

## Effectiveness of Intervention Program on Nurses' Practice toward Neonatal Endotracheal Suctioning Procedure

فاعلية البرنامج التداخلي في اداء الممرضين تجاه اجراء سحب سوائل التنبيب الرغامى لحديثي الولادة

Alaa Q. Ahmed Yas, MScN \*

Khatam M. Hattab, PhD\*\*

\* Clinical Nurse Specialist, Ghazi al-Hariri Surgical Specialties Hospital, Ministry of Health and Environment.

E: mail: [alla.qasem.1204@conursing.uobaghdad.edu.iq](mailto:alla.qasem.1204@conursing.uobaghdad.edu.iq)

\*\* Professor, Pediatric Nursing Department, University of Baghdad, College of Nursing, Iraq.

E: mail: [dr.khatam@conursing.uobaghdad.edu.iq](mailto:dr.khatam@conursing.uobaghdad.edu.iq)

### المستخلص

الاهداف: لتقييم ممارسة الممرضات تجاه إجراء شفط الرغامى لحديثي الولادة، ولتحديد فاعلية البرنامج التداخلي على ممارسات الممرضين، وكذلك لمعرفة العلاقة بين ممارسة الممرضين وخصائصهم الديموغرافية.

المنهجية: تم إجراء دراسة ذات تصميم قبل تجريبي (تصميم لمجموعة واحدة لاختبار قبلي وبعدي) في مستشفى حماية الاطفال التعليمي/ دائرة مدينة الطب، أجريت على ممرضى وحدة العناية المشددة لحديثي الولادة. بدأت من 17 كانون الثاني إلى 31 حزيران 2022. تم اختيار تقنية أخذ العينات غير احتمالية (غرضية) لأربعة وعشرين ممرض لتطبيق أهداف الدراسة. بعدها تم وضع قائمة مرجعية تتكون من جزئين: الجزء الاول- الخصائص الديموغرافية للممرضين اما الجزء الثاني- يتكون من نموذج لممارسات الممرضين في (3) محاور و (60) فقرة لتطبيق الاجراء. وايضا تم تحديد صلاحية الأداة من قبل لجنة مكونة من (13) خبيراً، بينما تم تحديد مدى موثوقيتها من خلال الاختبار وإعادة الاختبار على (5) ممرضين.

النتائج: أظهرت نتائج البيانات أن جميع ممرضات وحدة العناية المركزة لحديثي الولادة وعددهم (24) لم يكن لديهم مستوى ملائم من الممارسة في الاختبار القبلي، بينما كانت نتائج الاختبار البعدي بعد تنفيذ البرنامج كافية من خلال تطبيق جميع خطوات الشفط. إجراء.

الاستنتاجات: البرنامج التداخلي بعد تطبيقه كان له تأثير ايجابي وفعال على ممارسات ممرضى وحدة العناية المشددة. بينما كان هناك تغيير واضح نحو الأفضل في نتائج أدائهم بعد تنفيذ البرنامج.

التوصيات: يوصي الباحث بتنفيذ وتعميم البرنامج التداخلي لممارسات الممرضين وإدراجه في منهج التمريض وايضا يوصي وزارة الصحة بتعيين وتوزيع حملة الشهادة الجامعية فقط في جميع وحدات العناية المشددة لحديثي الولادة وإلزامية الممرضين المشاركة في الدورات التدريبية وبشكل مكثف ومستمر.

الكلمات المفتاحية: اداء الممرضين، اجراء سحب سوائل، التنبيب الرغامى، حديثي الولادة.

### Abstract

**Objective(s):** To evaluate nurses' Practice toward neonatal endotracheal suctioning procedure, and to determine the effectiveness of the interventional program on nurses' practices, as well as to find out the relationship between nurses' practice and their demographic characteristics.

