

## Nurses' Knowledge about Umbilical Cord Blood Banking and it's Barriers

Manal Farouk Moustafa<sup>1</sup> & Entisar Mohammad Youness,<sup>2</sup>

<sup>1,2</sup>Obstetrics & Gynecological Nursing Department, Faculty of Nursing Assiut University, Egypt

---

### **Abstract:**

**Introduction:** Umbilical Cord Blood(UCB) used as a source of hematopoietic stem cells for bone marrow transplantation in the treatment of malignant and nonmalignant diseases. Knowledge of the nurses is vital to success the science of Umbilical Cord Blood Banking.

**Aim of the study:** Researchers sought to assess nurses' knowledge regarding umbilical cord blood banking and identifying the barriers of it to be applied as their support is crucial to the success of development and functioning of cord blood banks in Women's Health Hospital, Assiut University Hospitals, Egypt.

**Research design:** Descriptive study design was utilized in this study.

**Subjects and Methods:** All nurses who work in Obstetrics and Gynecological department, Women's Health Hospital, Assiut University, Egypt, were included in the study between October 2014 and January 2015. Data were collected in interviews by using an interview form developed by the researchers according to the literature. All nurses were 150.

**Results:** Nurses' Knowledge about UCBB are lacking , inadequate knowledge represented 79.7% and they identified from their point of view that the costs of the umbilical cord blood banks, policies and procedures are barriers of conducting such new technology in their hospitals.

**Conclusion and Recommendations:** Nurses' level of knowledge on UCBB is inadequate and this indicates the necessity of creation of educational programs and continual training with the use of UCBB. Also nurses must be equipped to know the approved standards and understanding UCBB.

**Keywords:** nurses' knowledge, stem cells, umbilical cord blood banking

---

### I. Introduction

A stem cell is a cell that can become establishes in an appropriate growing environment, has the ability to multiply, can produce cell types that continue to differentiate and renew itself or ensure the continuation of its own population and can regenerate tissue with functional damage. Stem cells, which have been used for a period of time in the treatment of leukemia and other types of cancer, have recently started to be used in medicine development , and this progress offers us hope for the treatment of diabetes, cardiovascular and neurogenerative diseases, but these applications are still unproven.<sup>[1]&[2]</sup>

Stem cell transplantation has traditionally been performed utilizing bone marrow or peripheral blood as a source of hematopoietic stem cells, but in many circumstances, stem cells from umbilical cord blood are preferable, given a lower risk of graft vs. host disease, greater human leukocyte antigen mismatch tolerance, lower costs, less infectious morbidity, more expeditious time to obtainment and nonexistent risk to the donor.<sup>[3]</sup>

Nurses need to understand stem cell sources so they can enter the debate on this issue. Discussions are often intense because of the different positions held by scientific, religious, social and political sources. Nurses need to equip themselves with accurate information, using the international Council of Nursing Code of Ethics for Nurses<sup>[4]</sup> and their own ethical decision- making processes. They can then make decisions for themselves about the efficacy of stem cell research and then become important sources of knowledge and information to help others understand and debate the direction of this scientific breakthrough.<sup>[5]</sup>

The collection of CB is primarily carried out by obstetricians, midwives and nurses who have received training in this area. The collection of cord blood occurs after the delivery of infant and does not cause any kind of injury to the infant or mother.<sup>[6]</sup> No significant risk from collecting cord blood has been documented for the mother or the baby. The only possible risk identified in the literature is that early cord clamping may increase the risk of neonatal anemia.<sup>[7]</sup>

Blood should be universally collected from both vessels, arterial and venous blood, before placental delivery by umbilical vein puncture or after delivery of the placenta.<sup>[8]</sup> Cord blood can be kept for decades and it might be that the mandatory markers pertinent at the time of donation will not be the same as those required when a unit is issued for transplant decades later.<sup>[9]</sup>

Two generally accepted methods for collecting CB following delivery of the newborn baby. One is to collect the blood immediately after delivery prior to placental separation from the wall of the uterus. The other

way is to deliver the placenta with the cord clamped and pass it from the operative or delivery field to an attendant who performs the CB collection. Several studies have compared CB units collected by both techniques, and, in aggregate, they do not demonstrate consistent or significant differences in total blood volume. The major issues in obtaining high- quality units for transplantation are maximizing the volume of blood collected, avoiding microbial contamination, and avoiding undue delays that could result in clotting of the specimen.<sup>[1]</sup>

