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IMPLEMENTING COMPETENCY BASED EDUCATIONAL PROGRAM FOR IMPROVING NURSES' PERFORMANCE AT NEONATAL INTENSIVE CARE UNITS

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Abstract

Aim: Evaluate the effectiveness of Competency Based Educational Program on knowledge and practice towards nurses' performance in the NICUs. Design: A quasi experimental design was used. Settings: The study was conducted at NICUs in both Maternity and Pediatric Hospitals that affiliated to Ain shams university hospitals. Sample: A convenient sample of 70 nurses, from the previously mentioned settings during the period of 1 year. Tools: Two tools were used to collect data namely: A structured interviewing questionnaire and standardized observational checklists (A pre-posttest) to assess nurses' knowledge and practice regarding their performance at NICUs. Results: There was highly statistically significant improvement in posttest compared to the pretest results regarding the nurses' performance at NICUs where $P<0.001$. Conclusion: The competency based educational program for nurses' was effective in improving nurses' performance at NICUs. Recommendations: Conduct competency based educational programs to improve nurses' performance at NICU based on their actual need assessment.

Key words: Neonatal Intensive Care Units, Pediatric, CBEP, Nurses.

INTRODUCTION

The healthcare environment of today is increasingly demanding more effective and good outcomes, which can be attained when treatments are based on best practices and instructional methods. Competency-based education is a new trend in nursing education that is being increasingly used in both curriculum design and nursing practice regulation (Darby and Nurse, (2016).

Nurses who work with newborns must develop their nursing skills and apply them to their daily work. Competence is a skill that may be learned and developed through experience. The idea of competency has two components: 1) One has prospective skills that might be valuable in specific situations, and 2) One is motivated to apply those skills to demonstrate their value. Competency, on the other hand, is a behavioral trait based on one's interests and experiences, impacted by the nurse's drive and attitude (McGrath et al., 2016).

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The Intensive Care Unit (NICU) is distinguished by a variety of emotional stressors and tasks. Based on the neonates and the family, the care is comprehensive. The medical strategy and the staff's interaction with the parents of the neonates receiving care must both support during the hospital stay (Dutta et al., 2015).

Health care workers have been the focus of competency-based education programmes, which ensure that students have the skills needed to deliver high-quality care. The CBE went on to say that training for the health professions should purposefully equip practitioners to handle the challenges of evolving health care. Competencies can offer effective substitutes for conventional courses and a means of rigorous evaluation (Gruppen et al., 2012).

SIGNIFICANCE OF THE STUDY

The competency based educational program affects the nurses' performance at Neonatal Intensive Care Units. Therefore it is important to carry out this study to shed light on nurses' performance at neonatal intensive care units that can be improved significantly with implementation of competency based educational program that can affect the quality of nursing care provided to neonates at Neonatal Intensive Care Units .

Aim of the study:

The present study aimed to evaluate the effect of implementing competency based educational program on nurses' performance through:

- Assess nurses' knowledge and practice regarding competency based educational program.
- Design, implement and evaluate outcomes of the implemented competency based educational program regarding care of newborns in the NICUs.

Research hypothesis:

Competency Based Educational Program will be effective in improving nurses’ knowledge and practices regarding care of newborns in the NICUs.

Research design:

A quasi-experimental design was used in the current study.

Setting:

This study was conducted at Maternity and Pediatric Hospitals affiliated to Ain sham Hospitals / Cairo/ Egypt.

Sample:

A convenient sample that consisted of 70 nurses, who employed in the previously mentioned setting and were responsible for care of the newborns in NICUs regardless their characteristics. Nurses were assessed twice pre/ post CBEP using same tools.

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Tools for data collection:

1- A predesigned interviewing questionnaire format (pre-posttest): It was developed by the researcher based on related literature review and covered the following parts:

Part 1: Characteristics of the nurses (age, qualification, years of experience and attending previous training program related to CBEP in NICU).

Part 2: Nurses' knowledge regarding competency based educational program as the following:

- Causes of Neonatal Intensive Care Units admission, protocol of care….etc.
- Competency based educational program concept, importance, principles, stages, steps, types of characteristics, models benefit, advantages and disadvantages and its effect on nurses' performance at Neonatal Intensive Care Units.