**Methodology:** A Pre-experimental, one group design, was carried out to achieve the objectives of the current study using the evaluation approach and the implementation of the education program for the period from January 17 to June 31, 2022. A non- probability, purposive sample of (24) nurses were selected from the Neonatal Intensive Care Unit at Pediatric Teaching Hospital/ Medical City Department. A checklist was developed consists of two parts: part I: Nurses' demographic characteristics, and part II: Evaluation of nurses' Practice toward neonatal endotracheal suctioning procedure which consist of three domains (60) item, using the observation technique for data collection....

**Results:** The results of the data showed that all of the (24) neonatal intensive care unit nurses had an Inadequate level of Practice in the pre-test, while the results of the post-test after implementing the program was adequate through apply all steps the suctioning procedure.

**Conclusions:** The intervention program, after its application, had a positive and effective effect on the practices of neonate intensive care unit nurses. While there was a clear change for the better in their practices after apply the program.

**Recommendations:** The researcher recommends the implementation and generalization of the interventional program for nurses' practices and its inclusion in the nursing curriculum. It also recommends that the Ministry of Health appoint and distribute university degree holders only in all neonatal intensive care units and compulsory nurses to participate in training courses intensively and continuously.

**Keywords:** Nurses' Practice, Endotracheal, Suctioning Procedure, Neonatal

## Introduction

Neonate is a child that is less than one month old at the time of birth. In this month is seen as a transitional period between fetal life (during which nutrition and oxygen are transferred via the umbilical cord within the mother's womb) and normal life (where he must adapt to the outside world and breathe). This stage is successful in the majority of newborns without external assistance (90 percent), but some are exposed to less than 10% of complications during birth, and some require pulmonary and cardiac resuscitation in the delivery room, necessitating their placement in the neonate intensive care unit (NICU) for various reasons <sup>(1)</sup>. The primary goal of neonatal care for at-risk neonates is to maintain adequate respiration. Numerous young infants require oxygen and mechanical ventilation, which is commonly performed by an artificial airway, such as endotracheal <sup>(2)</sup>.

Endotracheal suctioning is required to prevent partial or complete endotracheal tube occlusion, lobar collapse, atelectasis, and increased labor of breathing. However, open suction is associated with substantial problems such as hypoxia, cardiovascular instability, and changes in cerebral blood volume, due to the ventilator circuit being disconnected. Closed suction, without breaking the circuit, has been found to reduce difficulties. Closed suction may be less successful than open suction in eliminating secretions <sup>(3)</sup>.

Patients in the intensive care unit (ICU) who have endotracheal tube (ETT) in place require the nursing procedure of Suctioning. Airway resistance and respiratory burden, hypoxia, hypercapnia, atelectasis, and infection are all consequences of ciliary motility and cough reflex degradation. So, suctioning the trachea and lower airways of patients with an (ETT) in place is very important <sup>(4)</sup>.

The aspiration method tackles the challenges of evaluating endotracheal sucking in newborns. They don't follow normal suction nursing rules, whether they use a closed or open method. The catheter should

be half the diameter of the (ETT) diameter, and no suction for more than 10 seconds <sup>(5)</sup>.

Nursing interventions have a direct effect on the health and clinical outcomes of neonatal. Nurses should be trained on the risks of tracheal Suctioning on a frequent basis. To survive, the majority of children in intensive care units require mechanical ventilation and tracheal Suctioning. Each day, 45% of neonates' experience oral or nasal suctioning. The majority of intensive care nurses lack knowledge and competence about (ETT) suctioning <sup>(6)</sup>.

It is reported that inadequately qualified nurses are considered to be the greatest important factor for providing adequate newborn nursing care, according to the US Department of Health and Human Services. Intervention programs are designed to improve nurses' capacity to provide adequate care for newborns in hospitals across the United States <sup>(7)</sup>.

Nurses are the primary drivers of hospitals, and hence improving their neonatal care work is the single most important factor that can accelerate recovery. As a result, this study assessed nurses' techniques for neonatal endotracheal suctioning in the neonatal intensive care unit <sup>(8)</sup>.