There are three types of UCB banks; public, private and hybrid. In public banks the UCB is stored without charge and is available for any recipient who needs an allogenic transplant.<sup>[10]</sup> There are currently approximately 44 banks over the world and they are connected to the World Marrow Donor Association. Private banks, in contrast, charge for UCB collection and storage in order to cover the maintenance costs. The collected and stored UCB is available for the child that donated it and also for his or her family, although research has shown that the probability that a child uses its own blood is extremely low, ranging from 1 in 1.000 to 1 in 200.000.<sup>[11]</sup> Hybrid cord blood banks have recently been funded in several countries in an effort to reduce costs for UCB storage, because of the limited funding for public UCB banks. Hybrid banks are a new model that combines allogenic UCB donation and autologous cell storage.<sup>[12]</sup>

Cord blood banking involves recruitment, consent and testing of maternal donors, collection, processing and freezing, testing of the collected cord blood and release of cord blood unit to transplant center.<sup>[1]</sup>

Because of the many issues involved and the widespread public discussion on the issue, nurses and midwives who provide care in the ante- and perinatal period should be able to provide counseling services to pregnant women on the new concept of stem cell utilization and cord blood banking.<sup>[5]</sup>

The nurses role in collection of cord blood is preparation, tube labeling, packaging in Styrofoam box for return, and in some cases, prepping collection tubes with heparin.<sup>[13]</sup> Cord blood is collected using sterile technique, drawing the blood from the umbilical vein into a collection bag, using a closed system collection kit. Blood collection from the umbilical vein into the takes about 10 minutes, and total collected volume average about 100mL. cord blood collection is done within 10 minutes of birth.<sup>[14]</sup>

Researchers found that many barriers are identified by participants to decide not to have UCB collected that included concerns about the safety of the mother and neonate, beliefs about the placenta, threats against confidentiality, rejection of UCB, and the influence of fathers. Moreover women expressed a clear desire to learn more about the collection, storage, and use of UCB before delivery.<sup>[15]</sup>

#### **Aim of the study:**

Aim of this study is to assess the nurses' knowledge regarding umbilical cord blood banking and identifying the barriers of it to be applied.

## **II. Subjects And Methods**

### **2.1 Study Design:**

This study was a descriptive study design

**2.2 Setting:** The study was conducted at the Women's Health Hospital, Assiut University, Egypt. This is a busy hospital conducting about 42,000 deliveries per year. The study was carried out in the Department of Obstetrics & Gynecology of the Women's Health Hospital, at the antenatal, labor, postpartum wards and the nurses of the outpatients clinics.

### **2.3 Sample:**

Convenient sample was utilized in this research. 150 female nurses who work in Obstetrics and Gynecology Department, Women's Health Hospital, Assiut University, were included in the study. Data collection started from October 2014 and ended at January 2015.

### **2.4 Tools of the study:**

A structured self administrative questionnaire was developed by the researchers for data collection to fully meet the demands of this research. The questionnaire had confirmed its validity in several studies with different backgrounds and refers mainly to UCBB. After that the developed questionnaire are revised by panel of Obstetrical and Gynecological experts in nursing and hematology medical staffs and then has been translated into Arabic language. This tool contained many sections, **the first section** of this tool contained questions on the personal data of the recruited nurses such as age, qualifications, years of experience the current nursing role at Women's Health Hospital and the source of knowledge gained. **The second section** contained data related to the type of banks, whether it private or public. It also contained data related to the reasons of choosing the storing banks of umbilical cord blood in private or public banks. Reasons given in the tool for private banks are as it is a good chance if the child need it, is it more safe than the others blood and fearing of

being used for other cases. The reason of choosing the public banks are as its availability, the less cost of it, and the child may not need it. This section also contained data related to the knowledge of the source of blood collection whether it from venous, arterial or from both vessels. Advantages and the disadvantages of the use of cord blood. **The third section** contained data related to the nurses knowledge about the diseases that can be treated with umbilical cord blood transplantation such as malignancies, immunodeficiency disorders, bone marrow failure, haemoglobinopathies and the metabolic disorders. **The fourth section** included data related to the nurses' knowledge about the recommended procedures during cord banking and the precautions during the collection of blood. These knowledge such as the collection of blood in a special bags that containing anticoagulant agents, the importance of processing and freezing the collected blood immediately, the recommended temperature for storing and following the infection control precautions it also contained data related to the importance of blood banks accreditation and the cord blood standards which must be followed. The fifth section contained data related to the nurses' knowledge about the possible barriers in applying and providing cord blood banking such as the high cost of blood banks, policies and procedures, lack of nurses' and mother's knowledge about the cord blood banking, believes towards the placenta, the time which may be an avoidable barrier in educating the mothers about CCB and the pregnancy which is a difficult time to make decision by the mothers.