2- Standardized observational checklists (A pre-posttest): Observational checklists were used to assess nurses' practices for newborns in NICUs (Newborn admission, hand washing, vital signs, medication administration, nutrition, urinary catheter care, oxygenation, respiratory suctioning and diagnostic measures competency based practice).

Scoring system:

Nurses' knowledge was checked with a model key answer and accordingly their knowledge were considered either complete or incomplete.

As regards nurses' practices, nurses were directly observed using the observational checklists and accordingly their practices were considered either competent or incompetent.

Content validity and reliability:

Content validity of the study tools was assessed by Jury of 3 experts in the field of the study and reliability of the tools was tested by cronbakh alpha test (0.814).

Protection of ethical and human rights:

The ethical research committee, the nursing faculty, and Ain Shams University all approved the study. The study's objective and purpose are made apparent to each subject by the researcher, and it is safe. The researcher protects the subjects' privacy and anonymity. Subjects have the freedom to participate or not at any time without consequence.

Procedure:

The researcher was available in the study setting 3days/week through morning and afternoon shifts to gather data from April 2020/2021 where 4 nurses were interviewed daily using the previously mentioned tools (30-45 minutes for each nurse) upon data gathering the CBEP designed in the light of actual need assessment of the study subjects. Then the CBEP was implemented either individually or in group from 3-5 nurses. Different teaching strategies were used .Then evaluation was carried out using same pretest tools.

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RESULTS

Table (1): Distribution of the studied nurses according to their characteristics (n=70)

Socio-demographic data	No.	%
Age (years)		
20-<25	13	18.6
25-<30	27	**38.6**
30-<35	5	7.1
35-<40	3	4.3
≥40	22	31.4
$\bar{x}$ ±SD	34.77±5.91	
Gender		
Male	16	22.9
Female	54	**77.1**
Social Condition		
Unmarried	15	21.4
Married	46	**65.7**
Divorced	5	7.1
Widow	4	5.7
Qualification		
Diploma of nursing (3 years)	14	20.0
Diploma of technical nursing institute (2 years)	45	**64.3**
Bachelor of nursing science	6	8.6
Other (Interns, nursing students).	5	7.1
Experience (year)		
<1	2	2.9
1-<5	11	15.7
5-<10	19	27.1
10-<15	38	**54.3**
$\bar{x}$ ±SD	2.38±0.40	
Previous attendance of training about CBEP in NICU		
Yes	29	41.4
No	41	**58.6**

Table 1 shows that age of 38.6% of the studied sample ranged from 25-< 30years. Also 77.1% of the studied sample were females and 65.7% of them were married. Moreover, this table shows that 64.3% had diploma of technical nursing institute (2 years), regarding the years of experiences, 54.3% of the studied sample had from 10-<15 years of experiences and 58.6% of them attended training courses in CBE.

Table (2): Distribution of the studied nurses according to their total knowledge regarding CBEP (pre/ post) implementation (n=70).

Total satisfaction about the CBEP	Pre-CBEP (n=70)		Post- CBEP (n=70)		X^2	p-value
	No.	%	No.	%		
Incompetent <80%	37	52.9	8	11.4	25.675	<0.001**
Competent >80%	33	47.1	62	88.6		
Total	70	100.0	70	100.0		

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Using: Chi-square test

P-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table 2 showed that there were marked improvement in nurses' knowledge regarding CBEP (pre/ post) implementation with highly statistical significance difference $\chi^2 =$ 25.675 and P<0.001**.

Figure (1): Distribution of the studied nurses according to their total knowledge regarding CBEP (pre/ post) implementation