Nurses play a vital role in world health. Critical care Nursing (CCNs) provide complete care and assistance to patients admitted to the (NICU) and discharged from the hospital. In hospitals, the productivity and quality of treatment are directly linked to the Practice of healthcare workers, especially professional nurses in critical care units. For new nurses, NICU is one of the most difficult and critical places to work in a hospital <sup>(9)</sup>.

A quasi-experimental study was conducted to determine whether intensive care unit nurses followed technical advice for tracheobronchial suctioning. A lack of adherence by healthcare staff to preventive measures against hospital infection underscores the significance of implementing education programs. Technical advice for tracheobronchial Suctioning have been shown

to be more adhered to when the intervention was implemented<sup>(10)</sup>.

## Methodology

### Design of the Stud

A Quasi-experimental (Pre-experimental) design was carried out on nurses who work at NICU in Pediatric Teaching Hospital. An application of pre-post- test approach was used to evaluate nurses' practices toward Neonatal Endotracheal Suctioning Procedure in NICU. The study was started from the January 17 to June 31, 2022

### Setting of the Stud

The study is conducted at Neonatal Intensive Care Unit in Pediatric Teaching Hospital.

### Sample of the Stud

A purposive (non-probability) sample of 24 nurses working at neonatal intensive care units in pediatric teaching hospital were selected to achieve the objectives of the study. The study sample was exposed to the intervention program.

### Ethical Considerations:

The researcher distributed an informed consent sheet to all participating NICU nurses in order to obtain their permission to participate in the current study. In addition, they were informed that they could opt out of the research or refuse to answer a specific question and participate in the practice at any time. Submit an informed consent form

### The Program and Instrument Construction

According to the findings of nurses' assessment needs (preliminary assessment) of their practices toward neonatal endotracheal suctioning and an intensive review of related literatures to construct the intervention program, a questionnaire as a checklist is constructed based on the program contents which consisted of two parts:

#### Part I: Demographical Characteristics of the Nurses

This part includes nurses' sociodemographic characteristics of gender, age, level of education, years of employment, years of employment in NICU.

#### Part II: Evaluation of Nurses' Practice

##### Check lis

This part is composed of (3) domains of general preparations by the nurse before performing Endotracheal Suctioning Procedure; Implementation of Neonatal Endotracheal Suctioning Procedure, and Nurses' interventions after Endotracheal Suctioning Procedure which include (60) items. The time of apply questionnaire items, for each nurse took about 10-15 minute (pre and post-test)

#### The Interventional Program

##### Implementation

The interventional program was presented to nurses to develop their practices toward neonatal endotracheal suctioning procedure throughout the period from 27th February to 26th May 2022.

#### Validity of the Study:

The content validity of the program and the study tools are determined through a review by a panel of (13) experts with an experience of more than (9) years in their specialty related to the study. The experts' suggestions and recommendations were taken into consideration and the final copy of the constructed instrument and program has become acceptable as a tool for conducting the study.

#### Reliability of the Study Instrument:

Internal consistency reliability is employed for the determination of the study instrument's adequacy. Cronbach alpha correlation coefficient is computed on responses of (5) nurses working at ICU in at pediatric teaching hospital. Finding of this computation indicates that the correlation coefficient is approving that the instrument is adequately reliable measure for the phenomenon underlying the present study

### Rating and Scoring of the Study Instrument:

The check list questionnaire form style has been scored and rated on two levels dichotomous scale (2) for applying the practice and (1) for not applying based on three observations. The items were rated according to the Likers' scale of the three observations then rated to (3) apply always, (2) apply sometimes, and (1) for not apply. The higher grade of scoring, the greater practice and according to high (2.5 - 3), moderate (1.5– 2.5), and low (1. – 1.5). The practice improvement effect result from the application of the interventional program was exposed as (apply).

