

ORIGINAL ARTICLE

The Role of an Interventional Program in Improving the Nurses' and Practice in Neonatal Nasogastric Intubation and Feeding at Duhok City

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ABSTRACT

Globally, less than 2 % of children admitted into hospitals require intensive care services. However, children admitted to neonatal and pediatric intensive care units (ICUs) are at increased risk of mortality. Assisted feeding, often by nasogastric tube (NGT), also known as Enteral Nutrition (EN), is one of a set of interventions that form an essential package of facility based services. When fully implemented, feeding (oral or nasogastric) has the potential to substantially reduce neonatal mortality and morbidity, especially for low-birth weight neonates. To evaluate the nurses' practice regarding neonatal NGT Feeding and to assess the role of an interventional program on improving their practice A quasi experimental, pre and post program study included (53) nurses who worked at neonatal intensive-care unit and semi neonatal intensive care unit in the Heevi Pediatric Hospitals and neonatal intensive care unit in the Maternity hospital from October 15, 2021 to December 18, 2022 with regard to inserting nasogastric tube and feeding through NG tube before and after their training program, the data were collected through the use of a check list that focused on nurses' practice. After assessing the pretest evaluation an educational program was given to the Nurses by the researcher for (three months). After one month, then after three months after that, Nurses' practice regarding nasogastric tube insertion and feeding through nasogastric tube was evaluated, using the same tools which were used in pre-program implementation by other trained and qualified researcher to reduce bias. The data were coded and entered in Statistical Package for the Social Sciences (SPSS) version 22 for analysis. Tests were considered significant when p-value <0.05. The study included 53 nurses. 73.7% were female, 84.9% aged 20-29 years, 83% had institute diploma, 47.2% had 1-5 years' experience as nurses. 15/53 nurses had previous training on NGT. There was significant correlation between nurses' performance and their education level ( $p < 0.001$ ) but not with the type of employment. There was a significant improvement in all aspects of practice between pre and post - program and follow up stage ( $p < 0.001$ ). There was a significant relation between improvement of practice and history of being trained for EN before but no significant relation between the improvement and each of age, education, type of employment, years of experience and the source of receiving information. The practice of nurses regarding NGT feeding improved significantly after application of the training program with a significant correlation with history of being trained for enteral nutrition. It is very important to stress the importance of applying such programs to improve the practice of nurses in various aspect of pediatric and neonatal care.

**Keywords:** Neonatal Nasogastric Intubation, NGT, ICUs, EN

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**INTRODUCTION**

Globally, less than 2 % of children admitted into hospitals require intensive care services. However, children admitted to neonatal and pediatric intensive care units (ICUs) are at increased risk of mortality due to the complex nature of their illnesses posing a burden on pediatric care(1). According world health organization number of newborns deaths declined due to improvement the quality of health care from 5 million in 1990 to 2.4 million in 2019, children face the greatest risk of death in their first 28 days (2). Evidence suggests that 50 % of critically ill children admitted to the intensive care are prone to malnutrition due to increased metabolic rate from their illnesses. It is important for the critically ill to receive constant optimal feeding to facilitate recovery especially with breastmilk since it is rich in immune components and

nutrients (3). Once a baby is born there are three threats to his/her survival including temperature of the environment, infections and most significantly feeding (4).

Full oral feeding is generally the last milestone achieved for neonates prior to hospital discharge from the neonatal intensive care unit (NICU), but many patients are prone to prolonged hospital stay or increase mortality due to low quality of hospital care (5, 6).

To improve neonatal survival, the provision of high-quality care to small and sick is must improve. Assisted feeding, often by nasogastric tube (NGT), also known as Enteral nutrition (EN), is one of a set of interventions that form an essential package of facility-based services. When fully implemented, feeding (oral or nasogastric) has the potential to substantially reduce neonatal mortality and morbidity, especially for low-birth weight neonates. (7)

Nasogastric tube is easily administered, more physiologically efficient, and typically less expensive (8).

