

Effect of Nursing Intervention Guidelines on Nurses' Knowledge and Performance Regarding Prevention and Management of Intraventricular Hemorrhage Among Preterm Neonates.

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Abstract: Intraventricular hemorrhage (IVH) is one of the leading cause of morbidity and mortality among preterm neonates. It is one of the most common types of neonatal intracranial hemorrhage which may happen during first few days after birth. The study aimed to; implement intervention guidelines for prevention and management of neonates' intraventricular hemorrhage and assess its effects on nurses' knowledge and performance. A Quasi experimental research design was used for conducting the study. Convenience sample of available nurses working at Tanta university neonatal intensive care unit during the period of the study whom willing to participate in the study their number was 50 nurses. Data was collected through a structure questionnaire sheet and observational checklist. Results: The studied subjects had good knowledge and practice immediately and one month post the intervention regarding preterm with intraventricular hemorrhage. There was a positive correlation between the studied subjects' educational level and their total knowledge score pre and post the intervention with significant difference, also there was a positive correlation between the studied subjects' educational level and their practice of care pre, immediately and one month post the intervention. Conclusion: There was a significant improvement in nursing staff knowledge and performance regarding prevention and management of intraventricular hemorrhage. Recommendation; Nurses constitute an important part in the health team and they spent all their time beside the preterm so it is recommended to improved their knowledge through well prepared educational intervention and improve their practice by comprehensive training about important aspects of preterm with intraventricular hemorrhage care.

Key words: Intervention guidelines, Nurses' performance, preterm neonate and intraventricular hemorrhage.

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I. Introduction

Prematurity is a major health problem and a leading cause of infant mortality and morbidity. Preterm birth mean child birth occurring less than 37 weeks or 259 days of gestation, it is a major element of neonatal mortality & morbidity and has long-term contrary consequences for preterm health status (Stacy , 2011& ABabeker, 2015). Yearly 15 million babies are born preterm around the world and their survival chances vary radically (Lawn, et.al., 2013& ABabeker, 2015). Researches proved that from 7-12 % of all deliveries in developing countries are preterm (Gray et. al., 2007). Preterm babies are at high risk for medical difficulties, future developmental incapacities and can develop many health problems because of their organs are not fully mature (Aita & Sinder, 2003 and Ahmed, et .al. 2013). Moreover; preterm infants are at greater risk for cognitive, social-emotional, mental health, behavioral, speech-language, and regulatory difficulties well into school age and beyond educational attainment of young adults (Johnson & Marlow 2016).

Intraventricular hemorrhage constitutes bleeding in the capillary network of the germinal matrix of the brain. It is classified anatomically into four grades according to whether it is restricted to the subependymal area, extends to the lateral ventricles with or without dilatation and brain parenchyma involvement (Mulindwa ,Sinyangwe , Chomba,2012). IVH occurs in 20% - 25% of neonates born before 32 weeks gestation or weighing less than 1500 grams at birth (Christ, et. al., 2015). Worldwide, IVH is a severe problem which occurs in the neonatal period especially in premature babies. Its incidence is increased particularly in preterm neonates who have bleeding disorders or subjected to birth trauma (Mc Crea& Ment, 2008). Fragility of the fine cerebral blood vessels, or abnormality of cerebral blood flow are the main cause of IVH (Ballabh , 2010) also instrumental delivery, acute respiratory distress syndrome, brain anoxia, hypercapnia, convulsions, bleeding, coagulation disorder, patent ductus arteriosus and presence of neonatal infection are the central risk factors leads to the

development of IVH (Sarkar et. al.,2009). The majority of infants with IVH are asymptomatic, which worsen the condition, moreover some infants manifest slight non observable abnormalities in level of consciousness, or in movement character, respiration, eye movement, and rarely acute deterioration in form of disturbed in level of consciousness, irritability, coma, seizures and quadriplegia (Antoniuk& Da Silva,2000). Diagnosis of IVH is confirmed by performing cranial ultrasound within the first 48 hours of birth and then repeated weekly until the age of 4 weeks(Sarkar, et al., 2009& El faragy, Adel Eltomey, Soliman, 2017).

Treatment of IVH focused on; adequate oxygenation and ventilation, adequate feeding, prevention and early detection and management of metabolic acidosis, manage coagulation disorders and administering of anticonvulsant therapy to control seizure. Fresh frozen plasma and platelets may be beneficial and neurosurgical intervention should be considered in post hemorrhagic hydrocephalus to relieve increased intracranial pressure and to drain hemorrhagic ventricular cerebrospinal fluid (Gupta, Kechli, Kanamalla, 2009 & Szepecht et. al., 2016). Any neonate with 30 weeks or less of gestational age at birth should have a routine cerebral ultrasound by 7–14 days and repeated at 36–40 of age as recommended by American Academy of Neurology recommends (Ment, et al., 2002). Supportive care helps to reduce further damage by correcting acidosis, replacing intravascular volume and maintaining hemodynamic stability(Shah, &Wusthoff, 2016).

Although there is no particular preventive measure to alleviate IVH other than prevention of pre-term delivery, some practices are beneficial to minimize adverse outcomes. When used collectively these potentially best practices can help reduce the rate of IVH in neonates' intensive care units (NICU) (Vermont Oxford, 2016 and Green, 2017).The immediate effect of IVH includes; low psychomotor and mental developmental indices, high incidence of cerebral palsy, and visual impairment while long-term effects include cognitive, physical, and behavioral impairment. IVH can prove to be fatal in many premature infants. Those who survive may experience post-hemorrhagic ventricular dilatation and post-hemorrhagic hydrocephalus which is associated with various degrees of neurodevelopment abnormalities. It may also lead to periventricular leukomalacia, cognitive impairment, decreased visual fields, and spastic diplegia (McCrea&Ment, 2008 & El-Atawi, et. al, 2016).Prognosis depends on the bleeding severity, its effect on morbidity and mortality ranges extensively. Early diagnosis can facilitate interventions and improve neurodevelopmental outcomes (Shah, &Wusthoff, 2016).Developmental care aimed to support the developing brain post birth, control morbidity and decrease mortality rates. It also aimed to optimize the NICU environment and care giving practices to facilitate the best outcomes for infants and their families. This intervention combines evidence-based practices with neuroprotective core measures for developmentally supportive care. It receives a lot of attention because it promotes neurosensory and emotional development in newborns while reducing stress during admission in the neonatal unit. NICU healing environment, including space, privacy and safety, the sensory environment of temperature, touch, smell, taste, sound, and light, as well as people and their interactions. Premature infants have demonstrated markedly improved outcomes when the stress of environmental sensory over stimulation is reduced incorporating neuroprotective strategies into care and NICU design (Pickler, et al., 2013,Altimier, 2011, Altimier& Phillips 2013,Altimier, &White, 2014 and Pena, et. al., 2016).