The participants completed the questionnaire manually in a space provided by their service in the presence of the researchers and after completion they handed it back to them, they requested to complete all sections of this questionnaire.

Scoring system for the nurse's knowledge was (49) degree, the essential items took a higher degree. Below 60% was regarded as inadequate knowledge, 60 % and above was regarded as Adequate knowledge.

### **2.5 Pilot Study:**

A pilot study was conducted on 10% of female nurses (15 nurses) from the Women's Health Hospital, Assiut University Hospitals, to test feasibility of tools and time required to be applied. Simple modification was done of some items of the questionnaire that they were not consistent with this study. The participants of the pilot study were included in the study sample.

### **2.6 Content Validity:**

To establish face validity, the questionnaire was piloted on panel of 3 experts of Obstetrics and Gynecological staff, hematology Medical staff and Nursing professors who reviewed the instruments for clarity, relevance, comprehensiveness, understanding, applicability and easiness.

## **III. Administrative design**

Before the conduction of the pilot study as well as the actual study, an official permission and consent were obtained from the dean of the Faculty of Nursing, as well as the Director of Women's Health Hospital, Assiut University Hospitals.

### **3.1 Procedure:**

An official permission was obtained from the research ethical committee of the Department of Obstetrics and Gynecology, Women's Health hospital, Assiut University Hospital and Faculty of Nursing, Assiut University to commence and approve this study.

Participants nurses were recruited from the Women's Health Hospital as it provided a list of nurses who were likely to be current practitioners in Women's Health Hospital, Assiut University Hospitals, Egypt. Each nurse in Women's Health Hospital were interviewed individually after taking their consent to participate in the study and given an explanation about the nature of the study by the investigators. Data included assessment of the nurses' knowledge regarding umbilical cord blood banking and identifying the barriers of it to be applied in such hospitals. Data collection occurred over a 4-month period between October 2014 and January 2015, the time required to fill the questionnaire was from 20- 30 minutes.

### **3.2 Ethical Consideration:**

The study protocol was approved by pertinent research and ethical committees. Informed written consent was taken from every nurse before inclusion in the study. No health hazards were present. Participants were assured that all their data are highly confidential, anonymity was also assured through assigning a number for each nurse instead of names to protect their privacy. Data was only available to the researchers and the participants.

### 3.3 Statistical Analysis:

Collected data were coded and analyzed. Descriptive statistics for the variables were calculated. Variables were compared using chi-square test. The variables were significant at P value < 0.05. All the statistical analysis was performed using SPSS package version 16. To identify the independent predictors which may affect the nurse's knowledge of UCBB, multiple stepwise backward linear regression analysis was used and analysis of variance for the full regression models were done.

## IV. Results

**Table (1)** represents the characteristics of the nurses. The studied sample consisted of 150 nurses, the gender of all of them were females. Participant nurses were primarily between 19 And 58 Years of age. As regards the current nursing role in the women's Health Hospital, most of the nurses(75.3%) were practice nurses who were provided care for women in the ante partum, intra-partum and post partum period of childbirth and (14.0%) of the nurses role were staff nurse and the remaining (12.7%) were supervisor's nurses. Bachelor's degree represented (24.6%) of the studied sample and (34.7%) of them had more than 20 years of experience. The first source of information was the books and magazines followed by seminars and conferences (39.3%and14.0%) respectively. Concerning the additional information the nurses want to be gained, the present study found that vast majority of them( 95.3%) need additional information in the form of training courses, educational programs.

**Table (2)** shows that approximately three quarters (78.7%) of nurses had inadequate knowledge about the UCBB, while (21.3%) only of the participant nurses' knowledge were adequate.

Nurses knowledge about the type of storage banks were presented in **Table (3)**. One third of the nurses (33.3%) reported that they know the private banks as a type of storage while(16.7%) reported public banks and (50.0%) of the participant nurses didn't know anything about the type of storage. A list of reasons was provided for participants if they were taught or known about these reasons of UCBB storage before, (28.0%%)of nurses indicated they thought that the own blood might be safer than the others in private banks and those who chose the public banks gave reasons as it may be less cost than the private banks in (50.0%) of the nurses.