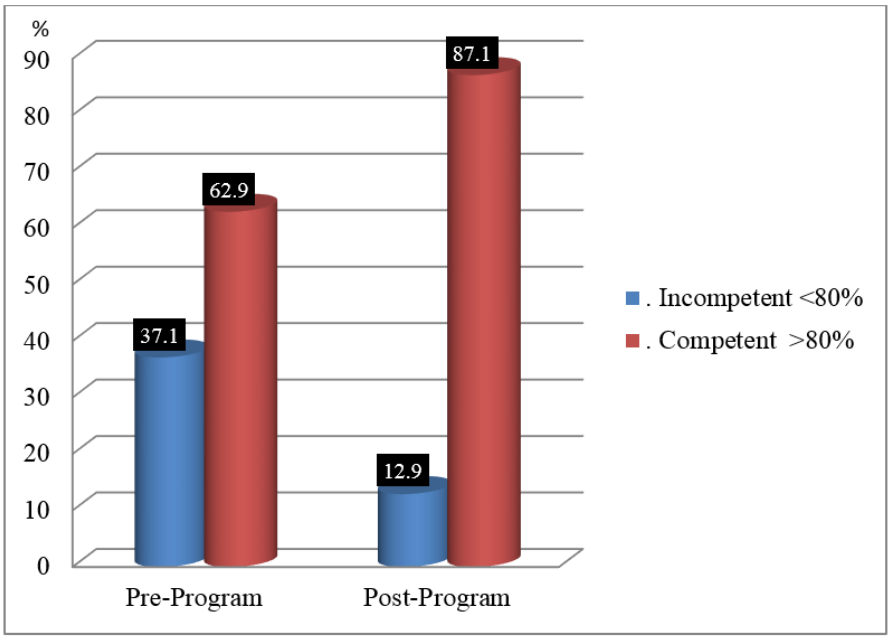

Figure 1 shows that 47.1 % of the studied nurses had competent total knowledge pre – CBEP implementation, while 88.6 % of them had competent total knowledge post CBEP implementation. It was observed from this figure that there was marked improvement in nurses' total knowledge post nursing implementation with $\chi^2 =$ 25.675 and P<0.001**

Table (3): Distribution of the studied nurses according to their total practice regarding CBEP (pre/ post) implementation (n=70)

Domain of competency-based program practice	Pre-CBEP (n=70)		Post- CBEP (n=70)		X^2	p-value
	No.	%	No.	%		
Incompetent <80%	26	37.1	9	12.9	9.752	**<0.001****
Competent >80%	44	62.9	61	87.1		
Total	70	100.0	70	100.0		

Table 3 shows that there were marked improvement in nurses' practices regarding CBEP (pre/ post) implementation with highly statistical significance difference $\chi^2 =$ 9.752and P<0.001**.

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Figure (2): Total nurses' practice regarding CBEP (pre/ post) implementation

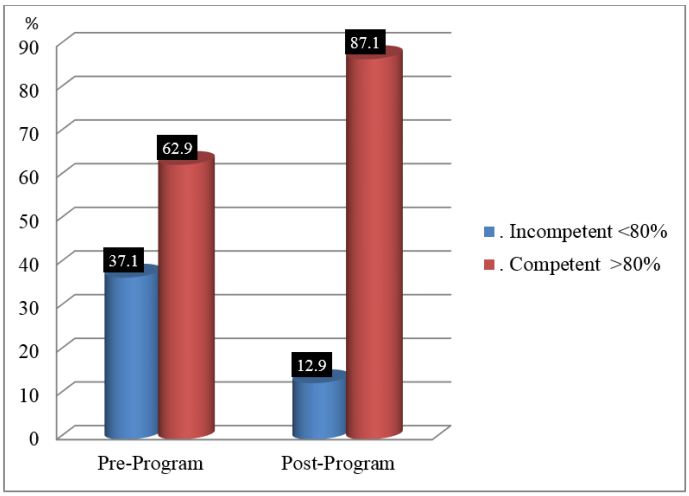

Figure 2 shows that 62.9 % of studied nurses had competent total practices pre – CBEP implementation, while 87.1 % of them had competent total practices post CBEP implementation. It was observed from this figure that there was marked improvement in nurses' total practices post nursing intervention with $\mathbf{X^2}$ = 9.752and P<0.001**.

Table (4): Relation between nurses' total knowledge about CBEP (pre/ post) implementation and their socio-demographic data (n=70)