Therapeutic supportive positioning is vital for optimal musculoskeletal development, physiologic function, maintain stability, thermal regulation, neurobehavioral organization, sleep assistance, skin care, optimal growth and development(Fegraml, 2006).It also allows natural movement, provide tactile and displace infant body weight(Pena, et. al., 2016).Handling and touching of the neonates should be done with slow, gentle, movements, with the infant's extremities flexed and controlled. When handling a preterm infant, he can react negatively until being exhausted which results in loss of energy that can contribute to distress and pain, in addition; frequent handling and touching of the preterm neonates can disturb sleep (Picheansathian, Woragidpoonpol &Baosoung 2009).Quiet sleep is necessary for energy restoration and the maintenance of body homeostasis, preterm infants tends to remain sleeping when they are in the prone position(Maquet, Smith, &Stickgold, 2003 and Pena, et. al., 2016).

Preterm environmental stimuli produce alteration in the outcome of developmental processes producing changes in brain development that can be either positive or negative (Altimier, et.al, 2014 and Pena, et. al., 2016).Premature neonates are subjected to noxious sounds, bright lights, and painful procedures. They are also subjected to toxic stress which linked with changes in the developing brain, negatively impacting the creation of neural connections. Increased exposure to painful procedure associated with poorer cognitive and motor scores and impairments of growth. Common neonatal painful procedures as; heel sticks, venipunctures and nasogastric tube insertions managed by non-pharmacological interventions as a first choice before starting pharmacological interventions. The premature neonates have an immature skin barrier, which sets them at risk for high fluid loss contributing to electrolyte imbalance, thermal irregularity, skin injury, and infection. Skin care practices for preterm neonates should be incorporated into unit practices and policies. Improved skin outcomes through using evidence-based skin care guidelines along with careful assessment and gentle, handling, positioning and cares to achieve optimum skin condition and optimizing nutrition which effects brain development (Walker 2014&Goubet, Strasbaugh et. al, 2007 &Visscher, 2014 and Pena et. al., 2016).

II. Research Problem Significance

Despite the incidence of intraventricular hemorrhage, it's seriousness on preterm life and the growing importance of the developmental care, there is no previous training was conducted to nurses whom are working at NICU of Tanta and daily practice care of preterm neonates who are more liable to develop intraventricular hemorrhage so; the idea of the research was raised by the researchers. IVH is a great challenge for the preterm neonates and their parents due to its short and long term impacts on their prognosis and long life. There is no one measure for preventing intraventricular hemorrhage occurrence in pre-term neonates so; nursing care practice is very important measures to minimize intraventricular hemorrhage occurrence, improve prognosis of preterm infant with IVH and minimize its long life impact. Nursing Intervention Guidelines is scientific based management practice which aimed to educate NICU nurses regarding all required knowledge and care practice about Intraventricular hemorrhage, to raise their awareness about IVH and its consequences and improve their care practice provided to preterm neonates with IVH to minime the adverse outcomes.

III. Material And Methods

Aim of the study: This study aimed to design and implement Nursing Intervention Guidelines for prevention and management of intraventricular hemorrhage and evaluate its effectiveness on nurses' knowledge and performance.

Research Design: A quasi-experimental design was used in this study.

Type of the study: It is an intervention study (pre, immediate and one month post the intervention).

Setting; Tanta university neonatal intensive care unit, Tanta city, Garbia governorate, Egypt.

Sample; Convenience sample of available nurses (50) during the period of the study whom working at Tanta university neonatal intensive care unit and willing to participate in the study .

Hypotheses: post the intervention researchers hypothesized that;

1. Nurses who are exposed to the Nursing Intervention Guidelines may exhibit improvement in their knowledge regarding intraventricular hemorrhage.

2. Nurses who are exposed to the Nursing Intervention Guidelines may exhibit improvement in their practice regarding care of premature neonates with intraventricular hemorrhage.

Tools of data Collection:

Tool 1: Nurses' knowledge Questionnaire sheet :It was developed by the researchers after reviewing the related literature comprised of three parts:

- First part: it covered social characteristics of studied nurses which includes; age, educational qualifications, years of experience inside neonatal intensive care unit, marital status and attendance of any training courses regarding premature neonates with intraventricular hemorrhage.
- Second part: concerned with studied preterm regarding biosocial characteristics.
- Third part: Cover nurses' knowledge about IVH regarding; definition, causes, classification, signs & symptoms, complications, and nursing intervention to preterm with intraventricular hemorrhage.
- ☒ Scoring system of knowledge: The correct and complete answer was scored with (2), the correct and incomplete answer was scored (1) while the incorrect answer was scored with (0). Scores then were summed up and converted to percent, Knowledge was considered poor if the percent score was < 60%, 60- <75 % fair and 75-100% was considered good knowledge score.

Tool 2: Observation checklist: Which developed by the researchers after reviewing the related literature to assess nurses' practices of care of premature with intraventricular hemorrhage. It is concerned with nursing regarding; maintain midline head position, elevate the head of the bed, maintain normal body temperature (36.5-37°C), maintain adequate respiration, minimal stimulation, reducing noise, minimize pain and minimize stress.

- Scoring system of nurses' care practice; the items who done as good practice was scored with "1" and the items not done or incorrectly done was scored "0". For each area, the scores of the items were summed-up and converted to percent score, the total scores divided by the number of the items, giving a mean score for the part. The practice was considered poor if the percent score was less than 60%, considered as fair if the score ranged from 60- <80 % and 80 -100% was considered good practice.