As regards the nurses knowledge about the source of blood collection, **Table (4)** presents that 24.0% of nurses reported the source of collected blood is venous, 32.0% of the nurses knows that the source of collected blood is arterial while 38.0% of them know that the source of collected blood is from both vessels and 54.0% of nurses didn't know about the source of blood collection. Numerous advantages of UCBB are present. This table also illustrated the nurse's knowledge about advantages of UCBB. (14.0%) of nurses reported that umbilical cord blood is an available source of hematopoietic stem cells,(14.6%) of them reported it is a life-saving procedure while(11.3%) reported that there are no risk of transmission of infectious diseases, (42.0%) reported that UCBB treat some of the diseases and (58.0%) of nurses reported they didn't know any advantages of UCBB. As regarding the disadvantages of the UCBB, nurses reported that it may endanger the newborn survival, transmit the blood-borne infectious diseases, expose the newborn to bleeding, and may cause anemia to the newborn in (63.0%,56.6%,53.3%,60.0%) respectively. (30.0%) of the studied nurses reported that UCB may be rejected by the body when transplantation occurs while (34.0%) of the nurses reported that they didn't know the disadvantages of the UCCB.

Nurses knowledge about the diseases that treatable with umbilical cord blood transplantation are presented in **Table (5)**. Nurses reported that UCB used to treat some of the diseases such as malignancies( 36.6%), immunodeficiency disorders( 31.3%), and metabolic disorders (63.3%) and (58.0%) of the participant nurses didn't have knowledge regarding the diseases which treated by UCB.

**Table (6)** shows the nurses' knowledge about the recommended procedures related to cord blood banking which it is their main role in UCB collection and storage. (65.3%) of the nurses reported that their role is presented in collection of the blood in bags that containing anticoagulant agents and (74.6%) of them reported that cord blood should be processed and being frozen immediately after collection, while (73.3% & 70.6%) of the participants nurses reported that the collected blood should be stored under the recommended temperature and standardized freezing and storing should be followed respectively. As regards the accreditation of the blood banks (67.3%) of the nurses knew that the blood banks should be accredited and followed the CBB standards and (74.6%) of them knew that infection control precautions must be followed when collecting, processing and storing the cord blood. Finally (14.6%) of the nurses didn't know the procedures that must be followed when collecting the blood.

In **Table (7)** the investigators tried to understand what knowledge the nurses encounter as barriers in providing UCBB from their point of view in their hospital in integration with hematology unit. They perceived that the most greatest barrier was the cost of cord blood banks (70.0%) followed by policies and procedures of their hospitals (66.6%), the time needed to educate the mothers takes(54.0%), lack of the nurses' knowledge and culture believes toward the placenta were the same (52%) of the barriers, pregnancy is not the suitable time for mothers to make decisions represented (38.0%), lack of mothers' knowledge about UCBB represents (34.0%), religious barriers take the lowest percentages as it represented (32.6%) of their barriers

**Table (8)** shows the relationship between knowledge about the UCBB and the socio-demographic characteristics of the nurses. (34.4%) of nurses who had adequate knowledge aged 30-40 years,(50.0%) of them act as a practice nurse, (87.5%) of them had Bachelors' qualifications and (43.8%) of the nurses had from 10-20years of obstetric nursing experiences. It also presents that the best fitting multiple linear regression model for nurses' knowledge is the qualifications of the nurses followed by the age of them, meanwhile, educational level and age of nurses had a highly statistical significant independent effect on nurses' knowledge.

**Table (1):Distribution of the studied nurses according to their Characteristics.**

Items	No. 150 (%)
<b>Age : (years)</b>	
-<30	38(25.4%)
-30-39	70(46.6%)
-≥ 40	42(28.0%)
<b>Current nursing role:</b>	
-Staff nurse.	21 (14.0%)
-Supervisors nurse	16 (12.7%)
-Practice nurse	113(75.3%)
<b>Qualifications:</b>	
-Diploma	113(75.3%)
-Bachelors	37 (24.6%)
<b>Years of experiences:</b>	
-< 10 years	35(23.3%)
-10-20 years	63(42.0%)
->20 years	52(34.7%)
<b>*Source of knowledge:</b>	
-Books and magazines	59(39.3%)
- Seminars and Conferences	21(14.0%)
- Brochures	13(8.6%)
- Study(School or university)	8 (5.3%)
- Websites	5 (3.3%)
<b>Need Additional information:</b>	
- Needed	143(95.3%)
- Not needed	7 (4.7%)