NGT and feeding is typically the formal responsibility of nurses (7, 9). Critical care nurses are frontline caregivers, vital to both appropriate delivery of enteral feedings and management of critical care patients, It is important for the intensive care unit nurse to be knowledgeable of the primary characteristics of enteral feeding. Nurses are poised to have a great impact on patient care by ensuring the adequacy of delivered enteral nutrition. Critical care nurses spend more time at the bedside with patients than any other health care provider, allowing the nurse to monitor the amount of enteral nutrition delivered and to monitor and treat complications associated with enteral feedings (10). The nurse roles in delivering the NG tube usually include insertion of the tube; maintenance of the tube, administration of feeding, participation in assessment of the patient's response to tube feeding, prevention and detection of complications associated with this form of therapy as gastric distention, nausea, bloating, vomiting, aspiration pneumonia and diarrhea. However, NG tube feeding insertion is a non-trivial clinical skill; applying excessive force during insertion may cause damage to the turbinates or nasopharynx,(11).

More seriously, NG tube insertion is a blind process in that the tube may reach other parts of the body instead of the stomach without the knowledge and skills of the nurse. Enteral feeding is a relatively safe procedure with limited complications that can usually be avoided or managed. These complications can be classified as primarily gastrointestinal, mechanical, metabolic, and infectious categories.

The most serious of these complications is pulmonary aspiration, which can be fatal, moreover misplacement of NGT has unfortunately resulted in unexpected complications as lung perforations leading to hydrothorax and pneumothorax due to the mistaken placement of the NGT into the pleural cavity (12). the nurses' knowledge and skills regarding NG tube feeding insertion are vital issues to ensure patient safety, Consequently, nurse educators should encourage their students to effectively acquire relevant and scientific knowledge based on evidence through an active learning technique and new teaching methods to assess their effect on students' acquisition of knowledge and skills (9).

Heevi pediatric hospital is a main pediatric hospital in duhok governorate 190 bed, neonatal intensive care unit 9 bed, the nurses who work their need to improve quality care about knowledge and practice.(13).

There is no study on nurse knowledge regarding NG tube due to recently new established NICU in Duhok governorate at 12 October 2016 (30), but study done in other city concluded that the nurses whose not trained had poor knowledge and need improving and update the knowledge toward nasogastric and feeding through NG tube(14, 15)

To evaluate the nurses` practice regarding neonatal NGT Feeding and to assess the role of an interventional program on improving their practice

## **MATERIAL AND METHODS**

A quasi experimental, pre and post program study was selected to accomplish the aim of this study after ethical approval was obtained from the directorate of Health in Duhok. The study included (53) nurses who worked at neonatal intensive-care unit and semi neonatal intensive care unit in the Heevi Pediatric Hospitals and neonatal intensive care unit in the Maternity hospital from October 15, 2021 to December 18, 2022 with regard to inserting nasogastric tube and feeding through NG tube before and after their training program. The nurses who did not participate in the educational program and not agreed to participate were excluded. The data were collected through the use of a check list that focused on nurses' practice. It was created through a comprehensive review of the previous studies and literatures related to the concept of the current study and, reviewed by nine experts for reliability. After assessing the pretest evaluation an educational program was given to the Nurses by the researcher for (three months). After one month, then after three months after that, Nurses' practice regarding nasogastric tube insertion and feeding through nasogastric tube was evaluated, using the same tools which were used in pre-program implementation by other trained and qualified researcher to reduce bias.

The check list included five parts, the first part was contained demographic characteristics of the nurses, and the second part assessed the quality of nursing care before insertion a nasogastric tube, the third part quality practicing insertion of nasogastric tube, the fourth part was quality nursing care after insertion of nasogastric tube and the last part was assessing feeding though nasogastric tube. The researcher assessed the nurses practicing during the working time at each subgroup shift

Ethical approval was obtained from the General Director of health at Duhok city. Data were collected as planed then the data were coded and entered in Statistical Package for the Social Sciences (SPSS) version 22 for analysis. Data were analyzed by using descriptive statistics such as percentage, frequency , stander deviation and mean then inferential statistics such as Pearson correlation and Chi-square then ANOVA test was used to determine relationship between variables at different time, tests were considered significant when p- value <0.05 and highly significant if p value <0.01 pre, post and second post evaluation score were compered and finding were presented in tables and interpreted accordingly.

