Assessment of Nurses' Performance regarding Developmental Care at Neonatal Intensive Care Units

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Abstract

Background: Developmental care is a professional practice, education and research opportunity that nurses need to explore, evaluate and refine continuously within the rapidly changing technological environment of the Neonatal Intensive Care Units. **Aim:** This study aimed to assess nurses' performance regarding developmental care at Neonatal Intensive Care Units. **Research design:** A descriptive design was used. **Setting:** This study was conducted at the Neonatal Intensive Care Units of El-Fayoum General Hospital. **Sample:** A convenient sample that composed of 65 nurses who were working at the previously mentioned settings. **Tools:** A pre-designed questionnaire sheet, observational checklists and attitude-type rating scale to assess nurses' performance regarding developmental care at NICUs. **Results:** The majority of the studied nurses had poor level of knowledge, all of them were having an unsatisfactory level of practice and the majority of them showed positive attitude regarding developmental care at neonatal intensive care units. **Conclusion:** Nearly two thirds of the studied nurses had an incompetent level in total performance regarding developmental care at NICUs. **Recommendations:** Raising awareness about developmental care and its core measures in the care of neonates at NICUs.

Key words: Developmental Care, Neonatal Intensive Care Units, Nurses' Performance.

Introduction:

Neonatal nurse is professional with special training, skills, and knowledge in the care of neonates and their families. The progresses of science and technology in neonatal intensive care units (NICUs) have contributed to the increased survival of neonates **(Saxton et al., 2020).** However, factors such as the increase in both of number equipment and invasive procedures, the constant need for light, the presence of ambient noise and the required excessive manipulation during care have resulted in a number of adverse effects. Subsequently, these effects trigger changes in the development of neonates, especially in preterm neonates **(Alebel et al., 2020).**

Preterm neonates are particularly considered a high-risk group who require advanced medical interventions and highly specialized nursing care in order to survive. Worldwide, preterm birth affects almost 11.1%of all pregnancies. Actually, preterm births represent for approximately 70% of neonatal deaths and 36% of infant deaths **(Griffin et al., 2019).** The World Health Organization WHO, **(2018)** has estimated that 15 million neonates are born preterm every year. In Egypt, the percentage of preterm deliveries was 8.2% of all deliveries **(Algameel et al., 2020).**

Despite the innovative interventions in medical field, preterm neonates remain at risk for a wide spectrum of long-term morbidity including cerebral palsy, mental retardation, developmental delay, school problems, behavioral issues, and overall poor health status. Several researches suggest that the cognitive disabilities, poor academic achievements, and disordered behavioral regulation seen in preterm, are the result of early disruption of their intrauterine life and sudden exposure to entirely unfamiliar NICU environment **(Crilly et al., 2021).**

One strategy for reducing irritating stimulations and helping neonates grow

normally at NICU is developmental care. Developmental care (DC) is a professional practice, education and research opportunity that nurses need to explore, evaluate and refine continuously within the rapidly changing technological environment of the NICU. The goal of developmental care is to provide a structured care for environment the preterm neonates, recognizes the physical, psychological and emotional vulnerabilities of premature and/or critically ill neonates and their families and is focused on minimizing potential short and long-term complications associated with the hospital experience **(Héon et al., 2022).**

Developmental care is a broad category of interventions that is designed to minimize the stressors in the NICU environment. The elements of developmental supportive care include control of external stimuli (vestibular, auditory, visual, tactile) by noise and light reduction as well as minimal handling, clustering of nursing care activities, and positioning of the preterm neonates to provide a sense of containment similar to the intrauterine experience is included under the umbrella of developmental care **(Lubbe et al., 2020).**

Neonatal nurses are the primary caregivers in the NICUs and a key position to influence the environment of the developing neonates. Nurses can take steps during nursing care such as lowering ambient light and noise to reduce stimuli, clustering care procedures to minimize sleep disruptions, modifying regimens to improve feeding tolerance and creating opportunities for nurturing bonding experiences between the neonates and parents to chives optimal normal physical, psychological and emotional development of neonates **(Griffiths et al., 2021).**

Significance of the Study

Premature births as the main factor of neonates' mortality and adverse health effects remains a global problem in developing and developed countries. Annually, approximately 15 million neonates are born premature around the world. In Egypt, the percentage of preterm deliveries was 8.2% of all deliveries **(Walani, 2020).** The third trimester of fetal development is a period of rapid brain growth and the environmental influences such as noise or handling may impact on the developing premature neonates' brain **(Filippa et al., 2020).**

