

# The Effect of Implementing a Guideline Protocol on Nurses' Knowledge about the Nutritional Requirements of Low Birth-Weight Infants

Hend Abdelhady Salah El-Morsy<sup>1,\*</sup>, Rabab El-Sayed Hassan El-Sayed<sup>2</sup>, Magda Ahmed Abd El Aziz<sup>2</sup>

<sup>1</sup>Neonatal Nursing Department, Biyala Central Hospital, Kafr El-Shaikh, Egypt

<sup>2</sup>Pediatric Nursing Department, Faculty of Nursing, Mansoura University, Egypt

\*Corresponding author: hindshady2233@gmail.com

Received September 12, 2019; Revised October 16, 2019; Accepted November 05, 2019

**Abstract Background:** Optimal nutritional management for low birth weight infants decreases postnatal catabolism, promotes growth, and improves neurodevelopmental outcomes. A guideline protocol about the nutritional requirements is necessary to understand the practical knowledge related to feeding of these infants, decrease variation in knowledge among nurses, and promote the health outcomes for low birth weight infants. **Aim:** This study aimed to assess the effect of implementing a guideline protocol on nurses' knowledge about the nutritional requirements of low birth weight infants. **Research design:** A quasi-experimental design was used. **Setting:** The study was conducted at the neonatal intensive care units affiliated to Health Insurance Hospital, Mansoura Old General Hospital, and Mansoura New General Hospital in El - Mansoura City, Egypt. **Sample:** The study included a convenience sample of 59 nurses working in the previously mentioned study settings. **Tool:** Data were collected by using self-administered questionnaire sheet which composed of two parts. **Part 1:** Characteristics of the studied nurse. **Part 2:** Nurses' knowledge about nutritional requirements of low birth weight infants. **Results:** More than half of the studied nurses had insufficient knowledge about nutritional requirements of low birth weight infants, pre implementation of guideline protocol, while all of the studied nurses had a sufficient knowledge post implementation of guideline protocol, which revealed a significant differences. **Conclusion:** There was a significant improvement in nurses' knowledge about the nutritional requirements of low birth weight infants post implementation of guideline protocol. **Recommendation:** Developing training programs regarding nutritional requirements of low birth weight infants depending on evidence-based guideline protocol for the nurses at neonatal intensive care units is important to improve their knowledge.

**Keywords:** low birth weight infants, neonatal intensive care units, nurses' knowledge, nutritional requirements

**Cite This Article:** Hend Abdelhady Salah El-Morsy, Rabab El-Sayed Hassan El-Sayed, and Magda Ahmed Abd El Aziz, "The Effect of Implementing a Guideline Protocol on Nurses' Knowledge about the Nutritional Requirements of Low Birth-Weight Infants." *American Journal of Nursing Research*, vol. 8, no. 1 (2020): 9-17. doi: 10.12691/ajnr-8-1-2.

## 1. Introduction

Low birth weight (LBW) is one of the greatest serious challenges for maternal and infant health in each developed and developing world. It is the single most important issue that defines improvements in child survival. About 50 % of infant deaths occur among LBW infants. Survivors are at a higher risk for developing malnutrition, recurrent infections and neurodevelopment retardation [1]. Low birth weight is defined as body weight less than 2500 grams at birth regardless of gestational age. Overall, 15 to 20 % of all births globally are projected to be low birth weight, comprising more than 20 million LBW infants born each year [2].

The causes of LBW are multi-factorial and birth weight is determined by the interaction of both socio-demographic

and biological factors [3]. Preterm birth is the predominant cause of LBW in developed countries, while intrauterine growth restriction is the predominant cause of LBW in developing countries. Furthermore, demographic risk factors such as young maternal age, early pregnancy, low maternal literacy and poor maternal nutritional status before and during pregnancy are well known as risk factors for poor birth outcomes [4]. Preterm low birth weight infants have small nutrient stores at birth, take time to start enteral feeding, are at risk of developing severe nutritional deficits, and often suffer from poor development. All these risks are associated with worse neurodevelopmental outcomes [5].

The major goal of optimal nutrition of LBW babies is to improve their immediate survival and achieve optimal short-term and long-term growth and development. While deciding the feeding approach, the weight, as well as the maturity of the neonate, should be taken into consideration

[6]. Also, suboptimal nutrition is related to poorer head growth; persevering littler head size leads to poor psychomotor and mental skills, higher rates of cerebral palsy, and autism [7]. Moreover, faster weight gain in preterm LBW infants may be related with an expanded chance of overweight and obesity; higher body fat percentage, waist circumference, serum triglycerides, and blood pressure; endothelial dysfunction; and adverse long-term cardiovascular outcomes. Therefore, monitoring and ensuring optimal weight gain is essential to prevent long-term complications [8].

Nurses are a vital component in nutritional aid because they are responsible for providing dietary formulas. On the other hand, several studies have indicated that although nutrition is a major concern in hospitals, it has a low priority and there is very little literature on this topic. Minimal consideration has been given to how nurses are administered enteral feeding. There are wide variations in the management of nutritional support that may be linked to knowledge gaps, the use of multiple sources of information, or lack of standardization in the care environment. Maintaining continuity in the feeding of critically ill infants was described as a concern secondary to the lack of knowledge of nurses [9].