Socio-demographic data	Pre-CBEP (n=70)						Post- CBEP (n=70)					
	Incomplete (n=37)		Complete (n=33)		X^2	*p-value*	Incomplete (n=8)		Complete (n=62)		X^2	*p-value*
	No.	%	No.	%			No.	%	No.	%		
Age (years):												
20-<25	7	18.9	6	18.2	17.682	<0.001**	3	37.5	10	16.1	6.954	.138
25-<30	21	56.8	6	18.2			4	50.0	23	37.1		
30-<35	3	8.1	2	6.1			0	0.0	5	8.1		
35-<40	2	5.4	1	3.0			1	12.5	2	3.2		
≥40	4	10.8	18	54.5			0	0.0	22	35.5		
Gender:												
Male	11	29.7	5	15.2	2.102	0.147	5	62.5	11	17.7	8.050	.005
Female	26	70.3	28	84.8			3	37.5	51	82.3		
Social Condition:												
Unmarried	8	21.6	7	21.2	.125	0.989	3	37.5	12	19.4	2.801	.423
Married	24	64.9	22	66.7			4	50.0	42	67.7		
Divorced	3	8.1	2	6.1			0	0.0	5	8.1		
Widow	2	5.4	2	6.1			1	12.5	3	4.8		
Qualification:												
Diploma of nursing (3 years)	7	18.9	7	21.2	2.803	0.423	3	37.5	11	17.7	29.15	<0.001**
Diploma of technical nursing institute (2 years)	25	67.6	20	60.6			1	12.5	44	71.0		
Bachelor of nursing	4	10.8	2	6.1			0	0.0	6	9.7		
Other (Interns, nursing students).	1	2.7	4	12.1			4	50.0	1	1.6		
Experience:												
<1	1	2.7	1	3.0	11.426	0.010*	1	12.5	1	1.6	8.15	0.043*
1-<5	6	16.2	5	15.2			3	37.5	8	12.9		
5-<10	4	10.8	15	45.5			0	0.0	19	30.6		
10-<15	26	70.3	12	36.4			4	50.0	34	54.8		
Previous attendance of training about CBEP in NICU												
Yes	5	13.5	24	72.7	25.204	<0.001**	0	0.0	29	46.8	6.38	0.011*
No	32	86.5	9	27.3			8	100.0	33	53.2		

Table (4) shows that there was a highly statistically significant relation between total studied sample knowledge about CBEP of the studied sample and their level of

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qualification at level (P= <0.001). Also, there was a statistically significant relation between total nurses' knowledge about CBEP and their experience at level (p= 0.043). While there was a statistically insignificant relation between total nurses' knowledge about CBEP and their age at level (p= .138) and also there was a statistically insignificant relation between total nurses' knowledge about CBEP and their social condition at level (p= .423).

Table (5): Relation between nurses' total practices about CBEP (pre/ post) implementation and their socio-demographic data (n=70)

Socio-demographic data	Pre-CBEP (n=70)						Post- CBEP (n=70)					
	Incompetent (n=26)		Competent(n=44)		X^2	p-value	Incompetent (n=9)		Competent (n=61)		X^2	p-value
	No.	%	No.	%			No.	%	No.	%		
Age (years):												
20-<25	5	19.2	8	18.2	8.856	0.065	3	33.3	10	16.4	5.900	.207
25-<30	13	50.0	14	31.8			4	44.4	23	37.7		
30-<35	3	11.5	2	4.5			1	11.1	4	6.6		
35-<40	2	7.7	1	2.3			1	11.1	2	3.3		
≥40	3	11.5	19	43.2			0	0.0	22	36.1		
Gender:												
Male	9	34.6	7	15.9	3.243	0.072	1	11.1	15	24.6	.808	.396
Female	17	65.4	37	84.1			8	88.9	46	75.4		
Social Condition:												
Unmarried	5	19.2	10	22.7	.395	0.941	2	22.2	13	21.3	1.269	0.737
Married	17	65.4	29	65.9			6	66.7	40	65.6		
Divorced	2	7.7	3	6.8			0	0.0	5	8.2		
Widow	2	7.7	2	4.5			1	11.1	3	4.9		
Qualification:												
Diploma of nursing (3 years)	7	26.9	7	15.9	2.135	0.545	7	77.8	7	11.5	21.70	<0.001**
Diploma of technical nursing institute (2 years)	14	53.8	31	70.5			2	22.2	43	70.5		
Bachelor of nursing	3	11.5	3	6.8			0	0.0	6	9.8		
Other	2	7.7	3	6.8			0	0.0	5	8.2		
Experience:												
<1	1	3.8	1	2.3	4.409	0.221	2	22.2	0	0.0	37.20	<0.001**
1-<5	3	11.5	8	18.2			6	66.7	5	8.2		
5-<10	4	15.4	15	34.1			1	11.1	18	29.5		
10-<15	18	69.2	20	45.5			0	0.0	38	62.3		
Previous attendance of training about CBEP in NICU												
Yes	7	26.9	22	50.0	3.587	0.058	0	0.0	29	47.5	5.477	0.019*
No	19	73.1	22	50.0			9	100.0	32	52.5		

Table (5) shows that there was a highly statistically significant relation between total nurses' practices of CBEP and their level of qualification and experience at level (P= <0.001). While, there was a statistically insignificant relation between total practice of CBEP application of the studied sample and their age level at (p= .207). Also, there was a statistically insignificant relation between total practices of CBEP implementation of the studied sample and their social condition at (p= > 0.737).