**RESULTS**

The table -1- revealed that, around to three quarters (73.6% ) of the study participants were female. The highest percentage of them (84.9 %) were between 20 to 29 years old while most of them (83%) held institute diploma degree , and (47.2%) had of experience as a nurse for 1- 5 years , only (15) of the participant were trained on nasogastric tube and feeding through NG and most of them received their information from their colleagues and all of them stated there was no Hospital protocol on how to inserting Nasogastric tube and how to feed babies through Nasogastric tube before the study.

		No.	%
Gender	male	14	26.4
	female	39	73.6
age of nurses by years <b>Mean 26.4 ( 2.1)</b>	< 20	2	3.8
	20 - 29	45	84.9
	30 - 39	2	3.8
	40 - 49	3	5.7
	50 - 59	1	1.9
level of education <b>Mean 2.09 (.405)</b>	nursing school	2	3.8
	health institute diploma	44	83.0
	bachelor degree	7	13.2
	master	0	0.0
place of work	NICU Heevi	18	34.0
	SNICU Heevi	17	32.1
	NICU Maternity	18	34.0
type of employ	permanent	11	20.8
	temporary	42	79.2
Years of working as general nurse <b>Mean 1.94 (.412)</b>	<1 year	6	11.3
	1-5 years	25	47.2
	6-10 years	16	30.2
	11-15 years	2	3.8
	16-20 years	1	1.9
	21-25 years	1	1.9
	>25 years	2	3.8
Years of working as peditrics nurse <b>Mean 1.94 (.412)</b>	<1 year	6	11.3
	1-5 years	26	49.1
	6-10 years	15	28.3
	11-15 years	3	5.7
	16-20 years	0	0.0
	21-25 years	2	3.8
formal training received	not trained	45	84.9
	trained	8	15.1
source of receiving information	from colleagues	45	84.9
	where I am student	0	0.0
	in service training	5	9.4
	internet	3	5.7
Hospital protocol for NG Tube & feeding	not present	53	100.0
	present	0	0.0

Table -1- distribution of the study participants according to socio demographic data.

Table 2 shows that nurses with different qualifications (Nursing school, Diploma and Bachelor) had significantly different scores of practice performance prior to the educational programs and improved post intervention with various mean for nursing school, Diploma and Bachelor degree holder respectively (23, 31.59 and 42.14) improved to (30.5, 57.8 and 75.57) for the first evaluation after educational program and for the second evaluation to (31, 56.93 and 75.57).

Table 2. Correlations between the quality performance of the nurses' pre, post and Second post evaluation and education level.

		N	Mean	Std. Deviation	F	p- value
Pre program evaluation	nursing school	2	23.0000	.00000	9.126	<.001
	diploma	44	31.5909	7.16684		
	bachelor	7	42.1429	5.24177		
	Total	53	32.6604	7.89338		
Post program evaluation	nursing school	2	30.5000	2.12132	41.412	<.001
	diploma	44	57.8409	7.05442		
	bachelor	7	75.5714	2.29907		
	Total	53	59.1509	10.54368		
Second post program evaluation	nursing school	2	31.0000	1.41421	43.815	<.001
	diploma	44	56.9318	6.87901		
	bachelor	7	75.5714	2.93582		
	Total	53	58.4151	10.51452		

p-value <0.01 significant; <0.01 highly significant

The type of nurses' employment both permanently and temporarily had approximately similar score of practice performance prior to the educational program and equally improved after program intervention (Table 3).

Table -3- Correlations between nurses' quality performance pre, post and second post evaluation and type of employment.