Although the role of the nurse in relation to feeding depends on the organization, the following are suggested for nursing responsibilities: (1) to recognize feed readiness; (2) to recognize feeding habits characteristic of preterm infants; (3) to understand the history and current medical condition of the infant; (4) to consider the environment, behavioral status, time of day, type of nipple and positioning; (5) understand the rationale for the various facilitation strategies and use them appropriately; (6) evaluate the feeding capacity and tolerance; (7) recognize infants with inadequate growth, structural defects or irregular feeding habits that would benefit from direct therapy; and (8) offer help for mothers who choose to breast-feed [10].

Individual clinicians base their initiation and advancement practices for enteral feedings on their own historical experiences leading to wide variations in nutrition-related practice, therefore, recommendations that focus on initiation, advancement, and fortification of enteral feeding, along with a feed intolerance algorithm, are important for handling these vulnerable infants in order to provide optimal nutrition [11].

Evidence-based practice recommendations are important for the care of critically ill infants. This might allow establishing a practical feeding guideline avoiding complications and making best use of available resources, it is critical that every neonatal care unit that looks after these infants implements a consistent feeding protocol based on current best evidence for vulnerable infant groups at higher risk of developing NEC [12]. The benefit of these recommendations lies in the fact that it offers comprehensive nutritional support through a combination of early TPN and early enteral feeding, followed by a steady decrease in TPN as the amount of enteral feed increased gradually [13].

the development and implementation of consistent evidence-based feed recommendations for VLBW infants in NICU, along with continuous monitoring and feedback,

resulted in a significant reduction in postnatal growth restriction (PNGR) at the time of discharge to home. Such effects have also been seen in ELBW babies, a population is known to be at the highest risk of PNGR [14]. Research for the adoption of the evidence-based oral feed advancement protocol in the neonatal intensive care unit have also been shown to minimize variation in feeding practices, promote shortened transition times from gavage to oral feed, increase bottle-feed quality, and the length of stay in the NICU significantly decreases [15].

Also, recent literature indicates that more aggressive parenteral nutrition supply, early initiation of enteral feeding, more rapid advance in the volume of enteral feeding, and early breastmilk fortification are well tolerated and promote nutrition, growth, and health outcomes. Clinical attainable and evidenced-based enteral and parenteral nutrition support strategies that promote the best outcomes for very low birth weight infants [16].

## 1.1. Significant of the Study

Optimal feeding of LBW infants is important for immediate survival as well as for subsequent growth. Unlike their normal birth weight infants, these infants have vastly different feeding abilities and nutritional requirements. It is important for all health care providers caring for such infants to be well trained with the necessary skills required for feeding LBW depending on up-to-date guideline protocol. It is equally important to have a protocol based approach to managing various issues that occur while feeding LBW.

## 1.2. Aim of the Study

Assess the effect of implementing a guideline protocol on nurses' knowledge about the nutritional requirements of low birth-weight infants

## 1.3. Research Hypothesis

- Neonatal intensive care unit nurses have insufficient knowledge about the nutritional requirements of low birth weight infants.
- Nurses' knowledge about LBW feeding will be improved after introducing a guideline feeding protocol for low birth weight infants admitted in the NICU.

## 2. Subjects

### 2.1. Study Design

A quasi experimental design was used.

### 2.2. Setting

The study was conducted in the neonatal intensive care units (NICU) affiliated to Health Insurance Hospital (HIH), Mansoura Old General Hospital (MOGH), and Mansoura New General Hospital (MNGH) in El - Mansoura City, Egypt.

## 2.3. Subjects

A convenient sample of all available nurses who working in the previous mentioned settings during the study period were recruited to achieve the aim of the study  $n= (59)$ .

## 2.4. Tool of Data Collection

**Tool: Self - administered Questionnaire Sheet for nurses (pre & immediate post test):** It was developed by the researcher after reviewing the related literature and translated into the Arabic language to assess nurses' knowledge about nutritional requirements of LBW infants. It divided into:

### Part 1 Characteristics of the studied nurse

such as age, gender, workplace, level of education, marital status, years of experience as a neonatal nurse, and attending courses about care of LBW infants.

**Part 2 Nurse's knowledge about the nutritional requirement of LBW infants (pre/immediate post test).** Which covered the following items:

- Feeding of stable LBW infants.
- Different methods of LBW feeding.
- Manifestations of feeding intolerance.
- Nutritional supplements of LBW infants.
- Signs of nutritional supplements deficiencies.
- Common misbelieves about LBW feeding.