\* More than one source of information was present

**Table(2):Assessment of nurse's total knowledge about umbilical cord blood banking.**

Items	Adequate ≥60% No. 150 %	Inadequate <60% No. 150 %
<b>Knowledge</b>	32(21.3%)	118(78.7%)
<b>Total</b>	150 (100%)	

**Table(3):Nurses' knowledge , choices and reasons for storing cord blood in private versus public banks.**

Items	No. 150 (%)
<b>Type of storage banks :</b>	
-Private	50(33.3%)
- Public	25(16.7%)
- Don't know	75(50.0%)
<b>* Reasons for storing umbilical cord blood in:</b>	
<b>- Private banks:</b>	
<input type="checkbox"/> Good chance if the child need it	31(20.6%)
<input type="checkbox"/> The own blood is thought to be safer than that of others	42(28.0%)
<input type="checkbox"/> Fear of using the stored blood for other reasons	25(16.6%)
<input type="checkbox"/> Don't know	87(58.0%)
<b>- Public banks:</b>	
<input type="checkbox"/> Public banks are available for others	65(43.3%)
<input type="checkbox"/> Less cost	75(50%)
<input type="checkbox"/> The child may not in need for it	47(31.3%)
<input type="checkbox"/> Don't know	52(34.6%)

\*More than one reason was checked

**Table (4): Nurses' knowledge about source of Umbilical Cord Blood collection, its advantages and disadvantages.**

Items	No. 150 (%)
<b>* Nurses knowledge about source of blood collection:</b>	
1- Venous	36(24.0%)
2- Arterial	48(32.0%)
3- Both vessels	57(38.0%)
4- Don't know	81(54.0%)
<b>*Nurses knowledge about advantages of the use of umbilical cord blood:</b>	
- Available source of hematopoietic stem cells	21(14.0%)
- Life- saving procedure	22(14.6%)
- No risk of transmission of infectious diseases	17(11.3%)
- Treat some of the diseases	63(42%)
- Don't know	87(58.0%)
<b>*Nurses knowledge about disadvantages of the use of umbilical cord blood:</b>	
- May endanger the newborn survival	95(63.0%)
- Transmission of blood born infectious diseases	85(56.6%)
- May expose the newborn to bleeding	80(53.3%)
- May cause anemia to the newborn	90(60.0%)
- No confidentiality to the mother	48(32.0%)
- Fear of rejection	45(30.0%)
- Don't know	51(34.0%)

\*More than one item was checked

**Table(5): Nurses knowledge about the diseases that treatable with umbilical cord blood transplantation**

Items	No. 150 %
<b>*Nurses' knowledge about the treatable diseases UCB:</b>	
- Malignancies	55(36.6%)
- Immunodeficiency	47(31.3%)
- Bone marrow failure	13(8.6%)
- Haemoglobinopathies	5 (3.3%)
- Metabolic disorders	95(63.3%)
- Don't know.	63(42.0%)

\*More than one item was checked

**Table (6): Nurses' knowledge about recommended procedures related to cord blood banking**

Items	No. 150 (%)
<b>* Recommended procedures related to cord blood banking:</b>	
1-CB should be collected in a bag containing anticoagulant agent	98 (65.3%)
2-CB should be processed and frozen immediately	112(74.6%)
3-CB unites should be stored under the recommended temperature	110(73.3%)
4-Standardized freezing and storing should be followed	106(70.6%)
5-Blood banks should be accredited and followed the CBB standards	101(67.3%)
6-Infection control precautions must be followed when collecting , processing and storing the cord blood.	112 (74.6%)
7- Don't know.	22 (14.6%)

\* More than one item was checked

**Table (7): Barriers of conducting Umbilical Cord Blood Banking in their hospital from Nurses' Point of view.**

Items	No. 150 (%)
<b>* Barriers to Cord Blood Banking:</b>	
1- The cost of cord blood banks	105(70.0%)
2- Policies and procedures of their hospitals.	100(66.6%)
3- The time needed to educate the mothers	81 (54.0%)
4- Lack of nurses' knowledge about UCBB	78( 52.0%)
5- Cultural believes of the placenta	62 (41.3%)
6- Pregnancy is a difficult time to make decisions.	57 (38.0%)
7- Lack of mothers' knowledge about UCBB.	51 (34.0%)
8- Religious barriers	49 (32.6%)

\* More than one barrier was checked

**Table (8): Relations between knowledge of the nurses about the UCBB and socio-demographic characteristics of the studied nurses.**