Type of employment		N	Mean	Std. Deviation	F	p-value
Pre program evaluation	permanent	11	28.1818	6.33748	3.795	.063
	temporary	42	33.8333	7.90158		
	Total	53	32.6604	7.89338		
Post program evaluation	permanent	11	56.3636	14.54835	.970	.329
	temporary	42	59.8810	9.31352		
	Total	53	59.1509	10.54368		
Second post program evaluation	permanent	11	55.0000	14.31084	1.478	.230
	temporary	42	59.3095	9.29067		
	Total	53	58.4151	10.51452		

p-value <0.01 significant; <0.01 highly significant ; F ANOVA test

Table -4- illustrate that mean of nurses' practice toward quality care preparation before inserting nasogastric tube Mean SD (.654(.26)) at pre implementation of program, while mean scores of nurses' practice regarding NG tube insertion were Mean, SD (1.377(1.353) & 1.353 (.256)) at post and second post implementation of program respectively. As well as mean score of quality nursing care during applying NG tube (1.035(.190) at preprogram, while mean scores of nursing care during applying NG tube (1.677(.251) & 1.646 (.286)) respectively. In addition, mean score of nurses' practice regarding feeding through NG tube Mean, SD (0.658 (.304) at preprogram, while mean score for first and second post program evaluation respectively (1.307(.36) & 1.31 (.379)).

Table 4: practice of nurses toward nasogastric tube insertion and feeding

Quality nursing care	Pre program	Post- program	2 <sup>nd</sup> post program	Greenhouse-Gesieer	p- value
Before inserting NG tube	.654 (.260)	1.377 (1.353)	1.353 (.256)	.605	<.001
During inserting	1.035 (.199)	1.677 (.251)	1.646 (.286)	.682	<.001
After inserting	.721 (.307)	1.215 (.323)	1.174 (.326)	.727	<.001
Feeding through NG tube	.658 (.304)	1.307 (.360)	1.310 (.379)	.600	<.001

P value < 0.05 is significant

Table -5- show that prior to the educational interventional program 35.8% of the participants scored as quality of nursing care regarding nasogastric tube are not done, partially done 64.2% and no one scored for done correctly, after program quality nursing care 22.6% partially done and 75.5% of participant are improved, while after three months from first evaluation post program are remained improve and according table 6 the p value are <0.001.

Table -5- Distribution of study participants according to their knowledge regarding three different times period.

	Not done		partially done		done		Mean SD
	No	%	No	%	No	%	
Pre program evaluation	19	35.8%	34	64.2%	0	0.0%	1.642 (.482)
Post program evaluation	1	1.9%	12	22.6%	40	75.5%	2.736 (.486)
Second post program evaluation	0	0.0%	20	37.7%	33	62.3%	2.623 (.489)

The (Table 6) clarified that the program significantly affected the quality nursing care practice regarding nasogastric tube pre, post and second post evaluation.

Table -6- Comparing means of pre, post and second post program score regarding quality nursing care about steps of nasogastric tube insertion and feeding through it

	N	Mean	Std. Deviation	Epsilon Greenhouse- Geisser	Sig
pre program evaluation	53	32.6604	7.89338	.578	<.001
post program evaluation	53	59.1509	10.54368		
Second post program evaluation	53	58.4151	10.51452		

p-value <0.01 significant; <0.01 highly significant

The table -7- show that at pre program evaluation score the most of nurses partially done the nasogastric tube insertion and feeding then at both post program improved to done correctly, also find out the relationship between socio-demographic data with practice performance at each period of evaluation pre, post and second post evaluation, also it was found that there was a statistically significant relationship between educational level and the history of being trained on enteral feeding within three times of program evaluation.

Table -7- Relation between nurses regarding level of practice pre - two evaluation after educational program and their demographic data (n=53)

	Pre program score						Post program score						2 <sup>nd</sup> post program score						
	not done (19)		partial done (34)		Done(0)		not done (1)		partial done(12)		Done (40)		not done (0)		partial done(20)		Done (33)		
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
Gender P-value (.380)	male	8	57.1	6	42.9	0	0.0	0	0.0	5	35.7	9	64.3	0	0.0	7	50.0	7	50.0
	female	11	28.2	28	71.8	0	0.0	1	2.6	7	17.9	31	79.5	0	0.0	13	33.3	26	66.7
age of nurses by years P-value (.795)	<20	0	0.0	2	100	0	0.0	0	0.0	0	0.0	2	100	0	0.0	0	0.0	2	100
	20 - 29	18	40.0	27	60.0	0	0.0	1	2.2	11	24.4	33	73.3	0	0.0	19	42.2	26	57.8