**Scoring system:** According to the answers collected from the neonatal nurses; a scoring system was applied to interpret nurses' knowledge about the nutritional requirement of LBW infants. The studied nurses' answers were checked and compared with the pre designed model answers. Accordingly, their knowledge was categorized into correct answer that was given a score one, while zero was given for incorrect, missed or unknown answer. The total scoring of the studied nurses' knowledge was obtained (54) and the median score was estimated to be (33) and considered as a cut off point, based on the median score, nurses' knowledge were categorized into

- Insufficient knowledge if the obtained score was less than 33
- Sufficient knowledge if the obtained score was equal to or more than 33

## 3. Method

### 3.1. Preparatory Phase

- It was started with the administrative process, in which the official approval was obtained from the Research Ethical Committee of the Mansoura Faculty of Nursing, the official approvals were obtained from the hospitals' administrative authorities in the previously mentioned settings in response to the official letters sent from the Faculty of the Nursing Mansoura University to conduct the study after explaining the purpose of the study.
- develop tools for data collection and develop the content of the guideline protocol by the researcher after reviewing the related literature using available books, articles, periodicals and magazines were

necessary to be acquainted with all aspects of the study problem

- A constructed guideline protocol about the nutritional requirements of low birth weight infants was designed by the researcher in a simple Arabic language after reviewing the related literature and based on the actual needs assessment of the studied nurses.
- A structured questionnaire sheet for nurses was developed by the researcher after reviewing the related literature and translated into the Arabic language to assess nurses' knowledge about the nutritional requirements of LBW infants.
- The content validity of the study tools was assessed and revised by five experts in the field of nursing care for clarity, content and relevance or irrelevance of content. According to their suggestion, the required modification was done.

### 3.1.1. Ethical Consideration

The researcher followed Ethical Research principles as the following:

- An oral approval was obtained from the nurses after explaining the aim and nature of the study.
- The researcher emphasized that participation is voluntary and each participant has the right to withdraw from the study at any time without any responsibility.
- Privacy and confidentiality of the collected data were assured throughout the whole study phases.

## 3.2. Exploratory Phase

### 3.2.1. Pilot study

It was conducted on 10 % of the study sample size (6 nurses), it was carried out to evaluate the content validity, reliability, and applicability of the study tools. The subjects of the pilot study were excluded from the study's total sample to prevent contamination.

### 3.2.2. Operational phase/fieldwork

- Data collection extended for six months started from the first of December 2017 to the end of May 2018.
- The researcher started by introducing herself to the nurses and giving them a brief idea about the aim and the nature of the study.
- The framework of the study was carried out in 4 phases as the following:

#### 1) Assessment phase

- Each nurse was interviewed individually before applying the guideline protocol to collect nurses' data baseline using the study tool part (1).
- Assessment of nurses' knowledge about nutritional requirements of LBW infants using the study tool part (2).

#### 2) Planning phase

- Based on the findings of the assessment phase, the researcher designed the guideline protocol about the nutritional requirements of low birth weight infants depending on the actual needs assessment of the nurses through reviewing the related literature and based on recent evidence guidelines for the nutritional requirements of low birth weight infants.

- In this phase, six sessions were planned by the researcher for the nurses to provide them with knowledge regarding the nutritional requirements of low birth weight infants.
- A booklet was written in a simple Arabic language and supplemented by photos to help in the understanding of its content.

### 3) Implementation phase

- Each didactic session took between 30-45 minutes to discuss its items, taking into consideration the attention span of nurses.
- Each session started at 10 am. for nurses who attended the morning shift and at 2:30 pm. for nurses who attended the afternoon shift.
- The studied nurses were divided into small groups, each one has consisted of six to eight nurses. During the sessions, the researcher used teaching methods in the form of lectures, group discussion, questions, and other different teaching methods as brainstorming.
- Guiding colored booklet about the nutritional requirements of low birth weight infants were given to each nurse after the assessment phase
- Brief, clear and simple words used during the session by the researcher, as well as at the end of each session, a summary was given.

### 4) Evaluation phase

- Every nurse was interviewed separately after the guideline protocol was conducted to evaluate the level of knowledge by using tool part (2)
- Comparison between nurses, pre/immediate post test finding was done to determine the effect of the educational sessions on nurses, knowledge about nutritional requirements of low birth-weight infants.

## 3.3. Statistical Analysis

The data were transformed into the version of the Statistical Package for Social Sciences (SPSS) for windows version 20.0 by which the analysis was conducted applying frequency tables with percentage. Data were revised, coded and analyzed. Qualitative data were represented as number and percent. The-chi square test ( $\chi^2$ ), was used for comparison between groups as appropriate. Paired t-test used for comparison between two Paired groups, while the Pearson correlation was used for the correlation between continuous parametric data. All tests were performed at the level of significance "p – value "equal or less than 0.05 was considered statistically significant. Quantitative data were described as mean  $\pm$  SD (standard deviation) for parametric and median data for non – parametric data.