Developmental care has its roots in the principles of nursing science and considered as a philosophic approach to the care of hospitalized preterm neonates are subjected to many tests, procedures and therapies during hospitalization. The developmental care is used broadly to describe any neonatal care protocol designed to promote optimal physical, cognitive and emotional development in the first weeks or months of neonatal life **(Park & Kim, 2019).**

In fact, the major barriers on the path of developmental care implementation is insufficient knowledge and awareness. Furthermore, if the nurses' perceptions are known, the negative ones could be changed and directed towards the right path. Thereby, an effective step could be taken toward providing appropriate and desirable nursing care and performance.

Aim of the study:

This study aimed to assess nurses' performance regarding developmental care at Neonatal Intensive Care Units.

Research questions:

1. What are the nurses' knowledge about developmental care at neonatal intensive care units?
2. What are the nurses' practices regarding developmental care at neonatal intensive care units?
3. What are the nurses' attitudes regarding developmental care at neonatal intensive care units?

Subjects and Methods:

1.Technical Design

- **Research Design:** A descriptive design was used for conducting this study.

- **Research Setting:** This study was conducted at Neonatal Intensive Care Units of El-Fayoum General Hospital..

- **Study Subject:** A convenience study sample was employed; it included 65 nurses who were working on the neonatal intensive care units in the previously mentioned settings during the study period, regardless their characteristics.

Tools of data collection:

Tool (I): Nurses' Pre-designed Questionnaire Sheet:

It was designed by the researcher in simple Arabic language to suit the understanding level of the studied nurses after reviewing the recent and relevant literature **El-Ziady et al., (2017), Burk, (2018) and Baghlani et al., (2019).** It consisted of the following parts:

Part I:

This part was concerned with characteristics of study subjects including:

- Cistics of studied nurses such as age, gender, qualifications, years of experience in NICUs, as well as the attendance of previous training courses about the developmental care of neonates.

- Characteristics of studied neonates such as, gender, gestational age (weeks), mode of delivery, feeding method at admission and medical diagnosis.

Part II:

This part was concerned with assessment of nurses' knowledge regarding developmental care (DC) at NICUs. The total number of questions were 30 closed ended questions about, definition of DC and its components, importance and barriers of its application in NICUs, controlling the NICUs environment related to noise and light, common painful procedures for neonates & non-pharmacological pain management, positioning (nesting/swaddling), care clustering, non-nutritive sucking, kangarooing, benefits and time to initiate breastfeeding and family centered care.

Tool (II): An Observational Checklists:

The observational checklists were adopted from **Lynn & Lebon, (2011), MacDonald et al., (2012) & Altimier et al., (2016)** and were used to assess actual nursing practices regarding the developmental care at NICUs. It consisted of of six observational checklists which used to assess the actual nursing practice at NICUs related to developmental care namely; healing environment (10 steps), minimizing stress and pain (6 steps), positioning & handling (6 steps), safeguarding sleep (9 steps), protecting skin (7 steps) and optimizing nutrition (9 steps).

Tool (III): Nurses' Attitude Type-rating scale:

It was designed by the researcher in the light of related references **Macho, (2018)** & **Baghlani et al., (2019)**, used to assess the attitudes of the nurses toward the developmental care at NICUs. It included 13 items asking about nurses' attitude regarding developmental care at NICUs.

2.Operational Design:

A. Preparatory phase:

It included reviewing of related literature using textbooks, journals, scientific periodicals and web-sites was conducted to develop the study tools and to get acquainted with the various aspects of the research problem.

B. Pilot Study:

A pilot study involved seven nurses (10% of the total sample size) to test the clarity, applicability, feasibility & relevance of the tools used and to determine the needed time for data collection by using the study tools. After analyzing results of pilot study, the necessary modifications were done. Finally the nurses involved in the pilot study were excluded from the study sample later.

C. Validity and Reliability:

The tools were revised by a jury of five experts from different academic categories (professors and assistant professors) of the pediatric nursing department staff at Faculty of Nursing, Ain-Shams University. The jury reviewed the tools and its validity for

comprehensiveness, accuracy, clarity and relevance. The internal consistency of the developed tools was tested for their reliability using Cranach's alpha coefficient test by a statistician to assess reliability of the tools; the tool (I) was reliable at r = 0.82, tool (II) was reliable at r = 0.84 and tool (III) was reliable at r = 0.867.