### Data Collection Method

### Result

**Table (1): Distribution of NICU Nurses' Demographical Characteristics (n=24)**

Variable	Groups	Study Sample	
		Freq.	%
Gender	Male	9	37.5
	Female	15	62.5
	Total	24	100.0
Age Group	19- 23	7	29.2
	24 – 28	8	33.3
	29 – 33	3	12.5
	34 – 38	1	4.2
	39 – 43	2	8.3
	44 – 48	2	8.3
	49 and more	1	4.2
	Total	24	100.0
Educational level	Nursing school graduates	1	4.2
	Graduate of a secondary nursing school	3	12.5
	Graduate of the Nursing Institute	4	16.7
	Nursing college graduate	14	58.3
	Higher education in nursing graduate	2	8.3
	Other	0	0
Total	24	100.0	

The data were collected from (24) nurses who work in NICU for the period from 27th February to 26th May of 2022 by using the study questionnaire (observational checklist). The purpose and objectives of the study were explained to all participants and the nurses' practice was evaluated before implementing the intervention program (pre-test) for all participants. All nurses in the study were exposed to the program. Then, they were subjected to post-test (in the manner of direct observation by the researcher for each nurse for three times performing procedure suctioning practice on the neonatal).

### Statistical Analysis

SPSS (Statistical Package for Social Sciences) version 24.0 is used to analyze the study data.

years of experiences in Nursing	1 – 5	13	54.2
	6 – 10	6	25.0
	11 – 15	3	12.5
	16 – 20	1	4.2
	21 and more	1	4.2
	<b>Total</b>	<b>24</b>	<b>100%</b>
years of experiences in Neonatal Intensive care unit	1 – 5	16	66.7
	6 – 10	3	12.5
	11 – 15	3	12.5
	16 – 20	1	4.2
	21 and more	1	4.2
	<b>Total</b>	<b>24</b>	<b>100%</b>
Sharing in training sessions related to neonatal Endotracheal suctioning in NICU	Yes	8	33.3
	No	16	66.7
	<b>Total</b>	<b>24</b>	<b>100.0</b>
Sharing in training sessions related to Neonatal Endotracheal Suctioning in NICU which was established by other institutions	Outside Iraq	0	0
	Inside Iraq	8	33.3
	Not sharing	16	66.7
	<b>Total</b>	<b>24</b>	<b>100.0</b>
Number of training sessions	One	0	0
	Two	8	33.3
	Three and more sessions	0	0
	Not sharing	16	66.7
	<b>Total</b>	<b>24</b>	<b>100.0</b>
Duration of training sessions	Less than one week	8	33.3
	More than one week	0	0
	Not sharing	16	66.6
	<b>Total</b>	<b>24</b>	<b>100.0</b>
Updating Information	Yes	6	25.0
	No	18	66.7
	<b>Total</b>	<b>24</b>	<b>100.0</b>
Source of updating the information	Internet (Social media)	14	58.3
	Internet (Specified Scientific websites)	5	20.8
	Journals and magazines	1	4.2
	Libraries	1	4.2
	Television	1	4.2
	Other sources	1	4.2
	Not updating	1	4.2
	<b>Total</b>	<b>24</b>	<b>100.0</b>

Freq.= frequency, % = percentage

Table (4.1) showed that the majority of nurses were females (62.5%), within the age group of (19-28 years) (62.5%), most of them were graduated from nursing college (58.3%), with (1-5) years

of experience in nursing (54.2%). The majority of them have (1-5) years of experiences in Neonatal Intensive care unit.