## 4. Results

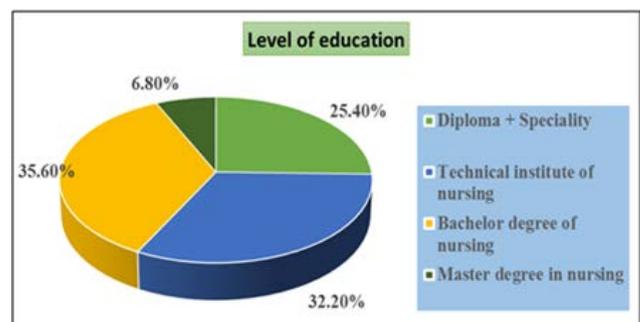
Table 1 revealed that 59.3 % of the studied nurses were in the age group from 20 to 30 years of age. As regards to years of experience, 37.3% of the studied nurses had 5 to less than 10 years of working in the NICU. Also, 61% of the NICU nurses received training program about low birth weight infant care. Furthermore, all the studied nurses were female (100%). Regarding the workplace

37.3% of the studied nurses worked at Mansoura old general hospital, 84.7% of them are staff nurses and 66.1% of them live in a rural area, as regards the marital status of the studied nurses 86.4% of them were married and 78.0% of the studied nurses have a nutritional protocol for low birth weight infants.

Figure 1 reveals that 35.6% of the studied nurses had a bachelor's degree in nursing, and 6.8% had a master's degree in nursing.

**Table 1. Distribution of the studied nurses according to their general characteristics (n=59)**

Characteristics	Number	%
<b>Age (years)</b>		
20-30	35	<b>59.3</b>
31-40	19	32.2
41-50	5	8.5
X $\pm$ SD		28.92 $\pm$ 6.71
<b>Years of experience in NICU</b>		
$\leq 1$	14	23.7
1 $\leq$ 5	13	22.0
5 $\leq$ 10	22	<b>37.3</b>
10 & more	10	16.9
X $\pm$ SD		6.5 $\pm$ 3.2
<b>Attending previous training courses about low birth weight infant care</b>		
Yes	36	<b>61.0</b>
No	23	39.0
<b>Sex</b>		
Female	59	<b>100.0</b>
<b>Workplace</b>		
Health Insurance hospital	19	32.2
Mansoura old general hospital	22	<b>37.3</b>
Mansoura new general hospital	18	30.5
<b>Nature of work</b>		
Staff Nurse	50	<b>84.7</b>
Nurse Supervisor	9	15.3
<b>marital status</b>		
Single	8	13.6
Married	51	<b>86.4</b>
<b>Residence</b>		
Rural	39	<b>66.1</b>
Urban	20	33.9
<b>Having a nutritional protocol for low birth weight infant in their NICU/ workplace</b>		
Yes	46	<b>78.0</b>
No	13	22.0



**Figure 1.** Percentage distribution of the studied nurses according to their educational level (n= 59)

Table 2 clarified that 69.5% of the studied nurses had insufficient knowledge about nutritional requirements of stable, low birth weight infants, pre implementation of guideline protocol which is improved to become 100.0% of the studied nurses had sufficient knowledge immediately post implementation of guideline protocol with a statistical significant difference at  $p \leq 0.001$ .

Table 3 As regards nurses' total knowledge about different feeding methods of low birth weight infants. It was found that 42.4% of the studied nurses had insufficient knowledge, pre implementation of guideline protocol, while 100% of the studied nurses had sufficient knowledge immediately post implementation of guideline protocol with a statistical significant difference at  $p \leq 0.001$ .

Table 4 proves that there was a statistical significant difference in relation to total nurses' knowledge about signs of feeding intolerance of low birth weight infants, pre and immediately post implementation of guideline protocol ( $\chi^2 = 36.796$  &  $P \leq 0.001$ ).

Table 5 clarified that there was a statistical significant difference in relation to total nurses' knowledge score about nutritional supplements of low birth weight infants, pre and immediately post implementation of guideline protocol ( $\chi^2 = 80.914$  &  $P \leq 0.001$ ). It was noted that

81.4% of the studied nurses had insufficient knowledge pre implementation of guideline protocol, while 100.0% of the studied nurses had sufficient knowledge immediately post implementation of guideline protocol with a statistical significant difference at  $p \leq 0.001$ .

Table 6 proves that there was a statistical significant difference in relation to total nurses' knowledge score about common misbeliefs about nutritional requirements of low birth weight infants, pre and immediately post implementation of guideline protocol ( $\chi^2 = 49.759$  &  $P \leq 0.001$ ).

Table 7 It is clear from that there was a statistical significant difference in relation to total nurses' knowledge score about nutritional requirements of low birth weight infants, pre and immediately post implementation of guideline protocol ( $\chi^2 = 53.901$  &  $P \leq 0.001$ ).

Table 8 demonstrated that there was no relation between characteristics of the studied nurses and their total knowledge about nutritional requirements of low birth weight infants, pre and immediately post implementation of guideline protocol, except related to nurses' level of education, and their knowledge level pre implementation of guideline protocol ( $\chi^2 = 13.029, 8.657$  &  $P \leq 0.011, 0.013$ ).

**Table 2. Distribution of the studied nurses according to their total knowledge score about nutritional requirements of stable low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	18	30.5%	59	100.0%	62.831	$\leq 0.001^*$
Insufficient	41	69.5%	0	0.0%		

(\* statistically significant at  $p \leq 0.05$ ).

**Table 3. Distribution of the studied nurses according to their total knowledge about different feeding methods of low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	34	57.6%	59	100.0%	31.720	$\leq 0.001^*$
Insufficient	25	42.4%	0	0.0%		

(\* statistically significant at  $p \leq 0.05$ ).