D. Field Work:

The actual field work was carried out over a period of six months starting from the first of June 2021 to the end of November 2021. At the beginning, the researcher introduced herself to the studied nurses and explained the purpose of the study to gain their cooperation and to assure the studied nurse about the anonymity of their answers and that the information will be used for scientific research only and was being strictly confidential.

The collection of data was conducted two days per week (Saturday and Tuesday) at morning and afternoon shifts in the previously mentioned settings. Where each study subject was interviewed individually for 20 minutes using the previously mentioned tools (questionnaire and attitude sheet) and each study subject was observed closely and evaluated during providing actual nursing care to neonates throughout the shift using the previously mentioned tool (observational checklists) which filled by the researcher.

3.Administrative Design:

Actual official permission, including an ethical committee letters including the title and the purpose of the study were submitted from the Dean of the Faculty of Nursing, to the Directors of El-Fayoum General Hospital and subsequently to the Head of NICUs to get an approval for conducting the study.

4.Statistical Design

Data collected from the studied sample were revised and coded. Data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) software version 20. The obtained data were organized, tabulated, analyzed and represented in tables and graphs as required. Data were presented using qualitative statistics in the form of frequencies, percentages, means, standard deviation (SD), chi-square ($\chi 2$) and correlation coefficient (r).

Level of significance was accepted at P value:

- Non significant difference > 0.05*
- Significant difference < 0.05*
- High statistical significant difference < 0.001*

Results:

Table (1): showed that, 46.2% of the studied nurses were in the age group 20: < 25 years ($\bar{X}$ ±SD30.8± 5.6). Concerning years of experience, it was clear that, 52.3% of them their years of experience were less than 5 years. All studied nurses (100%) were females and none of them had previously attended any training courses about developmental care at NICUs.

Figure (1): as regards the studied nurses' qualifications, this figure illustrated that, 72.3% of the studied nurse had diploma of technical nursing institute, while only, 3.1% of them had a bachelor in nursing science.

Figure (2): illustrated that, 6.2% of studied nurses had average level of total knowledge regarding the developmental care at NICUs, while 93.8% of them had poor level of total knowledge.

Table (2): cleared that, all of the studied nurses (100%) had unsatisfactory total practices regarding developmental care at neonatal intensive care units.

Figure (3): illustrated that, 93.8% of the studied nurses had positive attitude regarding the developmental care at NICUs, while 6.2% of them had negative attitude.

Figure (4): showed that, 33.8% of the studied nurses had a competent total level of performance regarding developmental care at NICUs, while 66.2% of them had an incompetent total level of performance.

Table (3): illustrated that, there were no statistically significant relation between the studied nurses' total level of performance and their age, qualification and years of experience with p-value >0.05.

Table (4): regarding correlation between total nurses' knowledge, practices and attitude regarding developmental care at neonatal intensive care units it was observed that, there were negative correlations among all study variables (p-value > 0.05).

Table (1): Distribution of the Studied Nurses according to their Characteristics **(n=65)**

Nurses' Characteristics	No	(%)
Age in years		
20: < 25	30	**46.2**
25: < 30	25	38.5
30: < 35	4	6.2
35: ≤ 40	6	9.2
$\bar{X}$ ±SD	**30.8± 5.6**	
Years of experience at neonatal intensive care units		
<5		
5: <10	34	**52.3**
10: <15	17	26.2
15≤20	10	15.4
	4	6.2
$\bar{X}$ ±SD	**5.8± 2.1**	