Items	≥60% Adequate N=32	Inadequate <60% N=118	p-value	Multiple regression	
	No %	No %		Sig	Exp(B)
<b>Age (years):</b>					
-< 30	11 (34.4%)	17 (14.4%)	0.015	0.196	0.001
-30-40	11 (34.4%)	59 (50.0%)			
-≥ 40 years	10 (31.2%)	42 (35.6)			
<b>Current nursing role:</b>					
-Staff nurse.	9(28.1%)	12(10.2%)	0.014	0.194	0.002
-Supervisor nurse	7 (21.9%)	9 (7.6%)			
-Practice nurse	16(50.0%)	97(82.2%)			
<b>Qualifications in nursing:</b>					
-Diploma	4 (12.5%)	109 (92.4%)	0.001	45.503	0.040
-Bachelors'	28(87.5%)	9 (7.6%)			
<b>Years of experience:</b>					
-< 10 years	7(21.8%)	28(23.7%)	0.048	0.194	0.036
-10-20 years	14(43.8%)	49(41.5%)			
->20 years	11(34.4%)	41(34.8%)			

## V. Discussion

This study provides nurses knowledge of the state of umbilical cord blood banking and the science of the use of umbilical cord stem cells, benefits, practice implications, advantages and disadvantages of different types of collection, storage and barriers of the application of umbilical cord blood banking, all are assessed by the nurses during implementation of this study through a structured self administrative questionnaire.

The results of this study indicate that nurses are poorly informed and had deficiency of knowledge and education regarding UCBB and that the vast majority are not being educated.

Women's Health Hospital at Assiut University Hospitals is one of the most important women's health agencies throughout south Egypt, it is a tertiary level Hospital and receives about forty two thousands deliveries annually. The nursing power providers of this hospital is excellent professionals because most of them is graduated from the Faculty of Nursing and the Technical Institute of Nursing, Assiut University, Egypt. So it is a valuable idea to recommend the initiation of an umbilical cord blood bank in collaboration with the hematology unit but many barriers will face .

When exploring the knowledge of the nurses about the umbilical cord blood banking , an important element highlighted in this study is the lack nurse's knowledge in basic clinical information regarding UCBB. The present study findings found that 79.7% of the studied nurses had inadequate knowledge and the main source of information was books and magazines followed by seminars and conferences. Compared to the results of Fernandez et. al,<sup>[16]</sup> who examine pregnant women's knowledge regarding cord blood banking as their support is crucial to the success of cord blood transplantation program. They found that, most respondents in their study rated their knowledge about cord blood banking as poor or very poor. Similar study which was done by Hatzistilli et. al,<sup>[17]</sup> to examine the health professionals' knowledge and attitude towards the umbilical cord blood donation in Greece and concluded that, the knowledge regarding the donation of umbilical cord blood was evaluated to be 15.6% of the respondents regarding the collection's storage and use of UCB, furthermore, no statistical significant relationship has been found between the percentage of correct answers and years of experience. In contrast, the results of the current study seemed to be different from the results of the previous study which was done by Katz et. al,<sup>[18]</sup> who study the attitude and knowledge of pregnant women in five European countries, they found that the source of knowledge mainly obtained from the internet. Moreover, in other study<sup>[19]</sup> that investigate the pregnant woman's level of knowledge about UCB, they found higher level of knowledge reported by the pregnant women and this is behind the fact that the quality of information among pregnant women was better than among donors and female blood donors was due to the information provided by professionals.

It is more interestingly that vast majority of the studied nurses of this study wanted additional information about the subject of umbilical cord blood banking this is due to the lack of their knowledge, thus this result is quietly encouraging because it was shown that the participants positively in need for further information on that subject they didn't know enough about it and preferred not to neglect. Similar findings by Katz et.al,<sup>[18]</sup> who found in their study that the respondents from other countries had a similar view point thus the respondents considered that the information provided by the health care professionals was insufficient so additional information was wanted.