Table (6): Correlation between total nurses' knowledge and their practices about CBEP pre- post implementation of CBEP (n=70)

	Total score of Knowledge			
	Pre		Post	
	r	P. value	R	P- value
Total score of Practices	0.130	0.608	0.701	<0.001**

r- Pearson Correlation Coefficient.

*p-value <0.05 significant correlation; **p-value <0.001 highly significant

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Table 6 illustrated that there was a positive correlation between total nurses' knowledge and their total practices regarding CBEP (pre/ post) implementation (r=0.130 and P-value = 0.608pre- implementation compared with (r= 0.622 and and P-value <0.001**) post - CBEP implementation.

DISCUSSION:

The current quasi-experimental study aimed to evaluate the effect of CBEP on nurses' performance at NICUs. The current study revealed that in relation to level of qualification it was found that 64.3% had diploma of technical nursing institute (2 years) and 58.6% of them were attended training courses. This result was in contradiction with Rogowski et al. (2015), who mentioned in the study entitled "Nursing Staffing in Neonatal Intensive Care Units in United States" that most NICU nurses 71% are bachelor of nursing, and all of the registered nurses in the NICU had varying levels of training courses

Regarding the years of experience, the current study showed that more than half (54.3%) of the studied sample had from 10-<15 years of experience in neonatal intensive care units. This was contradicted the findings of Ibrahim & Khudhair's (2022), who mentioned in the study entitled" Effectiveness of an Instructional Program for Nurses' About Nursing Documentation at Pediatric Surgical Wards. Submitted for Partial Fulfillment of the Requirements of The Master Degree in Pediatric Department" who found that near half of nurses had years of experience from 6 -10 years.

Regarding distribution of the studied nurses according to their total nurses' knowledge regarding CBEP (pre/ post) implementation this results was accordance with Salah et al (2021), who conducted a study titled "Effect of Nursing Intervention Program Related to Nursing Iatrogenic Events on Nurses Performance and Clinical Outcomes of Neonatal Intensive Care Unit" in Egypt that, before program the total knowledge scores of all nurses were poor while the majority of them had good scores after implementing program. Total practice scores of all nurses were good also immediately and after one month .There were statistical significant differences between nursing knowledge, practice and biosocial data .The outcomes of neonates showed an improvement in neonatal condition of discharge.

Distribution of the studied nurses according to their total nurses' knowledge regarding CBEP (pre/ post) implementation, this results was contradicted with Sultan et al.,(2021) who conducted a study titled " The Effect of Implementing Peripherally Inserted Central Catheter Educational Program on Nurses' Knowledge ,Practice , and Neonatal Outcomes" in Egypt who found that majority of the studied nurses had poor knowledge ,and more than half competent skills about Pediatric Intensive Care Units before program implementation .There was poor knowledge ,and more than half had average knowledge and two thirds had competent practices after program implementation .Also ,there was decrease in the prevalence of neonatal complications.

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Regarding to nurses' practice about hand washing competency based practice, the result of this study clarified that there was a marked improvement in practical skills of the studied sample post-implementation of CBEP related to hand washing competency based practice with a highly statistically significant difference at (P= < 0.01) . This result was in contradiction with Mohamad et al. (2022), who conducted a study about "'Effectiveness of an Educational Program on Nurses' Practice Regarding Neonatal Sepsis in Neonatal and Premature Care Units a Quasi-experimental Study " in Iraqi who found that there were mild differences between pre and post educational program practice of control group while there were significant differences between pre and post program for the intervention group.