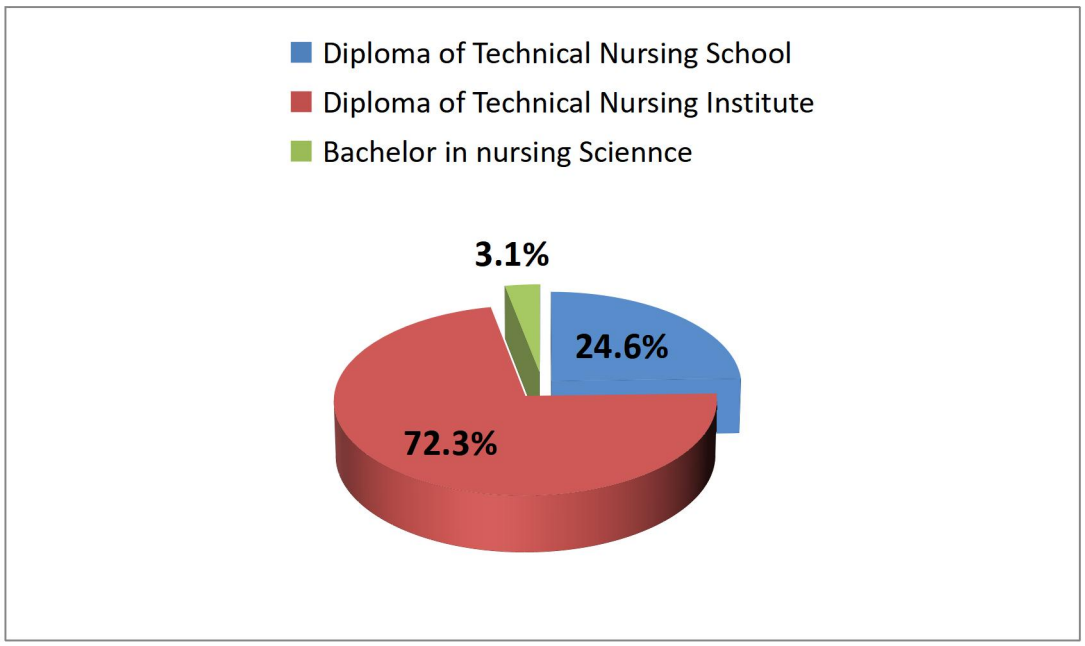

Figure (1): Distribution of the Studied Nurses according to their Qualifications

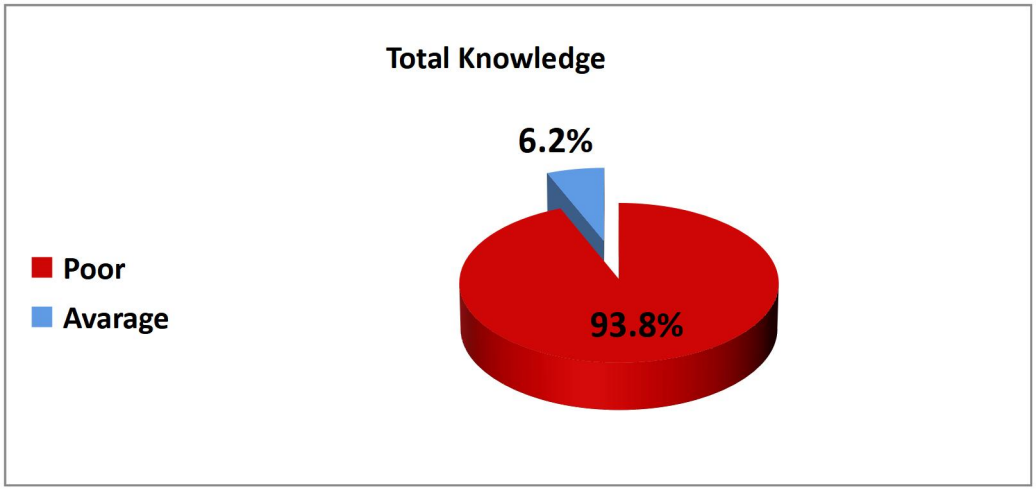

Figure (2): Distribution of the Studied Nurses' Total Knowledge regarding Developmental Care at NICUs (n=65).

Table (2): Distribution of the Studied Nurses' Total Practice Level regarding Developmental Care at NICUs **(n=65)**.