Methods:

1. The study was accepted by ethical committee of neonatal intensive care unit and official permission for data collection was obtained from the administrators of the unit after explanation of the study aim.
2. A cover letter illustrating the study aim was illustrated for each nurse and written informed consent was a pre request for each nurse inclusion and reassurance was provided that collected information will be used only for research purpose.
3. A review of different aspects of the intraventricular hemorrhage was done to increase researchers 'orientation with the actual dimensions and magnitude of the problem and guide them in developing the study tools.

4. Study tools contents validity was tested through submission to four experts of pediatric medicine. Some modification was done. Reliability of the tools was tested through SPSS version 20.0. Tool 1 reliability was estimated as $r = 0.90$ and tool 2 reliability was estimated as 0.92.
5. Nursing Intervention Guidelines was designed based on the identified nurses' needs, reviewing related literature and a group of experts reviewed its content and evaluated its reliability before applied on the studied nurses.
6. Pilot study was conducted on 5 neonatal nurses to test clarity and simplicity of tools, since minimal change has been done, so the 5 piloted nurses were included in the study.
7. Study Phases: The study was conducted on four phases:
 - i. **Assessment phase:** It was carried out by the researchers for all studied nurses to collect baseline data, assess nurses' knowledge and practice for premature neonates with intraventricular hemorrhage by using tool 1 & tool 2.
 - ii. **Developmental phase:** According to the actual nurses' assessment needs, the Nursing Intervention Guidelines was designed by researchers to improve nurses' knowledge and enhancing their practice of care regarding preterm neonate with intraventricular hemorrhage through: Positioning guidelines to save preterm life and minimize bad prognosis, Safe midline head position guidelines, Minimal handling guidelines, Effective method to provide safe preterm hygiene guidelines, Maintain premature neonate normal body temperature ($36.5-37^{\circ}\text{C}$) guidelines, Maintain humidity guideline, Safe principles of slow fluid administration guidelines, How to maintain respiration and evidence based respiratory intervention technique, Reduce simulation and noise in the NICU guidelines and all therapeutic intervention to minimize pain and stress in the NICU.
 - iii. **Implementation phase:**
 - a. Nursing Intervention Guidelines was discussed to nurses in conference room of neonatal intensive care unit. Nurses were divided into 5 groups according to their free time, each group was 10 nurses. Nursing Intervention Guidelines was discussed in 6 sessions through 2 continues weeks for each group 3 sessions weekly; each session lasted about (30-45 minutes) according to nurses' times and readiness. It was explained to nurses through using different teaching strategies as (lecture, group discussion, demonstration and real demonstration).
 - b. The first session was started with greeting nurses and giving them a brief idea about the aim of the study, its components and expected outcomes from this intervention also they were interviewed for their socio-demographic characteristics as pretest format.
 - c. The sessions consisted of formal presentations of all scientific knowledge of intraventricular hemorrhage, all evidence based nursing practice and guidelines provided to preterm babies with IVH which maintain safety and prevent complications also all practice to prevent occurrence of IVH. All items of practice were illustrated through videos and photograph to maintain clear information and nurses well understanding.
 - d. The studied nurses were motivated to be active participant to improve their practice and provide scientific based care. The data was collected over a period of four months from December 2018 -March 2019.
 - iv. **Evaluation phase:** Evaluation had been done before, immediately and one month post the implementation of the preterm Nursing Intervention Guidelines to investigate effects of the intervention on nurses' knowledge and care practice provided to preterm neonates with Intraventricular hemorrhage.

Statistical analysis:

The collected data was organized, tabulated and statistically analyzed using SPSS version 20 (Statistical Package for the Social Sciences). Descriptive statistics, including frequencies, percentages, measures of central tendency and means were calculated for each item. Paired T-test was used to compare between subjects' knowledge, and care management practice pre, immediately and one month post the intervention. Significant was estimated was adopted at $p < 0.05$. Pearson correlation was used to assess correlation between nurses' educational level, years of experience and total knowledge and practice score.

IV. Results

Table (1): Showed Percentage distribution of studied nurses' regarding social characteristics.

As clear from this table 16.0 % from studied nurses' aged from 20-<30, 34.0 % aged from 30-< 40 years also half of them aged 40 and more years with Mean \pm SD of $2.34 \pm .75$ and about half of them 46% graduated from nursing technician institute also the majority of them 80.0 % was married.

Figure 1: Present studied nurses' distribution of years' of experience in neonatal intensive care unit.

Regarding figure one; 60% from the studied nurses have years of experience ranged from 1-< 5 years.

Figure 2: Denotes studied nurses 'distribution regarding attendance of high risk training courses.

As clear from **figure 2**; more than half of studied nurses' (60.0%) not attend any training courses about care of high risk neonates.

Table (2): Demonstrated percentage distribution of studied preterm neonates regarding their biosocial characteristics.

It is clear that 60.0% of studied preterm infant has gestational age ranged from 34-37 weeks and suffer from respiratory distress syndrome and about one third from them weighed 2000-<2500 gram on admission (34%).

Table (3): Illustrated that percentage distribution of studied nurses' knowledge about Intraventricular hemorrhage among preterm

It showed that majority of the studied nurses have poor score in all knowledge items which has been improved dramatically immediately post the intervention, in addition more than half of the studied nurses 52%, 58%, 52%, 56% had good knowledge immediately post the intervention regarding types, clinical picture, treatment and complications of intra-ventricular hemorrhage respectively which has been declined to 46%, % 50%, 46%, 46% 1 month post the intervention. Same table presents a significant differences between nurses knowledge in the pre, immediately and one month after intervention in all knowledge items (P value =<0.05).

Table (4): Percentage distribution of studied nurses' knowledge regarding care premature neonates with Intraventricular hemorrhage.

It was noticed that none of the studied nurses had good knowledge pre nursing intervention guidelines in all knowledge items regarding care of IVH premature neonates while about two thirds & more of them 62%,64%, 74%, 66%, 64%, 64% had good knowledge regarding; maintain midline head position, elevate the head of the bed, maintain normal body temperature, slow intravenous fluid administration ,maintain respiration and minimize pain and stress respectively immediately post the intervention which has been slightly decreased to 40%, 40%, 56%, 50%, 52%,50%,respectively one month post the intervention with high significant differences were found pre immediately and post the intervention where P value =<0.05.