100	66.7	100	0.0	59.1	100	63.6	61.9	83.3	52.0	62.5	100.0	0.0
2	2	1	0	26	7	7	26	5	13	10	2	0
0.0	33.3	0.0	100	40.9	0.0	36.4	38.1	16.7	48.0	37.5	0.0	100
0	1	0	2	18	4	4	16	1	12	6	0	1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0
100	66.7	100	0.0	77.3	85.7	72.7	76.2	66.7	80.0	68.8	100	0.0
2	2	1	0	34	6	8	32	4	20	11	2	0
0.0	33.3	0.0	100	22.7	0.0	18.2	23.8	16.7	20.0	31.3	0.0	100
0	1	0	2	10	0	2	10	1	5	5	0	1
0.0	0.0	0.0	0.0	0.0	14.3	9.1	0.0	16.7	0.0	0.0	0.0	0.0
0	0	0	0	0	1	1	0	1	0	0	0	0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0	0	0	0	0	0	0	0	0	0	0	0
50.0	100	100	0.0	61.4	100	36.4	71.4	66.7	56.0	68.8	50.0	100
1	3	1	0	27	7	4	30	4	14	11	1	1
50.0	0.0	0.0	100	38.6	0.0	63.6	28.6	33.3	44.0	31.3	50.0	0.0
1	0	0	2	17	0	7	12	2	11	5	1	0
30 - 39	40 - 49	50 - 59	nursing school	diploma	bachelor	permanent	temporary	<1 year	1-5 years	6-10 years	11-15 years	16-20 years
			Education P-value (<.001)			type of employ P- (.573)		Years of Experian P-value (.404)				

	100.0	100.0	58.5	100	100.0	25.0	77.8	61.4
	1	2	24	2	6	1	7	27
	0.0	0.0	41.5	0.0	0.0	75.0	22.2	38.6
	0	0	17	0	0	3	2	17
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0	0	0	0	0	0	0	0
	100.0	100.0	73.2	50.0	100.0	75.0	88.9	72.7
	1	2	30	1	6	3	8	32
	0.0	0.0	26.8	0.0	0.0	25.0	11.1	25.0
	0	0	11	0	0	1	1	11
	0.0	0.0	0.0	50.0	0.0	0.0	0.0	2.3
	0	0	0	1	0	0	0	1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0	0	0	0	0	0	0	0
	100	100	61.0	100	100	25.0	88.9	45.5
	1	2	25	2	6	1	8	20
	0.0	0.0	39.0	0.0	0.0	75.0	11.1	54.5
	0	0	16	0	0	3	1	24
21-25 years		>25 years	from colleagues	where I am student	in service training	internet	Trained	not trained
source of receiving information			P-value (.385)				Trained for EN	
							P-value (<.05)	

## DISCUSSION

Delivering NGT feeding to critically ill patients is mostly the responsibility of critical care nurses. As a result, their experience and skills ensure that their patients receive proper nutritional support to avoid complications and other feeding disorders. For this reason, the researchers conducted the present study to apply the most update information according nasogastric tube insertion and feeding. Regarding gender three quarters of them were female, which agrees with other studies where most of the participant were female (16), and another study (10) concluded that there is more than half of nurses working at NICU was female.

The most common age of participants was between (20 – 29 years). This finding is similar to another study where three fourth of participants were (20 - 29) years old (17), another study showed similar results, the biggest rang of participant was less than thirty (16). Nurses at the young age are more able to acquire practical skill and knowledge and can change their behaviors based on submission of up-to-data information.

The current study found that most of sample graduated from technical institute of nursing (diploma) and most of them were employed temporary this founding is consistent with another study where most nurses had diploma degree (18), but dissimilar with another (19, 20) that showed majority of subjects graduated from bachelor degree., To manage patients in the critical care unit, a highly qualified nurse is necessary.

