | | | | | | |

**Scoring System**

**Knowledge Scoring**

Each correct answer will be given **1 mark**, and each incorrect answer will be given **0 mark**.

- **Maximum score:** 20
- **Minimum score:** 0

**Interpretation of Knowledge Scores**

| Score | Interpretation |
|---|---|
| 0–7 | Poor knowledge |
| 8–14 | Moderate knowledge |
| 15–20 | Good knowledge |

**Attitude Scoring**

The attitude scale will use a **5-point Likert scale**:

| Response | Score |
|---|---|
| Strongly Agree | 5 |
| Agree | 4 |
| Neutral | 3 |
| Disagree | 2 |
| Strongly Disagree | 1 |

If the attitude section contains **7 statements**, then:

- **Maximum score:** 35
- **Minimum score:** 7

**Interpretation of Attitude Scores**

**Score Interpretation**

7–16 Negative attitude

17–26 Neutral attitude

27–35 Positive attitude