Table (5): Percentage distribution of studied nurses' practice regarding care of preterm with Intraventricular hemorrhage

It demonstrated that studied nurses 'do good practice regarding; maintain midline head position, elevate the head of the bed, maintain normal body temperature, slow intravenous fluid administration, maintain respiration and minimize pain and stress was demonstrated by small percent of the studied nurses 2% ,2% ,4% ,10% ,10% ,6% respectively pre the nursing intervention guidelines which has been improved significantly by about two thirds of the studied nurses 64%, 68%, 64%, 68%, 64%, 68% respectively immediately post the intervention and slightly decreased to 50% ,52% ,50% ,60% ,54% ,58% respectively one month post the intervention with significant difference between pre & immediately and one month post the intervention.

Figure 3: Distribution of studied nurses regarding their total score of practice

It presented studied nurses' total score of practice; it illustrated that about two third 64% of the studied nurses' have good practice regarding care of premature neonates with IVH immediately post the nursing intervention guideline while more than half of them 53% have good practice one month

Table 6: Pearson Correlation of studied nurses' educational level and knowledge' score level

It illustrated that 62% and 53 % of the studied nurses whom had bachelor degree on nursing had good knowledge score level, compared to 45% and 25% of studied nursing technician while for nurses' who have diplomas; 30% and 15% of them hag good knowledge score level immediately and one month post the intervention respectively. post the intervention compared with small percent 5% pre the intervention. There was a positive correlation between the studied nurses' educational level and their total knowledge score level pre, immediately and one month post the nursing intervention guideline with significant difference P value =<0.05.

Table 7: Pearson Correlation of studied nurses' educational level and practice' score level

It is clear that 60% and 42% of the studied nurses whom had bachelor degree had good practice compared to52% and 35% of nursing technician while for nurses' who have diplomas; 40% and 22% of them had good knowledge immediately and one month post the nursing intervention guideline respectively. **Regarding table 7**; There was a positive correlation between the studied nurses' educational level and their practice score level pre, immediately and one month post the intervention with significant difference P =<0.05.

Table (1): Percentage distribution of studied nurses' regarding social characteristics.

Items	No (50)	%	Mean ± SD
1. Age (years):			2.34±.75
• 20-<30.	8	16.0	
• 30-< 40.	17	34.0	
• 40-	25	50.0	
2. Education.			1.86±.73
• Bachelor degree.	17	34.0	
• Nursing technician institute.	23	46.0	
• Diplomas.	10	20.0	
3. Social state :			2.7±.65
• Divorced.	5	10.0	
• Widow.	5	10.0	
• Married.	40	80.0	

Figure 1: Studied nurses' distribution of years' of experience in NICU.

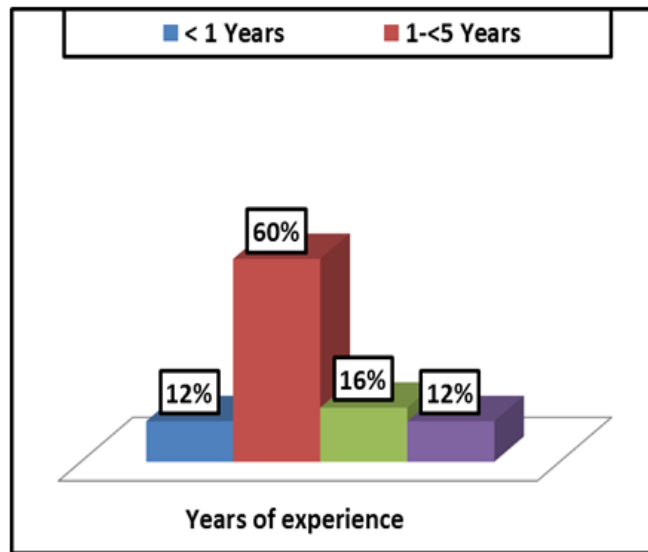


Figure 2: Studied nurses' distribution regarding attendance of high risk training courses.

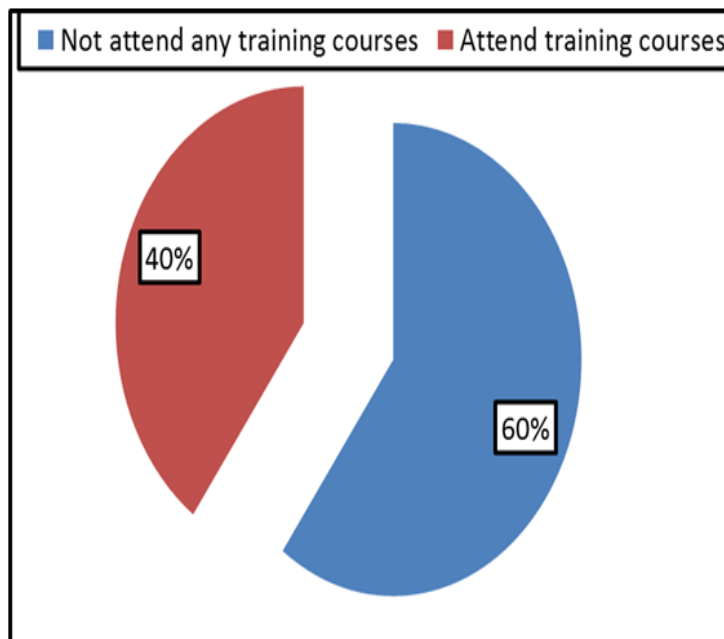


Table (2): Percentage distribution of studied preterm regarding biosocial characteristics.