Practice	Frequency	
	No	%
Unsatisfactory practices < 80%	65	100

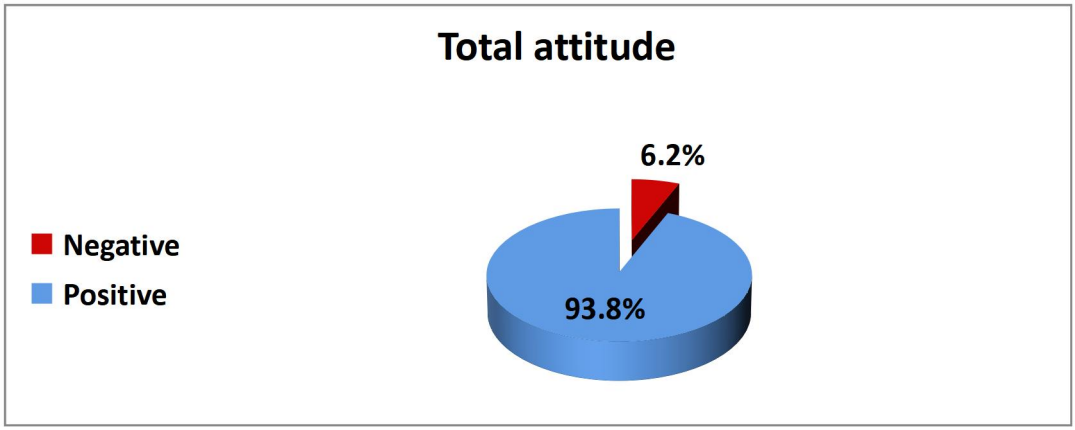

Figure (3): Distribution of the Studied Nurses' Total Attitude regarding Developmental Care at NICUs.

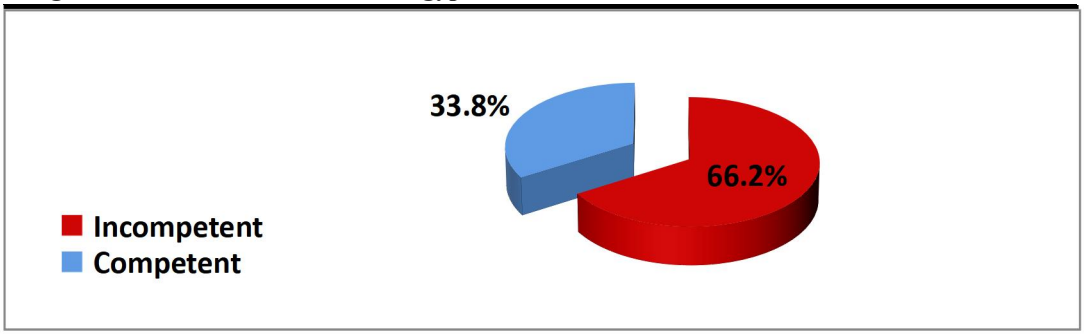

Figure (4): Distribution of the Studied Nurses' Total Performance regarding Developmental Care at NICUs (n=65).

Table (3): Relation between the Studied Nurses' Characteristic & their Total Performance regarding Developmental Care at NICUs (n=65).

Nurses' Characteristics	Nurses' Total Performance				X^2	p-value
	Competent		Incompetent			
	No.	%	No.	%		
Age in years						
20 : < 25	8	36.4	22	51.2	1.6	0.7
25 : < 30	10	45.5	15	34.9		
30 : < 35	2	9.1	2	4.7		
35: ≤ 40	2	9.1	4	9.3		
Qualifications						
Diploma of Technical Nursing School	6	27.3	10	23.3	4.3	0.1
Diploma of Technical Nursing Institute						
Bachelor in Nursing Science	14	63.6	33	76.7		
	2	9.1	0	0		
Years of experience at neonatal intensive care units						
<5	10	45.5	24	55.8	4.6	0.2
5 : <10	4	18.2	13	30.2		
10: ≤15	6	27.3	4	9.3		
15: ≤ 20	2	9.1	2	4.7		

*statistical significance difference with p-value <0.05

Table (4): Correlations between Total Nurses' Knowledge, Practice and Attitude regarding Developmental Care at NICUs.

Variables	Scores			
	Knowledge		Attitude	
	R	P-value	r	P-value
Attitude	0.02	0.87		
Practice	0.04	0.73	0.16	0.18

** Correlation is not significant with p-value >0.05

Discussion:

Neonates in the neonatal intensive care units are exposure to various noxious sensory stimulations (loud noise, bright light, pain, invasive oral stimulation, prolonged restrictive positioning). Neonatal care need to be modified to support neonates' brain development, social, and emotional development during hospitalization. Delivery of developmental care in neonatal intensive care units helps to save neonates' energy, maintains their physiological stability, reduces their families' stressors,

shortens their hospital stay and cuts healthcare costs **(Godarzi et al., 2018).**

Regarding studied nurses' total level of knowledge about developmental care at NICUs **(figure 2)** represented that, the majority of the studied nurses had poor knowledge related to developmental care at NICUs. These findings were in the same line with **Sathish et al., (2019),** who conduct a study entitled "Promoting Developmental Supportive Care in Preterm Infants and Families in a level III Neonatal Intensive Care Units (NICUs) in India" and reported that, the majority of the studied neonatal nurses had lack of knowledge about developmental supportive care at NICUs. From the researcher's point of view, this findings may be due to lack of opportunity for nurses attending workshops which helpful in refreshing their knowledge, unavailability of suitable booklet & handouts that suit level of nurses' understanding and workload that hindering updating their knowledge.