**Table 4. Distribution of the studied nurses according to their total knowledge about signs of feeding intolerance of low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	29	49.2%	58	98.3%	36.796	$\leq 0.001^*$
Insufficient	30	50.8%	1	1.7%		

(\* statistically significant at  $p \leq 0.05$ ).

**Table 5. Distribution of the studied nurses according to their total knowledge about nutritional supplements of low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	11	18.6%	59	100.0%	80.914	$\leq 0.001^*$
Insufficient	48	81.4%	0	0.0%		

(\* statistically significant at  $p \leq 0.05$ ).

**Table 6. Distribution of the studied nurses according to their total knowledge about common misbeliefs about nutritional requirements of low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	24	40.7%	59	100.0%	49.759	$\leq 0.001^*$
Insufficient	35	59.3%	0	0.0%		

(\* statistically significant at  $p \leq 0.05$ ).

**Table 7. Distribution of the studied nurses according to their total knowledge about nutritional requirements of low birth weight infants pre and immediate post implementation of guideline protocol (n=59)**

Nurses' Knowledge	Pre		Immediate post		$\chi^2$	P
	No.	%	No.	%		
Sufficient	22	37.3%	59	100.0%	53.901	≤0.001*
Insufficient	37	62.7%	0	0.0%		

(\*) statistically significant at  $p \leq 0.05$ .

**Table 8. Association between nurses' total knowledge score about the nutritional requirements of low birth weight infants and their characteristics pre and immediate post implementation of guideline protocol (n=59)**

Variables	Total knowledge				Test of significance	
	Pre		Immediate post		$\chi^2$ & P <sub>1</sub>	$\chi^2$ & P <sub>2</sub>
	Sufficient %	Insufficient %	Sufficient %	Insufficient %		
<b>Age (years)</b>						
20-30	54.5%	62.2%	59.3%	0%	2.264 0.520	-----
31-40	36.4%	29.7%	32.2%	0%		
41-50	9.0%	8.1%	8.5%	0%		
<b>Workplace</b>						
Health insurance hospital	40.9%	27.0%	32.2%	0%	<b>8.657</b> <b>0.013*</b>	-----
Mansoura old general hospital	13.6%	51.4%	37.3%	0%		
Mansoura new general hospital	45.5%	21.6%	30.5%	0%		
<b>Level of education</b>						
Diploma + specialty	18.2%	29.7%	25.4%	0%	<b>13.029</b> <b>0.011*</b>	-----
Technical institute of nursing	27.3%	35.1%	32.2%	0%		
Bachelor degree of nursing	36.4%	35.1%	35.6%	0%		
Master degree in nursing	18.2%	0.0%	6.8%	0%		
<b>Nature of work</b>						
Staff Nurse	80.0%	87.1%	84.7%	0%	4.194	-----
Nurse Supervisor	20.0%	12.9%	15.3%	0%	0.123	
<b>Years of experience in NICU</b>						
≤1	9.1%	32.4%	23.7%	0%	5.547 0.136	-----
1 ≤5	31.8%	16.2%	22.0%	0%		
5 ≤10	45.5%	32.4%	37.3%	0%		
10 &more	13.6%	18.9%	16.9%	0%		
<b>Attending of previous training courses about low birth weight infant care</b>						
Yes	72.7%	54.1%	61.0%	0%	2.022	-----
No	27.3%	45.9%	39.0%	0%	0.155	
<b>Having a nutritional protocol for low birth weight infant in their NICU/ workplace</b>						
Yes	68.2%	83.8%	78.0%	0%	1.955	-----
No	31.8%	16.2%	22.0%	0%	0.162	

P<sub>1</sub>: Relation between the characteristics and pre knowledge.

P<sub>2</sub>: Relation between the characteristics and immediate post knowledge.

(\*) statistically significant at  $p \leq 0.05$ .

## 5. Discussion

The results of the current study revealed that more than half of the studied nurses' age was between 20 to 30 years old, with a mean age of  $28.92 \pm 6.71$  years. This finding is consistent with [17] who conducted a study about "nurses' knowledge and performance regarding care of neonate with necrotizing enterocolitis at neonatal intensive care units of Benha Hospitals" and reported that more than one third of the participants were in the age group from 25 to less than 30 years of age, with the mean age of them  $25.93 \pm 4.36$ . Moreover, [18] who conducted a study about "knowledge and attitude of nurses toward kangaroo mother care in the four main hospitals in Ghana" and reported that, most of the nurses interviewed were between the ages of 21-30 years. This result could be related to the junior nurses, who were almost working as a staff nurse in

neonatal intensive care units which considered a dynamic and fast moving environment that needs active young nurses.

Regarding nurses' years of experience, the current study clarified that one-third of the studied nurses had 5 to less than 10 years of working experience in the NICU with the mean years of experience of them was  $6.5 \pm 3.2$  years. This result was in an agreement with [19] who conducted a study about "the knowledge, attitude, and practice of nursing management of birth asphyxia in Nigeria" and reported that, one- third of the studied nurses fall within 6-10 years of experience. This result was in disagreement with [20] who conducted a study about "assessment of nursing care provided to neonates undergoing phototherapy in Helwan and Ain shams hospitals, Egypt" and stated that more than one-third of them had from  $10 < 15$  years of experience with the mean years of experience was  $20 \pm 0.88$  years.