Items of characteristics N = 50	No	%	Mean ± SD
1. Age (weeks) :			
• Less than 30.	5	10.0	2.46±0.74
• 30 -33.	15	30.0	
• 34 -37.	30	60.0	
2. Diagnosis:			
• Respiratory distress syndrome.	30	60.0	1.34±0.49
• Neonatal sepsis	11	22.0	
• Pneumonia .	7	14.0	
• Congenital anomalies.	2	4.0	
3. Weight (gram) :			
• 1000-<1600.	10	20.0	2.66±0. 1.08
• 1600-<2000.	10	20.0	
• 2000-<2500.	17	34.0	
• 2500-3000.	13	26.0	

Table (3): Percentage distribution of studied nurses' knowledge about Intraventricular hemorrhage (N0= 50).

Subjects' knowledge about Intraventricular hemorrhage	Pre %	Immediately post%	1month post%	Pre- immediately	X2 Pre – 1 month post.	P Value
				Mean ± SD	Mean ± SD	
1. Definition:						.001
• Poor.	70.0	8.0	8.0	1.32±2.64	1.25±2.45	
• Fair.	30.0	20.0	36.0			
• Good.	0.0	72.0	56.0			
2. Causes :						.002
• Poor.	70.0	8.0	8.0	1.36± 2.85	1.26± 2.34	
• Fair.	30.0	26.0	40.0			
• Good.	0.0	66.0	52.0			
3. Types :						.000
• Poor.	76.0	8.0	8.0	1.24± 2.44	1.2± 2.36	
• Fair.	24.0	40.0	46.0			
• Good.	0.0	52.0	46.0			
4. Clinical picture :						.002
• Poor.	84.0	8.0	8.0	1.260± 2.50	1.160± 1.80	
• Fair.	16.0	34.0	42.0			
• Good.	0.0	58.0	50.0			
5. Treatment :						.001
• Poor.	82.0	8.0	14.0	2.44± 1.80	2.20± 1.76	
• Fair.	18.0	40.0	40.0			
• Good.	0.0	52.0	46.0			
6. Complications :						.003
• Poor.	76.0	28.0	8.0	1.28± 2.28	1.14± 0.1.83	
• Fair.	24.0	16.0	46.0			
• Good.	0.0	56.0	46.0			

Table (4): Percentage distribution of studied nurses' knowledge regarding care of premature neonates with Intraventricular hemorrhage (No=50)

Subjects' knowledge about items of care:	Pre %	Immediately post%	1month post%	Pre- immediately	X2 Pre – 1 month post.	P value
				Mean ± SD	Mean ± SD	
1. Maintain midline head position. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	64 36 0.0	2.0 36.0 62.0	0.0 60.0 40.0	1.20±0.66	1.04±0.40	.000
2. Elevate the head of the bed. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	56.0 44.0 0.0	0.0 36.0 64.0	0.0 60.0 40.0	1.20± 0.50	0.96± 0.49	.000
3. Maintain normal body temperature <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	46.0 54.0 0.0	0.0 26.0 74.0	0.0 40.0 60.0	1.2± 0.49	1.06± 0.37	.001
4. Slow intravenous fluid administration. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	50.0 50.0 0.0	0.0 34.0 66.0	0.0 50.0 50.0	1.14± 0.57	1.0± 0.45	.000
5. Maintain respiration <ul style="list-style-type: none"> • Poor • Fair • Good 	50.0 50.0 0.0	0.0 36.0 64.0	0.0 48.0 52.0	1.15± 0.57	1.1± 0.45	.018
6. Minimal simulation. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	70.0 30.0 0.0	0.0 46.0 54.0	10.0 60.0 30.0	1.24± 0.54	0.90± 0.43	.000
7. Reducing Noise. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	70.0 30.0 0.0	0.0 38.0 62.0	0.0 60.0 40.0	1.32± 0.47	1.00± 0.47	.018
8. Minimize pain and stress. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	60.0 40.0 0.0	0.0 36.0 64.0	10.0 40.0 50.0	1.24±0.45	1.00±0.43	.012

Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed).

Table (5): Percentage distribution of studied nurses' practice regarding care of preterm with Intraventricular hemorrhage (No=50)

Items of nurses' practice	Pre %	Immediately post%	1 month post%	Pre- immediately	X2 Pre – 1 month post.	P value
				Mean ± SD	Mean ± SD	
1. Maintain midline head position. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	60.0 38.0 2.0	2.0 34.0 64.0	10.0 40.0 50.0	1.47±2.66	1.42±2.40	.000
2. Elevate the head of the bed. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	40.0 58.0 2.0	0.0 32.0 68.0	6.0 42.0 52.0	1.45±2.49	1.38±2.36	.000
3. Maintain normal body temperature. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	32.0 64.0 4.0	2.0 34.0 64.0	4.0 46.0 50.0	2.38±0.66	1.32±0.49	.000
4. Slow intravenous fluid administration. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	28.0 62.0 10.0	0.0 32.0 68.0	2.0 38.0 60.0	2.62±4.90	1.38±4.70	.000
5. Maintain respiration. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	50.0 40.0 10.0	0.0 36.0 64.0	6.0 40.0 54.0	2.78±0.69	2.62±0.37	.018
6. Minimal stimulation. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	66.0 34.0 0.0	0.0 42.0 58.0	12.0 36.0 52.0	2.80±0.56	1.79±0.23	.000
7. Reducing noise. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	64.0 36.0 0.0	4.0 36.0 60.0	10.0 40.0 50.0	1.60±0.47	0.96±0.25	.000
8. Minimize pain and stress. <ul style="list-style-type: none"> • Poor. • Fair. • Good. 	60.0 34.0 6.0	2.0 30.0 68.0	2.0 40.0 58.0	1.84±0.45	1.00±0.34	.000

*Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)

Figure 3: Distribution of studied nurses regarding their total score of practice.