**Table (2): Comparison Significant of Pretest and Posttest Practice Score for NICU Nurses**

Main domain of Practice	N	Pre-test			post test			t	P-value	Sig.
		M.S	SD	df	M.S	SD	Df			
Domain One: General preparations by the nurse before performing Endotracheal Suctioning Procedure.	24	1.17	0.381	23	2.42	0.504	23	-11.519	.000	H.S
Domain Two: Implementation of Neonatal Endotracheal Suctioning Procedure.	24	1.38	0.495	23	2.54	0.509	23	-10.122	.000	H.S
Domain Three: Nurses' interventions after Endotracheal Suctioning Procedure.	24	1.13	0.338	23	2.29	0.464	23	-8.972	.000	H.S
Total	24	1.22	0.381	23	2.41	0.495	23	-10.063	.000	H.S

N: Number, M. S: Mean Score, SD: Standard Deviation, df: degree of freedom, t: t. test, H.S: high significant at P value  $\leq$  (0.05)

This table revealed the significant change in nurses' practices toward neonatal Endotracheal suctioning procedure at pre and post-test of the major domains at P. value equal to 0.000.

**Table (3): Relationship between Nurses' Practices and their Socio-demographic Characteristics**

Socio. Demographic Variables		Study Sample (N=24)											
		Pretest					Posttest						
		Sum of squares	Df	M.S	F	P value Sig.		Sum of squares	Df	M.S	F	P value Sig.	
Gender	Between groups	.075	1	.075	.297	.591	N.S	.469	1	.469	2.003	.171	N.S
	Within groups	5.550	22	.252				5.156	22	.234			
	total	5.625	23					5.625	23				
Age Group	Between groups	8.008	1	8.008	2.555	.124	N.S	9.669	1	9.669	3.161	.089	N.S
	Within groups	68.950	22	3.134				67.289	22	3.059			
	total	76.958	23					76.958	23				

Educational level	Between group	.208	1	.208	.211	.651	N.S	.136	1	.136	.137	.041	S
	Within groups	21.750	22	.989				21.822	22	.992			
	Total	21.958	23					21.958	23				
years of experiences in Nursing	Between groups	1.008	1	1.008	823	.374	N.S	.003	1	.003	.002	.963	N.S
	Within groups	26.950		1.225				27.956	22	1.271			
	total	27.958	23					27.958	23				
years of experiences in Neonatal Intensive care unit	Between groups	.533	1	.533	.407	.530	N.S	.178	1	.178	.134	.718	N.S
	Within groups	28.800	22	1.309				29.156	22	1.325			
	total	29.333	23					29.333	23				
Sharing in training sessions related to Neonatal Endotracheal Suctioning in NICU	Between group	.033	1	.033	.138	.713	N.S		1	.000	.000	1.000	N.S
	Within groups	5.300	22	.241				.000	22	.242			
	Total	5.333	23					5.333	5.333				
Sharing in training sessions related to Neonatal Endotracheal Suctioning in NICU which was established by other institutions	Between groups	.033	1	.033	.138	.713	N.S	.000	1	.000	.000	1.000	N.S
	Within groups	5.300	22	.241				5.333	22	.242			
	total	5.333	23					5.333	5.333				
Number of training sessions	Between groups	.033	1	.033	.138	.713	N.S	.000	1	.000	.000	1.000	N.S
	Within groups	5.300	22	.241				5.333	22	.242			
	total	5.333	23					5.333	23				



Duration of training sessions	Between groups	.075	1	.075	.084	.774	N.S	.025	1	.025	.028	.868	N.S
	Within groups	19.550	22	.889				19.600	22	.891			
	Total	19.625	23					19.625	23				
Updating Information	Between groups	.000	1	.000	.000	1.000	N.S	.011	1	.011	.054	.818	N.S
	Within groups	4.500	22	.205				4.489	22	.204			
	total	4.500	23					4.500	23				
Source of updating the information	Between groups	2.408	1	2.408	.796	.038	S	2.025	1	2.025	.666	.423	N.S
	Within groups	66.550	22	3.025				66.933	22	3.042			
	Total	68.958	23					68.958	23				

M.S: Mean of Score, df: degree of freedom, NS: Non-Significant at  $P > (0.05)$ , S: Significant at  $P < (0.05)$

Table (3) Showed there were significant relationships between Nurses' practices and their source of updating information in pretest level at ( $P$  value = 0.038) and, educational level in posttest at ( $p$  value = 0.041).