In relation to the studied nurses' attainment of previous training courses, the present study revealed that more than half of the studied nurses attended previous training courses related to low birth weight infant care. Similarly, [21] who conducted a study about "the effect of educational program on nurse's knowledge and practices about nasogastric tube feeding at neonatal intensive care units in Banha Hospitals" and reported that, nearly half of the participants had attended previous training courses for one time related to neonatal care. While it disagreed with [22], at a study about "effect of nursing intervention guidelines on nurses' knowledge and performance regarding prevention and management of intraventricular hemorrhage among preterm neonates in Tanta University, Egypt" and found that, more than half of studied nurses not attend any training courses about care of high risk neonates.

The current study findings illustrated that one-third of the studied nurses had a bachelor's degree in nursing. This finding is in an agreement with [23] who conducted a study about "pediatric nurses' knowledge and practices regarding management of preterm baby in neonatal intensive care unit in Sudan" and reported that, more than half of pediatric nurses working in the unit were had bachelor's degrees. On the other hand, this finding is in a disagreement with [24] who conducted a study about "nurses' performance in premature transition from gavage to breastfeeding at NICU in Cairo University Hospitals" and found that, more than half of nurses had a diploma of secondary nursing school.

Concerning the total nurses' knowledge about the nutritional requirements of stable low birth weight infants, the study showed that two-thirds of the studied nurses had insufficient knowledge about nutritional requirements of stable low birth weight infants, pre implementation of guideline protocol. On the other hand, all of them had sufficient knowledge immediately post implementation of guideline protocol. This finding was in an agreement with [25] who conducted a study about "effectiveness of structured teaching programme on knowledge regarding care of low birth weight babies among staff nurses working at hospitals of Vidarbha region" and proved that the study subjects have average to good knowledge regarding care of low birth weight babies and gained excellent knowledge regarding care of low birth weight babies after structured teaching.

The current study reflected the positive effect of the implementation of guideline protocol on total nurses' knowledge about different feeding methods of low birth weight infants, immediately post implementation of guideline protocol with a statistical significant difference. This result is in an accordance with [26] who conducted a study entitled "effect of a comprehensive total parenteral nutrition training program on knowledge and practice of nurses in NICU" and indicated that the mean scores of nurses' knowledge before and afterward parenteral nutrition training program were  $11.93 \pm 1.91$  and  $17.56 \pm 1.59$ , respectively. Comparing the mean scores of the nurses' familiarity, before and after taking the training course, demonstrated a significant difference ( $p \leq 0.0001$ ). Obviously, the current study achieved a significant improvement in the total studied nurses' knowledge regarding signs of feeding intolerance of low birth weight infants. As regards to this aspect, [27] who conducted a

study about "health-care professionals' approach in feeding term small-for-gestational age infants and its potential implications to later growth outcomes" and found that, one third of health-care professional know that feeding intolerance was the most concerns on short-term outcomes for small-for-gestational age infants.

Concerning nurses' knowledge about nutritional supplements of low birth weight infants, the present study revealed that more than three-quarters of the studied nurses had insufficient knowledge about nutritional supplements of low birth weight infants, pre implementation of guideline protocol. This result is similar to the result of a study was conducted by [28] entitled "knowledge of healthcare providers regarding breastfeeding preterm infants" and found that less than half of healthcare providers correctly answered questions about the use of human milk fortifier, nutrient requirements of preterm infants, and characteristics of preterm human milk.

The current study proofed a significant improvement in total nurses' knowledge about common misbelieves about nutritional requirements of low birth weight infants, which clarified that more than half of the studied nurses had insufficient knowledge, pre implementation of guideline protocol, while the majority had sufficient knowledge immediately post implementation of guideline protocol. This finding is on track with [29] who conducted a study entitled "educational intervention promoting an evidence-based transition from gavage to direct breastfeeding in a NICU" and stated that, nursing evidence-based educational intervention can improve NICU nurses' practice, beliefs, and knowledge regarding the transition of preterm infants from gavage to direct breastfeeding. However, a review of the format of the educational intervention is recommended to refute more efficiently nurses' beliefs. The researcher supposes that, when there are nurses with misbelieves and myths, they will affect on mother, attitudes, and practice as mothers are educated and are counseled by nurses, therefore they need to be more knowledgeable to provide counseling services correctly.

Regarding the total nurses' knowledge about nutritional requirements of low birth weight infants. The present study clarified that more than half of the studied nurses had insufficient knowledge, pre implementation of guideline protocol. This finding was in disagreement with [30] who conducted a study about "nurses' knowledge regarding nursing care of preterm infants in Sudan" and reported that two-thirds of the study sample responded with correct complete answers regarding the feeding of preterm infants.