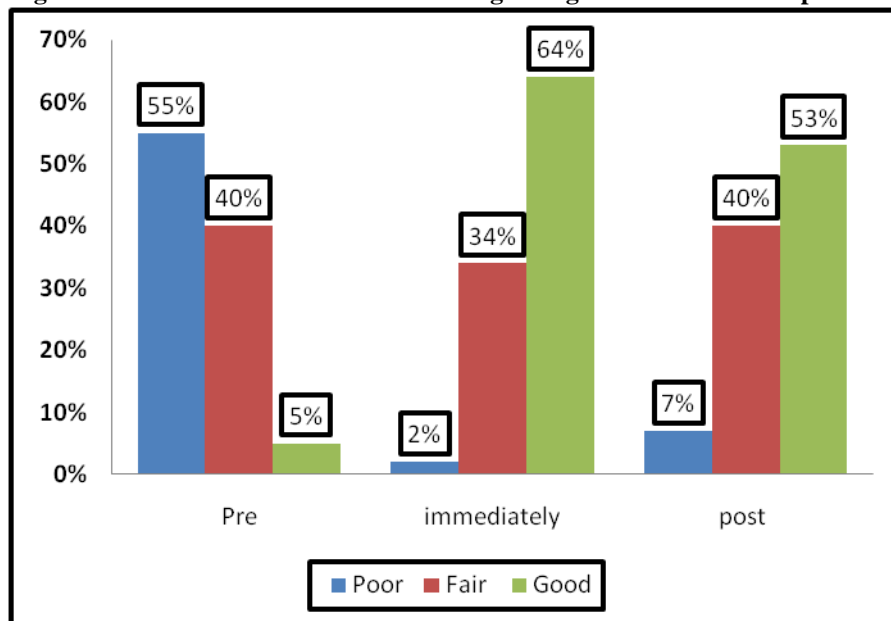


Table 6: Pearson Correlation of studied nurses' educational level and knowledge' score level.

Studied nurses' educational level.	Total score of knowledge								
	Pre			Immediately Post			One month Post		
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
	Pearson correlation 0.464** P =.001			Pearson correlation 0.832** P =.000			Pearson correlation 0.319** P =0.01		
1. Bachelor degree (n=17).	35.0%	45.0%	20.0%	15.0%	23.0%	62.0%	12%	35%	53%
2. Nursing technician (n=23).	44.0%	40.0%	16.0%	20.0%	35%	45.0%	35%	40%	25%
3. Diplomas (n= 10).	50.0%	36.0%	14.0%	40.0%	30%	30%	40 %	45%	15%

*Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)

Table 7: Pearson Correlation of studied nurses' educational level and practice' score level.

Studied nurses' education level.	Practice								
	Pre			Immediately Post			One month Post		
	Poor	Fair	Good	Poor	Fair	Good	Poor	Fair	Good
	Pearson correlation 0.434** P =.002			Pearson correlation 0.509** P =.000			Pearson correlation 0.642** P =0.000		
1. Bachelor degree	25%	55%	20%	15.0%	25%	60%	20%	38%	42%
	(N=17) 34.0%								
2. Nursing technician	50%	45%	5%	20%	28%	52%	30%	35%	35%
	(N=23) 46.0%								
3. Diplomas	60%	35%	5%	30%	30%	40%	40%	38%	22%
	(N= 10) 20.0%								

*Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)

V. Discussion

Intraventricular hemorrhage remains a serious condition which affects children life and survival. Nurses' knowledge and care practice affect child condition prognosis so this study aimed to design and implement nursing intervention guidelines for prevention and management of preterm neonates with intraventricular hemorrhage and evaluate its effect on nurses knowledge and performance. The results of the present study proved that studied nurses' knowledge was improved significantly immediately and one month post the intervention regarding definition, causes, clinical picture and treatment of intra-ventricular hemorrhage and the majority of them had good knowledge level regarding; how to maintain midline head position, elevate the head of the bed, maintain normal body temperature, respiratory intervention, reducing noise , reduce pain and stress immediately post and one month post the intervention with significant differences pre and post intervention so the first research hypothesis was accepted since the intervention improves nurses' knowledge this may be due to comprehensive explanation of the theoretical parts and also all important knowledge regarding care aspects of premature neonates with intraventricular hemorrhage.

The above mentioned finding was supported with Pena, et. al., in 2016 ⁽²⁶⁾; who found nurses Knowledge about developmental care improved significantly post the course and there was a significant statistical improvement in their knowledge score level also Elsobkey & Amer, in 2018 ⁽³³⁾; are in the same line with the current study finding and reported that nurses' knowledge improved significantly post implementation of educational guidelines and their total knowledge score were improved post the intervention with higher significant differences was found pre and post the intervention. In addition; Ahmed et. al., in 2013 ⁽⁶⁾ reported change in nurses and physician' knowledge about developmental care after implementation of instructional session's. Regarding Mohammed et. al., in 2014 ⁽³⁴⁾ reported there were highly statistically significances differences between nurses' knowledge about developmental care pre and post the program and there was highly statistically significant difference between the mean of the total nurses' knowledge score regarding developmental care which was in the same line with the result of the present study. Moreover, Shehab et.al in 2018 ⁽³⁵⁾ was in congruent and found a high statistical significant differences in knowledge scores related to all items of care provided to traumatic brain injury patients pre, immediately and 3 months after the program intervention with highly significance.

Regarding premature neonatal care of intra-ventricular hemorrhage; the result of the present study denoted that majority of the studied nurses demonstrated poor practice regarding; maintain midline head position, elevate the head of the bed, maintain normal body temperature, slow fluid administration, maintain respiration, maintain minimal stimulation and reducing noise in the pre intervention which improved significantly immediately and one month post the intervention so the second research hypothesis was accepted; the intervention improve nurses practice regarding care of preterm with intraventricular hemorrhage. Improvement in nurses' practice of care may results from providing them with the educational sessions by the researchers and researchers' demonstration of all items of practice, then they re-demonstrated until they can practice correctly and be satisfied about their performance level and their abilities to provide evidence based practice care. Pena, et. al., in 2016 ⁽²⁶⁾ was agreed with this finding and reported a significant improvement in

competence level of the correspondent' practice post intervention while most of them have an acceptable level of practice of care, which has been improved significantly post attending theoretical-practical course and the study shows that pre- and post-significance improvement, Macho, 2018⁽³⁶⁾ who study Nurses' Knowledge, Attitudes, and Perceived Self competency Regarding Individualized Developmental Care in the Neonatal Intensive Care Unit, supported the present study and stated a significant positive correlations between knowledge, attitude, practice and perceived self-competency, Lipson et. al., in 2004⁽³⁷⁾ was in consistent and found a positive relationship between knowledge, years of experience although no significant correlation was found with practice.