## Discussion

The results of study presented nurses' demographic characteristics, it is revealed that most nurses' gender is female (62.5%). Two thirds of them aged within the age group of (19-28 years) (62.5%). Concerning their education, more than half of sample were nursing college graduate (58.3%). In regarding to their years of experience in the nursing field, more than half of nurses in the study have service of (1-5 years) (54.2%). In relation years of experience in the ICU, the majority of nurses have (1-5 years), approximately nearly of three-quarters (66.7 %).

A study used a cross-sectional design to evaluate ICU Iraqi nurses' knowledge and practice about endotracheal suctioning. The

study found that most of the study samples were males (70%) and the rest were female (60%) aged 20-29 years in nursing, (68%) of them have a training course in the intensive care unit<sup>(11,12)</sup>.

It was mentioned that intensive care unit nurses at a Lahore children's hospital were the principal subject of the investigation. A total of 98 nurse participated in the study, 70% of them were between the age of 20 and 29, with the majority holding a nursing diploma (80%). Most of the critical care unit's staff (51 employees) had worked in the field for at least three to five years, and just 15% had been there less than three years<sup>(13)</sup>.



A cross-sectional descriptive study was conducted for 48 nurses working in the newborn critical care unit at Ahvaz Medical Sciences Training Facilities; 83.4 percent of employees were female, 16.6 percent were male, and the majority were between the ages of 26 and 35. 54.1 percent obtained on-the-job intensive care training. 52.1 percent of nurses' work in intensive care units for less than five years<sup>(7)</sup>.

The effectiveness of the intervention program is observed through the results of table (2) for all three domains, nurses' practice at the pretest was at low level but changed in to high level at the posttest. There are high significant differences between pre and posttest of the study sample in all (3) main domains at (P. value =.000).

A thirty randomly chosen nurses from Maulana's Maharishi Markandeshwar Institute of Medical Sciences and Research Hospital how were interviewed before and after the intervention. The activity was repeated until a score of >80% was achieved. The study found that endotracheal suctioning by nurses at the post-implementation for knowledge and practice scored significantly higher than pre-implementation scores (p 0.001)<sup>(14,15)</sup>.

No significant relationship between nurses' practice and their age, gender, educational level, years of employment in neonatal intensive care unit, and participation in training session before implementing the program but there is significant relationship between source of updating the information

with internet (Social media and Specified Scientific websites) at p value >0.05.

No significant relationship between nurses' age, gender, years of employment in neonatal intensive care unit, and participation in training session, source of the information with internet and their practice after implementing the program but there is significant relationship between level of education (graduate of nursing college) their practice after implementing the intervention program at p value >0.05.

Significant relationship between years of experience (1-5) and pretest for nurses' practice.

### Conclusions

Study concluded that the practice of most nurses in the neonatal care unit towards the application of scientific steps for neonatal Endotracheal suctioning procedure have been improved after implementing the program.

### Recommendations

The study recommends that the interventional program can be presented to all nurses working at the NICU and could be included in the critical care nursing procedures curriculum. Encouraging nurses working in intensive care to review reliable and practical scientific sources such as scientific websites and medical journals issued by the Ministry of Health (Journal of Medicine City). Suggestion to the Ministry of Health to appoint only academic nurses to work at NICU and them with organized training courses.