Regarding relations between characteristics of the studied nurses and their total knowledge about nutritional requirements of low birth weight infants, the findings of the current study prove that there was a statistical significant relation between nurses' level of knowledge and nurses' level of education, pre implementation of guideline protocol. It was observed that nurses who had sufficient knowledge had a bachelor degree in nursing. This finding is in agreement with Aziz, et al., [31] in their a study about "assessment quality of nursing care provided to neonates with respiratory distress syndrome at intensive care unit" and found highly significant relation between level of education and nurses' knowledge toward

quality of nursing care in neonatal respiratory distress syndrome by  $p\text{-value} \leq 0.05$ . On the contrary, this finding is versus to the finding of a study was conducted by [32] about "the knowledge regarding assessment of high risk neonates among staff nurses and nursing students in selected hospitals" who stated that there is no significant association between the levels of knowledge regarding assessment of high risk neonates among nurses with their level of education.

## 6. Limitations of the Study

Nurses' work overload and unavailability of all nurses at some times to carry out the guideline protocol and reassessed their knowledge, resulting in difficulty in implementation and a long time for data collection.

## 7. Conclusion

Based on the findings of the current study, it is concluded that: There was a significant improvement in nurses' knowledge about nutritional requirements of low birth weight infants immediately post implementation of guideline protocol. This improvement reflects the positive effect of the guideline protocol on nurses' knowledge.

## 8. Recommendations

- Developing training programs regarding nutritional requirements of low birth weight infants depending on evidence-based guideline protocol for the nurses at neonatal intensive care units is important to improve their knowledge.
- Designing a booklet containing the knowledge, related to the nutritional requirements of LBW infants for nurses working in the NICU to ensure that, it is in their hands and acts on it as, a standardized guideline protocol for the provision of the standard of LBW nutritional care.

## Approach for Further Studies

Another study to assess the effect of implementing LBW infant nutritional guidelines protocol on mothers' knowledge and their practices post NICU discharge and survivors.

## Acknowledgements

Special thanks should be given to the studied nurses who are helping me to conduct this study, although their stressful work and limited time.

## References

- [1] Bhimwal, R. K., Makwana, M., Chouhan, H. K., Gupta, M., Lal, K., & Jora, R. (2017). A study of various determinates and incidence of low birth weight babies born in Umaid hospital, Jodhpur (Western Rajasthan). *International Journal of Contemporary Pediatrics*, 4(4), 1302-1309.
- [2] World Health Organization (2018). New global estimates on preterm birth published. *WHO*.
- [3] Bansal, P., Garg, S., & Upadhyay, H. P. (2019). Prevalence of low birth weight babies and its association with socio-cultural and maternal risk factors among the institutional deliveries in Bharatpur, Nepal. *Asian Journal of Medical Sciences*, 10(1), 77-85.
- [4] Talie, A., Taddele, M., & Alemayehu, M. (2019). Magnitude of Low Birth Weight and Associated Factors among Newborns Delivered in Dangla Primary Hospital, Amhara Regional State, Northwest Ethiopia, *Journal of Pregnancy*.
- [5] Embleton, N. D., & Simmer, K. (2014). Practice of parenteral nutrition in VLBW and ELBW infants. In *Nutritional Care of Preterm Infants* (Vol. 110, pp. 177-189).
- [6] Karger Publishers. Gupte, S., (2016). Low Birthweight Neonates: Aspects of Feeding in Resource-limited Settings. *EC Paediatrics* 2.3, 143-152.
- [7] Lee, K. A., & Hayes, B. C. (2015). Head size and growth in the very preterm infant: a literature review. *Research and Reports in Neonatology*, 5, 1.
- [8] Wang, G., Johnson, S., Gong, Y., Polk, S., Divall, S., Radovick, S., ... & Chen, Z. (2016). Weight gain in infancy and overweight or obesity in childhood across the gestational spectrum: a prospective birth cohort study. *Scientific reports*, 6, 29867.
- [9] Mula, C. (2014). Nurses' Competency and Challenges in Enteral feeding in the Intensive Care Unit (ICU) and High Dependency Units (HDU) of a referral hospital, Malawi. *Malawi Medical Journal*, 26(3), 55-59.
- [10] Hockenberry, M. J., & Wilson, D. (2014). *BOPOD-Wong's Nursing Care of Infants and Children*. Elsevier Health Sciences.
- [11] Shakeel, F., Napolitano, A., Newkirk, M., Harris, J. E., & Ghazarian, S. R. (2015). Improving Clinical Outcomes of Very Low Birth Weight Infants by Early Standardized Nutritional Management. *ICAN: Infant, Child, & Adolescent Nutrition*, 7(6), 328-337.
- [12] Paul, S. P., Kirkham, E. N., Hawton, K. A., & Mannix, P. A. (2018). Feeding growth restricted premature neonates: a challenging perspective. *Sudanese journal of paediatrics*, 18(2), 5.
- [13] Ehrenkranz, R. A. (2014). Extrauterine growth restriction: is it preventable?. *Jornal de pediatria*, 90(1), 01-03.
- [14] Graziano, P. D., Tauber, K. A., Cummings, J., Graffunder, E., & Horgan, M. J. (2015). Prevention of postnatal growth restriction by the implementation of an evidence-based premature infant feeding bundle. *Journal of Perinatology*, 35(8), 642.
- [15] Kish, M. Z. (2014). Improving preterm infant outcomes: implementing an evidence-based oral feeding advancement protocol in the neonatal intensive care unit. *Advances in Neonatal Care*, 14(5), 346-353.
- [16] Thoene, M. K., Lyden, E., & Anderson-Berry, A. (2018). Improving Nutrition Outcomes for Infants < 1500 Grams With a Progressive, Evidenced-Based Enteral Feeding Protocol. *Nutrition in Clinical Practice*, 33(5), 647-655.
- [17] Zaki, A. M., El-Sayed, E. M., Said, K. M., & Ali, R. H. (2018). Assessment of Nurses' Performance Regarding Care for Neonates with Necrotizing Enterocolitis at Intensive Care Units. *Egyptian Journal of Health Care*, 9(3), 111-124.
- [18] Adzitey, S. P., Wombeogo, M., Mumin, A. H., & Adzitey, F. (2017). Knowledge and Attitude of Nurses in the Tamale Metropolis toward Kangaroo Mother Care (KMC). *Annals of Medical and Health Sciences Research*.
- [19] Ezenduka, P. O., Ndie, E. C., & Oburoh, E. T. (2016). Assessment of knowledge, attitude, and practice of nursing management of birth asphyxia in federal medical centre Asaba, Delta State-Nigeria. *Clinical Nursing Studies*, 4(2), 21.
- [20] Mohamed Ibrahim, M., El-Sayed Ouda, W., Salah Ismail, S., & Abdal semia Elewa, A. (2019). Assessment of Nursing Care Provided to Neonates Undergoing Phototherapy. *Egyptian Journal of Health Care*, 10, 1-12.
- [21] Mohammed, A. A., & Abdel Fattah, S. A. (2018). The effect of Educational Program on Nurse's Knowledge and Practices about Nasogastric Tube Feeding at neonatal intensive care units. *Journal of Nursing Education and Practice*, 8(8).
- [22] Abo-El Ezz, A. A., Alseraty, W. H., & Farag, N. H. (2019). Effect of Nursing Intervention Guidelines on Nurses' Knowledge and