Elsobkey, et. al., in 2018⁽³³⁾ reported that nurses' practice improved significantly post implementation of the educational guidelines program and provide adequate and effective practice and competent practice. In addition; Ahmed, et.al, in 2013⁽⁶⁾ proved that nurses' practice was improved post the intervention which means that the instructional sessions had an effective role in enhancing both knowledge and practice about care of preterm with intraventricular hemorrhage and Lombardo in 2018⁽³⁸⁾; found the educational intervention advances nursing proficiency and skills in identifying hemorrhagic stroke also Shehab, et. al, in 2018⁽³⁵⁾; reported high statistical significant differences in satisfactory practice of traumatic brain injury patients pre, immediately and 3 months post program intervention with highly significant positive correlation between total knowledge and total practice score immediately after program implementation. Mohammed et.al, in 2014⁽³⁴⁾; supported the above mentioned results and stated that nurses' reactions reflected that developmental care is useful for the newborn infant and it helps the nurse to feel more assured and majority of them agree that developmental program met their professional needs, help them in regulatory newborn infant's behaviors, met the responsive needs of the newborn infant, makes the preterm to become restored than before and allow nurses also to notice any observations on the newborn infant. Study results demonstrated highly statistically significance between nurses' performance before program application and during the three times of assessment after the program and the total mean scores of nurses' performance were significantly high in the first, second and third post-test compared to the pre-test and Laila, et. al., in 2018,⁽³⁹⁾ whom study ; Impact of Training on Nurses Performance and Productivity at Neonatal Intensive Care Unit; reported that continuous nursing education cause nurses to be valuable and safe by providing high quality care to neonates and helped nurses to have better abilities and skill at NICU which support the current study finding.

VI. Conclusion:

From the current study finding it was concluded that nurses' knowledge and performances about care of premature neonates with IVH was improved significantly immediately post the implementation of the nursing intervention guidelines and slightly decreased one month post the intervention.

VII. Limitations

The most important limitation which facing researchers during this study was use of purposive sample to conduct the current study and also small sample size constitute another limitation.

VIII. Recommendations

Nurses constitute a major contact personal and main responsible for quality of care provided to the preterm babies in the neonatal intensive care unit so; to improve quality of care provided, prevent complications, save children life and promote good consequences, the following recommendation are required:

1. Educate the NICU nurses regarding intra-ventricular hemorrhage pathophysiology, causes, consequence and its impacts on preterm babies' life, long life effect on preterm and how they can help in improving the prognosis and treatment strategies of the preterm neonates with IVH.
2. Instruct NICU nurses about need of preterm neonates, meaning of nursing intervention guidelines, its importance and advantages for all preterm babies inside NICU.
3. Using of updates and evidence based practice in management of preterm neonates with IVH and how to maintain therapeutic environment inside NICU which satisfy; all preterm needs, parents' options and maintain staff satisfaction regarding care quality.

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References:

- [1]. Stacy, B., (2011): The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity., *Bull World Health Organ*; 88:31–38.
- [2]. A Babeker, Z., (2015): Assessment of Nurse's Knowledge and Practice Regarding care of Premature Preterm in Neonatal Intensive Care unit At Omdurman Maternity Hospital and Alribat University Hospital, Master Degree in Pediatric Nursing, The National Ribat University, Faculty of Graduate Studies & Scientific Research:1-15.
- [3]. Lawn, J., Blencowe, H., Darmstadt, G., Bhutta, Z., (2013) :Beyond newborn survival: the world you are born into determines your risk of disability-free survival. *Pediatric research*. ISSN 0031-3998 DOI: <https://doi.org/10.1038/pr.2013.202.1-4>.
- [4]. Gray, L., Watt, L. & Blass, E (2007): www.pediatrics.org/cgi/content/full/105/1/e14.
- [5]. Aita, M., & Sinder, L., (2003): The art of developmental care in the NICU: a concept analysis. *Journal of Advanced Nursing*, 41(3):223-232.
- [6]. Ahmed, G., Mohammad, H., Assiri, M., & Ameri, A., (2013): Effect of Instructional Sessions on Nurses' and Doctors' Knowledge and Practice regarding Developmental Care in NICU in Abha City, *Journal of Education and Practice* www.iiste.org ISSN 2222-1735 (Paper) ISSN 2222-288X (Online), Vol.4, No.20, 2013;1-11.
- [7]. Johnson, S., Marlow, N., (2016): Early and long-term outcomes of infants born extremely preterm, *Arch Dis Child*.;1-6.
- [8]. Mulindwa, M., Sinyangwe S., Chomba E., (2012): The Prevalence of Intraventricular Haemorrhage and Associated Risk Factors in Preterm Neonates in the Neonatal Intensive Care Unit at the University Teaching Hospital, Lusaka, Zambia, Vol. 39, No.1.;16-21.
- [9]. Christ, L., Barber, J., Murray, A., Dunleavy, M., Stoller, J., Taha, D., Posencheg, M., (2015): Reducing intraventricular hemorrhage in a level III neonatal intensive care unit. *BMJ, Quality and Safety*, 24, 731-732.
- [10]. Mc Crea, H., & Ment, L., (2008): The diagnosis, management, and postnatal prevention of intraventricular hemorrhage in the preterm neonate, *Clin Perinatol.*; 35(4): 777-792. doi: 10.1016/j.clp.2008.07.014. PMID: 19026340, PMCID: PMC2901530.
- [11]. Ballabh, P., (2010): Intraventricular hemorrhage in premature infants: mechanism of disease. *Pediatr Res.*; 67:1–8. doi: 10.1203/PDR.0b013e3181c1b176. PMID: 19816235, PMCID: PMC2799187
- [12]. Sarkar, S., Bhagat, I., Dechert, R., Schumacher, R., Donn, S., (2009): Severe intraventricular hemorrhage in preterm infants: comparison of risk factors and short-term neonatal morbidities between grade 3 and grade 4 intraventricular hemorrhage. *Am J Perinatol*; 26: 419–24. doi: 10.1055/s-0029-1214237.
- [13]. Antoniuk, S, Da Silva, R., (2000): Periventricular And Intraventricular hemorrhage in the premature infants. *Rev Neurol*. 2000; 31: 238–43. PMID: 10996925.
- [14]. El farargy, M., Adel Eltomey, M., Soliman, N., (2017): Early predictors of neonatal intraventricular hemorrhage, Volume: 9, Issue: 8, Pages: 4946-4951, DOI: <http://dx.doi.org/10.19082/4946>.
- [15]. Gupta, S., Kechli, A., Kanamalla, U., (2009): Intracranial hemorrhage in term newborns: management and outcomes, *Pediatr Neurol*. 2009 Jan; 40(1):1-12.
- [16]. Szpecht, D., Frydryszak, D., Miszczyk, N., Szymankiewicz, M., and Gadzinowski, J., (2016): The incidence of severe intraventricular hemorrhage based on retrospective analysis of 35939 full-term newborns—report of two cases and review of literature, *Childs Nerv Syst*. 2016; 32(12): 2447–2451.
- [17]. Ment, L., Bada, H., Barnes, P, et al., (2002): Practice parameter: neuroimaging of the neonate: report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. *Neurology*; 58(12):1726-1738.
- [18]. Shah, N., & Wusthoff, C., (2016): Intracranial Hemorrhage in the Neonate *MARCH / APRIL*, 2016, Vol., 35, No., (2):67-72.
- [19]. Vermont Oxford Network. (2016). Optimizing outcomes of the micro-premature infant., Retrieved from www.vermontoxford.com.
- [20]. Green, N., (2017): Reducing Intraventricular Hemorrhage, University of San Francisco, master project, <https://repository.usfca.edu/capstone>: 2-10.
- [21]. El-Atawi, K., Elhalik, M., Kulkarni, T., Abdelsamed, A., Alexander, L., & Satyan, A., (2016): Risk Factors, Diagnosis, and Current Practices in the Management of Intraventricular Hemorrhage in Preterm Infants: A Review Article, *Acad J Ped Neonatol*, Volume 1, Issue 3 :001-007.
- [22]. Pickler, R., McGrath, J., Reyna, B., et al., (2013): *Adv. Neonatal Care*, Vol., 13(Suppl 5): S11-20. ISSN: 1536-0911.
- [23]. Altimier, L., (2011): Mother and child integrative developmental care model: a simple approach to a complex population. *Newborn Infant Nurs Rev.*; 11:105-8.
- [24]. Altimier, L., & Phillips, R., (2013): The neonatal integrative developmental care model: seven neuroprotective core measures for family centered care. *Newborn Infant Nurs Rev.*; 13:9-22.
- [25]. Altimier, L., White, R., (2014): The Neonatal Intensive Care Unit (NICU) Environment. In: Kenner C, Lott J, eds. *Comprehensive Neonatal Nursing Care*. NY, NY.: Springer Publishing: p. 722-38.
- [26]. Pena, R., Pablos, D., Munoz, A., Velasco, N., Pumarega, M., & Alonso, C., (2016): Impact of a Developmental Care Training Course on the Knowledge and Satisfaction of Health Care Professionals in Neonatal Units: A Multicenter Study, *Pediatrics and Neonatology* 57, 97-104.
- [27]. Fegram, L., (2006): Nurses as moral practitioners encountering parents in the neonatal intensive care unit. *Nurs Ethics*. 2006; 12:52-64.
- [28]. Picheansathian, W., Woragidpoonpol, P., Baosoung, C., (2009): Positioning of preterm infants for optimal physiologic development: a systematic review. *Joanna Briggs Inst LibrSyst Rev.*; 7:224-59.
- [29]. Maquet, P., Smith, C., Stickgold, R., (2003): *Sleep and Brain Plasticity*. New York: Oxford University Press.
- [30]. Walker, S., (2014): Neonatal pain. *Pediatr Anesth.*; 24:39-48.
- [31]. Goubet, N., Strasbaugh, K., Chesney, J., (2007): Familiarity breeds content? Soothing effect of a familiar odor on full-term newborns. *J Dev Behav Pediatr.*; 28:189-94.
- [32]. Visscher, M., (2014): A practical method for rapid measurement of skin condition. *Newborn Infant Nurs Rev*. 2014; 14:147-52.
- [33]. Elsobkey, F., & Amer, S., (2018): Effect of Educational Guidelines Program about Nursing Care of Neonates Receiving Continuous Positive Airway Pressure. *IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-* ISSN: 2320-1959, p- ISSN: 2320-1940 Volume 7, Issue 3 Ver. IX (May-June .2018).: 16-26 www.iosrjournals.org.
- [34]. Mohammed, S., Bayoumi, M., & Mahmoud, F., (2014): The Effect of Developmentally Supportive Care Training Program on Nurses' Performance and Behavioral Responses of Newborn Infants, Vol.5, No.6.:134-144.
- [35]. Shehab, M., Ibrahim, N., Elkader, H., (2018): Impact of an Educational Program on Nurses' Knowledge and Practice Regarding Care of Traumatic Brain Injury Patients at Intensive Care Unit, at Suez Canal University Hospital, *International Journal of Caring Sciences* May-August 2018 Volume 11, Issue 2: 1104-1116.

- [36]. Macho, P., (2018): Nurses' Knowledge, Attitudes, and Perceived Self competency Regarding Individualized Developmental Care in the Neonatal Intensive Care Unit, University of New York , Dissertations, Theses, and Capstone Projects Graduate:40-60.
- [37]. Lipson, A., Hausam, A. , Higgins, P. , &Burant, C. , (2004): Knowledge, attitudes, and predictors of advance directive discussions of Registered Nurses. *Western Journal of Nursing Research*, 26(7), 784-796.
- [38]. Lombardo,k., (2018): Improving Advanced Practice Nurses' Knowledge of Cerebral Hemorrhage Assessment and Management, doctorate thesis .: 30-35 ;<https://scholarworks.waldenu.edu/dissertations>.
- [39]. Laila, R., Zohra J, Kashif A, Brig , A ., et.al.,(2018) :Impact of Training on Nurses Performance and Productivity at Neonatal Intensive Care Unit (NICU) *JOJ Nurse Health Care*. 2018; 9(2):001-005.

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