Concerning level of nurses' total practices regarding hand washing competency based practice, the present study results clarified that most of them had incompetent levels of practices regarding hand washing competency based practice pre – CBEP - implementation. These results were in accordance with Eskander et al. (2013), who conducted a study about "Intensive Care Nurses' Knowledge and Practice Regarding Infection Control Standard Precautions", at a selected Egyptian Cancer Hospital. The study revealed that the studied sample had an unsatisfactory level of knowledge regarding infection control precautions

The present study shows that there was a marked improvement in practical skills of the studied sample post CBEP implementation related to nutrition competency based practice with a highly statistically significant difference at (P= < 0.01). This result was in an accordance with Mohamad et al. (2018), who conducted a study titled 'The Effect of Educational Program on Nurses" Knowledge and Practices about Nasogastric Tube Feeding at Neonatal Intensive Care Units" in Egypt who implied that the educational program was designed serves as a referral instructional for nurses was having a positive effect on enhancing nurses knowledge and practice related to nasogastric tube insertion feeding at neonatal intensive care units.

Regarding to nurses' practice about medication administration competency based practice the result of this study clarified that there was a clear improvement in practical skills of the studied sample post CBEP implementation related to medication administration competency based practice with a highly statistically significant difference at (P= < 0.01) . This result was in contradiction with Mohamad et al. (2022), who conducted a study about "Effect of an Educational Program for Nurses Regarding Errors in Medication Administration for Children " in Egypt who implied that the majority of the studied nurses had satisfactory knowledge and majority of them had positive attitude post program implementation and three quarters of them had competent practice regarding errors of medication administration for children.

Regarding to nurses' practice about vital signs competency based practice, the result of this study clarified that there was a marked improvement in practical skills of the studied sample post CBEP implementation related vital signs competency based practice with a highly statistically significant difference at (P= < 0.01) . This result was in an accordance

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with Daniel et al., (2019), who conducted a study about "Effect of an Educational Program for the Knowledge and Quality of Blood Pressure Recording" in Brazilian who implied that the educational program showed positive results in the promotion of knowledge among nurse's professionals and in the improvement of the quality of blood pressure recording.

The present study shows that there was a marked improvement in practical skills of the studied sample post CBEP implementation related to oxygen therapy competency based practice with a highly statistically significant difference at (P= < 0.01). This result was in an accordance with Mostafa et al., (2019) who conducted a study about "Effect of Educational Program on Nurses' Knowledge and Practice about Oxygen Therapy" in Egypt who implied that the total nurses' knowledge mean scores improved (9.080±4.818) before educational program to (19.840±.421) after its implementation and there was a good improvement with highly significant differences related to knowledge and practice of educational program.

Regarding to nurses' practice about urinary catheter care competency based practice, the result of this study clarified that there was a marked improvement in practical skills of the studied sample post CBEP implementation related to urinary catheter care competency based practice with a highly statistically significant difference at (P= < 0.01). This result was in an accordance with Mudgal et al., (2015), who conducted a study titled "Assess the Effectiveness of Educational Program on Practice Regarding Indwelling Catheter Care Among Staff Nurses at Selected Hospitals in Udaipure "in India who found that the majority of staff nurses having qualification (58.66%)were between age group of 25 and 29 years. The mean pre-test practice score was in experimental group 12 .24±1.39 and control group 12.2±1.44, respectively, subjects who were exposed to the educational program had significantly better practice scores than that of the control group.

Regarding to nurses' practice about diagnostic measures competency based practice, the result of this study clarified that there was a marked improvement in practical skills of the studied sample post CBEP implementation related to diagnostic measures competency based practice with a highly statistically significant difference at (P= < 0.01). This result was in an accordance with **Onianwa et al., (2021)** , who conducted a study titled "Outcome of an Educational Training Program on Blood Glucose Monitoring Among Nurses in the Management of Hypoglycemia and Hyperglycemia" in Nigeria who found that the educational intervention program with a practical training sessions was an effective approach for improving blood glucose monitoring among the participants. However, it is recommended that protocols and practice guidelines should be placed at strategic locations, and methods of empowering nurses, such as providing them with equipment needed to sustain this practice should be heightened.

CONCLUSION:

The competency based educational program for nurses' was effective in improving nurses' performance at NICUs.

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DOI 10.17605/OSF.IO/T3MVZ

Recommendation:

Conduct educational programs to improve nurses' performance for neonatal nurses based on actual need assessment of the nurses.

Conflict of Interest:

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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