- Performance Regarding Prevention and Management of Intraventricular Hemorrhage among Preterm Neonates. *IOSR Journal of Nursing and Health Science*, 8(3). 62-73.
- [23] Amoula, I. W., & Kambal, E. I. (2016). Pediatric Nurses' Knowledge and Practices Regarding Nursing Management of Premature Babies in Neonatal Intensive Care Unit at Soba University Hospital, Khartoum State, Sudan, *International Journal of Recent Research in Life Sciences(IJRRLS)* , 3(4): 1-9.
- [24] Salah Ismail, S., & Hassan Bayoumy, M. (2017). Nurses' Performance in Premature Transition from Gavage to Breastfeeding: Effect of Education Program. *Egyptian Journal of Health Care*, 8(1), 163–181.
- [25] Phanase, B. N. (2016). Effectiveness of Structured Teaching Programme (STP) on knowledge regarding care of low birth weight babies among staff nurses working at hospitals of Vidarbha region. *International Journal of Nursing Education and Research*, 4(2), 95-98.
- [26] Ameri, Z. D., Vafaee, A., Sadeghi, T., Mirlashari, Z., Ghoddoosi-Nejad, D., & Kalhor, F. (2016). Effect of a Comprehensive Total Parenteral Nutrition Training Program on Knowledge and Practice of Nurses in NICU. *Global journal of health science*, 8(10), 56478-56478.
- [27] Lee, L. Y., Muhardi, L., Cheah, F. C., Supapannachart, S., Teller, I. C., Bindels, J., ... & van Elburg, R. M. (2018). Health-care professionals' approach in feeding term small-for-gestational age infants and its potential implications to later growth outcomes. *Journal of paediatrics and child health*, 54(4), 370-376.
- [28] Yang, Y., Li, R., Wang, J., Huang, Q., & Lu, H. (2018). Knowledge of healthcare providers regarding breastfeeding preterm infants in mainland China. *BMC pediatrics*, 18(1), 251.
- [29] Ziadi, M., Héon, M., Aita, M., & Charbonneau, L. (2016). A pilot nursing educational intervention promoting an evidence-based transition from gavage to direct breastfeeding in a NICU. *Journal of Neonatal Nursing*, 22(3), 124-137.
- [30] Elzubeir, E. I. D. (2015). Nurses' Knowledge regarding Nursing Care of preterm Infants in Wad Medani Pediatric Teaching Hospital, Gezira State, Sudan (Doctoral dissertation, University Of Gezira).
- [31] Aziz, A. R., & Mansi, Q. H. (2017). Assessment Quality of Nursing Care Provided to Neonates with Respiratory Distress Syndrome at Intensive Care Unit in AL-Nasiriyah City Hospitals. *kufa Journal for Nursing sciences*, 7(2), 1-12.
- [32] Prasanna, K., Sheelu, J., & Indira, D. S. (2016). Assess the knowledge regarding assessment of high risk neonates among staff nurses and nursing students in selected hospitals at Nellore, AP. *IJAR*, 2(6), 730-4.



© The Author(s) 2020. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).