As regards the nurses knowledge about the source of blood collection, the presents study showed that some nurses reported the source of collected blood is venous while other nurses knew the source of collected blood is arterial and little percentage of them know that the source of collected blood is from both vessels while more than half of the sample of nurses didn't know about the source of blood collection. Many studies supported the drawing of the blood from the umbilical vein into the collection bags by using a closed system collection kit. Blood collection from the umbilical vein into the bag takes about 10 minutes, and total collected volume averages about 110ml.<sup>[20]</sup>

Concerning the nurses' knowledge about the type of storage banks, one third of the nurses reported that they knew the private banks as a type of storage while few of them reported public banks and half of the participant nurses didn't know anything about the type of storage . These results are disagreed with the results of a study of Scenci et.al,<sup>[19]</sup> who study donating umbilical cord blood to a public bank or storing in a private bank, the knowledge and preferences of blood donors and pregnant women, they found that, few health professionals have the necessary information to understand the difference between the public and private banks and even fewer health professionals have adequate information education time to provide citizens with independent and accurate information necessary to ensure informed consent for umbilical cord blood storage.

Findings of the present study represented that, nurses had a considerable knowledge regarding the diseases that can be treated by the CCB. They knew that the cord blood can treat immunodeficiency diseases, malignancies, metabolic disorders and bone marrow failure. These results are consistent with the results of Bertarm and William,<sup>[21]</sup> who refer in their study about the potential future transplantation. They showed that the umbilical cord blood contains a sufficient number of hematopoietic stem cells to be used for transplantation. More than 5500 unrelated- donor cord blood stem cells transplants for a variety of pediatric genetics, hematologic, immunologic, metabolic and oncologic disorders have been performed to date. They added, the cord blood include the fact that it is readily available and autologous stem cells have been used for geneotherapy in infants with severe combined immunodeficiency diseases.

Regarding the relationship between nurses' knowledge about the UCBB and the socio-demographic characteristics, the present study revealed that, more than two thirds of the nurses who had adequate knowledge aged 30-40 years and the majority of them had Bachelor's qualifications and exactly half percentage of them had an experience in the obstetrics Nursing field from 10-20 years and act as practitioner obstetric nurse. This

could be because nurses of this middle age have different priorities and interests such as postgraduate studying and looking for occupation rather than starting a family and having children. These findings are in agreement with the results in other countries like Dinc & Sahin,<sup>[2]</sup> who study the pregnant women's knowledge and attitude about stem cells and CB banking and they found that there is a strong positive correlation between the educational level and the knowledge of cord blood banking. Another studies are similar with the present study results which was done by Karagiorgous et al,<sup>[12]</sup> to assess the knowledge about umbilical cord blood banking among Greece citizens and they found that, respondents aged between 18-27 years old seemed to be less informed about the subject of UCBB compared to respondents of other age groups.

On the base of this study barriers were, from the nurses 'point of view is the cost of initiation of such high standardized unit takes the greatest priority. It also requires that umbilical cord blood banks establishments are inspected and accredited by a Competent Authority. Other mentioned barriers perceived by the nurses is the hospital policy and lacking of the time which needed to educate the nurses. The time needed for educating is an avoidable barrier while all nurses in such places underwent planned training courses in the required subjects periodically and as needed. These findings are nearly similar with study of Abdulla et. al,<sup>[14]</sup> in their study to know what nurses and health care providers should know, they found that from the health care providers' point of view the greatest barrier could be the time to educate the patient. Information given to the patients can be misinterpreted, misunderstood, or miss-communicated. The thoroughness of education provided to the patient is critical to the outcome, and yet the time to provide such education is not always available.

## **VI. Conclusion**

Nurses of this study have a lack of knowledge about umbilical cord blood banking from the scientific evidence to support the practice that permits the conduction of such unit in their hospitals. Providing UCBB requires that nurses have unique knowledge and skills, a supportive environment, adequate nursing staffing, applied polices and collaborative relationships among the health care team in the culture of the women's Health Hospital.

## **VII. Recommendations**

Future plans include presenting a condensed educational course and continual training about the use of UCBB and the potential benefits of cord blood banking for the nurses in Women's Health Hospitals, Assiut University, Assiut, Egypt.

Official websites of the Ministry of Health should play a more role in giving updated and evidence-based information about the usefulness and limitations of UCB to the population and inform their environment on its uses particularly it is an important source of hematopoietic stem cells.

Initiation of such banks should be according to the approved standards and parents and care providers understanding the differences between autologus vs allogenic donation and private vs. public banks.

### **Clinical implications:**

Once nurses are armed with considerable knowledge of this subject, they will be equipped to teach their patients about cord blood banking, including all the advantages, disadvantages and storage options.

## **Acknowledgement**

We would like to acknowledge the help of our nurses for their valuable participation.