Concerning the studied nurses' total practices regarding the developmental care at neonatal intensive care units **(table 2)** the findings of the current study represented that, all of the studied nurses had unsatisfactory level of practices regarding developmental care at neonatal intensive care units. These findings were in an agreement with **Youssef, (2020),** who conduct a study entitled "Effectiveness of Nurses' Training Program about Neuroprotective Developmental Care for Premature Neonates on their Knowledge and Practices in Neonatal Intensive Care Unit" and found that the majority of studied nurses' had unsatisfactory practices regarding the neuroprotective developmental care for premature neonates.

In addition, the results of the present study is compatible with the finding of the study conducted by **Khalil et al., (2021),** who mentioned that, more than half the studied nurses had inadequate level of practicing developmental supportive care for preterm and low birth weight infants. These findings might be due to the fact that there were, all the studied nurses didn't attained any training courses regarding developmental care for neonates and philosophy of hospital which didn't put developmental care as a part of the routine care for all neonates admitted to NICUs.

As regards nurses' total level of attitude regarding developmental care at NICUs **(Figure 3)**, the present study finding revealed that, more than four fifth of the study nurses had positive attitude regarding the developmental care at NICUs. This finding was in agreement with the study of **Macho, (2018),** who found that, the majority of the studied nurses had positive attitude regarding individualized developmental care in the neonatal intensive care Units. From the researcher's point of views, the study nurses believes that any new care provided in neonatal intensive care unit is beneficial for the neonates.

In assessing the studied nurse's total performance regarding the developmental care at NICUs **(Figure 4)**, the findings of the current study represented that, two thirds of the studied nurses had an incompetent total performance regarding developmental care at NICUs. These findings were in an agreement with **Valizadeh et al. (2013),** who conduct a study entitled **"**The Congruence of Nurses' Performance with Developmental Care Standards in Neonatal Intensive Care Units**"** and found that nurses' performance with standards of developmental care still requires more efforts. Therefore, it is necessary to train the staff in this regard and prepare them for structural and functional facilities.

Concerning the relation between the studied nurse's characteristics and their total performance regarding the developmental care at NICUs **(table 3)**, the findings of the present study clarified that, there were no statistically significant relation between the studied nurses' total performance and their age, qualification and years of experience. This finding was in disagreement with the study of **Abd-Rabou et al. (2020),** who found that, highly significant difference between developing nurse's performance and their age, education level and experience.

Concerning the correlation between total nurses' knowledge, practices & attitude regarding developmental care at NICUs **(table 4)**, the current study findings revealed that, there were negative correlations among all study variables. These findings were in

disagreement with **Youssef, (2020),** who found that there were positive correlations between nurses' knowledge and perceived self-competency regarding individualized developmental care in the NICUs.

Conclusion:

In light of the current study findings it can be concluded that, the majority of the studied nurses had poor level of knowledge, all of them had an unsatisfactory level of practice and majority of them showed positive attitude regarding developmental care at neonatal intensive care units. Nearly two thirds of the studied nurses had an incompetent total level of performance regarding developmental care at NICUs.

Recommendations:

In the light of the current study findings, the following recommendations are suggested:

- Raising awareness about developmental care and its core measures in the care of neonates at NICUs.
- A standardized procedure manual for the neonatal developmental care in NICU should be available.
- Enrollment the developmental care interventions into nursing care protocols as a routine.
- Neonatal intensive care nurses must be encouraged to attend refreshing courses and workshops regarding updated theoretical and clinical aspect of developmental care for neonates.
- Provision of the essential equipment and supplies necessary to application of DC (noise/light levels measuring devices, chairs, linens and gowns).
- Training programs should be applied for nurses in the neonatal intensive care units to improve their knowledge and practice regarding developmental care for neonates.
- Replication of this study using large sample size in different NICU over all Egypt for better generalization of the results.

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