The participants had experience as a nurse in general and as pediatric nurse are among one to five years in agreement with (21) where the participants had the same years of experience but this disagreed with other studies (20, 22, 23), where they had more experience of five to ten years and more

In addition, the current study revealed that more than four fifths of participants were not attended training course about nasogastric tube insertion and enteral feeding and the most of them specified that their colleagues were a source for their information.

This finding may be due to recently new opened neonatal intensive care unit and they haven't the opportunity to attending the training programs because of shortage of nurse's number and workload at NICU. This is in agreement with (7) that revealed that, four fifths had not participated in educational program. And also in agreement with another study (16) regarding Assessment of the Nurses Performance in Providing Care to Patients Undergoing Nasogastric Tube in Suez Canal University Hospital that showed that no one of the participant had attended to the education program. Another similar study about assessment of nurses' knowledge and practices about medications administration via nasogastric tube at emergency hospital showed that the majority of nurses had not attended any workshop, training program and scientific program. Conversely, a study done in Cairo(24) assessed nursing performance toward enteral feeding at Pediatric critical care unit showed that most of nurses had participated in educational training program regarding nasogastric tube and feeding this is very important in improving quality of care regarding neonatal receiving feeding and limit complication related to this nursing skill might be the primary factor. This is also consistent with another study (25), the effect of educational program on nurse's knowledge and practices about nasogastric tube feeding at neonatal intensive care unit' they confirm that where nurses participated in training course at least one time and more.

Furthermore the current study show up there is no written protocol toward nasogastric tube insertion and feeding in the Heevi and Maternity Hospitals as compared to other studies (22), that focused on Assessment of nurses' knowledge and practices about medications administration via nasogastric tube at emergency hospital which reported that the most of participant did not know about protocol toward nasogastric tube feeding, but conversely another study (10) on the adherence to standard nursing protocols on nasogastric tube feeding in a secondary referral hospital in Ghana that concluded that the protocol availability led to routinely use the procedure as written protocol that reduce the complications and increase the quality practical performance

This study illuminated the relationship between educational level among nurses at evaluation for implementation of nasogastric tube insertion and feeding for neonatal baby are significantly deferent at pre, post and second post interventional program. This relationship is similar to a study (26) that found education level significantly affect the quality nursing care at implementation of nasogastric tube and feeding

According to the findings of this study, the majority of nurses had (partially done to (not done) considering the steps of practice performance of nasogastric tube insertion and feeding, then the score of practice level in both post program evaluations increased significantly to (done) correctly. Similarly a study (27) supported that adequate program led to gaining a good lack of practice performance. Also this is supported with study done in Alexandria (28) that showed that the adequate education program related to enteral feeding significantly improved nurses` performance in critical care units, conversely, a study done at Tehran showed that the education program did not affect the quality nursing care.

NG tube and feeding within pre, post and second post program evaluation were significantly affected. This is similar to a study (29) where the nasogastric tube program significantly affected all steps of nasogastric implementation, and also agreed with a study done in Bagdad (17) regarding evaluation of nursing performance concerning nasogastric tube in neonatal intensive care unit and also a study done at Cairo (24)where the program used significantly improved the nurses` practice about EN at before, during, and after insertion of nasogastric tube.

The present study show up the relationship with in nurses` sociodemographic characteristics and their practice as correctly, or partially or not done related to three time period evaluation pre, post and second post the significances are only within level of education and the nurses who had trained on nasogastric tube insertion and feeding, and the other; gender, age of nurses, type of employment, years of experience and source of receiving information statistically are not significant, this is may be due to new established of NICU they haven't adequate experience on neonatal care and large number of cases with few number of nurses at each shift, another study (26) with same criteria had found that significant are between nurses age, level of education and years of experience, but the gender and place of work are not significant, another study (29) done on Nurses' Performance Regarding Nasogastric Tube Feeding in Intensive Care Units clarified the relation between socio-demographic and practice performance toward nasogastric and feeding significance are only between nurses` age and their practice and not significant between marital status, qualification, experience year, and trained program had not significant relationship with practical performance.



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