### References

- 1- Barfield, W. D., Papile, L. A., Baley, J. E., Benitz, W., Cummings, J., Carlo, W. A., ... & Watterberg, K. L. (2012). Levels of neonatal care. *Pediatrics*, 130(3), 587-597.
- 2- Hockenberry, M. J., & Wilson, D. (2018). *Wong's nursing care of infants and children-E-book*. Elsevier Health Sciences. available by <http://www.wongbooks.com>
- 3- Copnell, B., Tingay, D. G., Kiraly, N. J., Sourial, M., Gordon, M. J., Mills, J. F., ... & Dargaville, P. A. (2017). A comparison of the effectiveness of open and closed endotracheal suction. *Intensive care medicine*, 33(9), 1655-1662.
- 4- Maraş, G. B., Güler, E. K., Eşer, İ., & Köse, Ş. (2017). Knowledge and practice of intensive care nurses for

- endotracheal suctioning in a teaching hospital in western Turkey. *Intensive and Critical Care Nursing*, 39, 45-54.
- 5- Javadi, M., Hejr, H., Zolad, M., Khalili, A., & Paymard, A. (2017). Comparing the effect of endotracheal tube suction using open method with two different size catheters 12 and 14 on discharge secretion, pain, heart rate, blood pressure, and arterial oxygen saturation of patients in the intensive care unit: A randomized clinical trial. *Annals of Tropical Medicine and Public Health*, 10(5), 1312-1317.
  - 6- Ebrahimi, H. K., Jafarnejad, S., Sohrabi, S., Abbasi, A., & Esmaeilian, S. (2020). Effect of simulation-based suction education on the knowledge and Practice of pediatric intensive care unit nurses. *Journal of Critical Reviews*, 7(4), 685-694.
  - 7- Price, S., & Reichert, C. (2017). The importance of continuing professional development to career satisfaction and patient care: meeting the needs of novice to mid-to late-career nurses throughout their career span. *Administrative Sciences*, 7(2), 17.
  - 8- Hakim, A. (2015). assessing nurses' practice in endotracheal tube suctioning in neonatal intensive care units. available by [Hakim%2C+A.+%282015%29.+ASSESSING+NURSES%27PRACTICE.](#)
  - 9- AbdElbaky, M. M., Mohamed, E. A., & Nagib, R. M. (2018). Impact of Simulated Education program on Nurses' Practice of Invasive Procedure at Intensive Care Units: Evidence Based Practice. *International journal of Nursing Didactics*, 8(12), 13-20.
  - 10- Lima, E. D. A. D., Fleck, C. S., Borges, J. J. V., Condessa, R. L., & Vieira, S. R. R. (2013). Effects of educational intervention on adherence to the technical recommendations for tracheobronchial Suctioning in patients admitted to an intensive care unit. *Revista Brasileira de terapia intensiva*, 25, 115-122.
  - 11- Majeed, H. M. (2017). Assessment of knowledge and practices of intensive care unit nurses about endotracheal suctioning for adult patients in Baghdad teaching hospitals, Iraq. *Int J Res Med Sci*, 5, 4.
  - 12- Kadhim, A. J., & Khudur, K. M. (2021). Evaluation of Nurses' Intervention toward Oral Hygiene in Critical Care Unit Patient at Baghdad City. *Evaluation*, 10(3).
  - 13- Bano, H., Hussain, M., Afzal, M., & Gilani, S. A. (2020). Measurement of Knowledge and Practice of Pediatric ICU Nurses about Endotracheal Suctioning. *Measurement*, 73.
  - 14- Sharma, S., Sarin, J., & Kaur Bala, G. (2014). Effectiveness of endotracheal suctioning protocol, In terms of knowledge and practices of nursing personnel. *Nursing and midwifery research journal*, 10(2), 47-60.
  - 15- Al-Musawi, K. M., Shawq, A. H., Majeed, Z., Zaid, S., & Ibraheem, H. (2020). Risk factors for congenital anomalies in neonatal intensive care unit in Baghdad city. *Medico Legal Update*, 20(1), 1168-74.
  - 16- Shawq, A. H., Ajil, Z. W., & Al-Musawi, K. M. (2020). Attitudes of mothers towards over the counter antibiotics for their children in Baghdad city. *International Journal of Psychosocial Rehabilitation*, 24(09).