## **References**

- [1]. K.K Ballen., J.N Barker, Stewart, S.K., ,M.F. Greene &,T.A. Lane. Collection and preservation of cord blood for personal use. *Biology of Blood and Marrow Transplantation*; March 2008, 14(3), 356-363.
- [2]. H. Dinc, & N.H, Sahin, Pregnant women's Knowledge and attitudes about stem cells and cord blood banking. *International Nursing Review*;2009, 56 (2),2009, 250-256.
- [3]. H. Jordan & M D Perlow, Patients' knowledge of umbilical cord blood banking. *Journal of Reproductive Medicine*;2006,51(8), 642-644.
- [4]. J.A, Oulton.The International Council of Nursing Code of Ethics for Nurses( ICN). *International Nursing Review*;2000,47(3), 138-141.
- [5]. G.Yildirim &, N.H, Sahin. Stem cell transplantation and nursing approach. *Istanbul University, Florence Nightingale Nursing Academy. Nursing Journal* ; 2007, 60(15), ,25-31.
- [6]. V. Rocha. Transplants of umbilical-cord blood or bone marrow from unrelated donors in adults with acute leukemia. *The new England journal of Medicine*; 2004, 351(22), 2278-2285.
- [7]. N.S, Fox, F.A Chervenak,, & L.B Mc Cullough.: Ethical considerations in umbilical cord blood banking. *Obstetrics & Gynecology*,111(1),2008, 178-182.[Context Link].
- [8]. N. Tasagias, K.K. Kouzi, A.D, Hamidi,V. Karagiannis, E.Kostidou, and G. Koliakos. Cell recovery sufficient for adult transplantation by additional cord blood collection from placenta. *Transplant Proc.*;2007,39(10):3380-4.
- [9]. W. Ruth &Sue A, :Cord blood banking, best practice and research. *Clinical obstetrics & gynecology*. 2004 vol.18 (6);995-1011.

- [10]. G.C. Stavropoulos & A.C.Papassavas. Cord blood banking and transplantation: a promising reality. Hellenic Society of Haematology, Haema; 2006, 9:736-56.
- [11]. P.Hollands & C.Caule. Private cord blood banking: current use and clinical. Cell Rev.; 2009,5(3):195-203.[PubMed].
- [12]. L.Z. Karagiorgou, M.P.Pantazopoulou, N.C Mainas, A.I. Beloukas, and Kriebardis,A.G. Knowledge about umbilical cord blood banking among Greek citizens. Blood Transfus;2014,Jan;12(Suppl1): s353-s360.
- [13]. L.M Ikuta, Human umbilical cord blood transplantation: What nurses need to know. AACN Advanced Critical Care,19(3);2008,264-267.[Context Link].
- [14]. Y. Abdullah, Cord blood banking; what nurses and healthcare providers should know, The American Journal of Maternal and Child Nursing; 2011,36(6), 344-350.[PubMed].
- [15]. J. Sugarman,, Kaplan, B. Cogswell. and J.Olsol. Pregnant women,s persepectives on umbilical Cord Blood Banking; Journal of Women's Health; 2009,7 (6):747-757.
- [16]. C.V, Fernandez, , K Gordon,, M Van den Hof, S Taweel ,& F Baylis. Knowledge and attitudes of pregnant women with regard to collection, testing and banking of cord blood stem cells. CMAJ, 2010;168:695-698.
- [17]. H. Hatzistilli, O. Zissimopoulou, P. Galanis, .P Perzerakos, A. Zissimopolous, and D. Kaitelidou. Health professionals' knowledge and attitude towards the umbilical cord blood donation in Greece. Hippokratia;2014Apr-Jun.;18(2):110-115..
- [18]. G.Katz, A .Mills, J. Garcia, K. Hooper, C McGuckin and A. Platz, et al., . Banking cord blood stem cells: attitude and knowledge of pregnant women in five Europe countries. Transfusion. 2011;51:578-86.[PubMed].
- [19]. M. Screnci, E. Murgi, G. Pirre, E.Valende, E. Gesuit and F. Corona,et al. Donating umbilical cord blood to a public or storing it in a private bank: knowledge and preferences of blood donors and pregnant women. Blood Transfs. 2012;10:331-337.[PubMed].  
J. Kurtzberg, A D Lyerly, & J. Sugarman. Untying the Gordian knot: Policies, practices and ethical issues related to banking of umbilical cord blood, The Journal of clinical Investigation. 2015; 115(10),2592-2597.doi:10.1172/JCI26690 [Context Link].
- [20]. H.L.Bertarm and T.S.William. Cord blood banking for potential future transplantation. Pediatrics;2007,119,165-170.