

## Effect of Educational Intervention on Nurses Performance to Control Infection in Neonatal Intensive Care Unit Tanta University Hospital

Ebtisam M. Elsyed\*, Safaa A. Zahran\*\*, Thanaa A. Elawany\*

**ABSTRACT:** Nursing care of the high risk neonates requires critical care nursing, which has created a need for highly skilled personnel trained in the art of neonatal intensive care. The incidences of infection among high risk neonates are more frequent due to their immature immune system. It's considered the most serious complications and represents about 60% of neonatal death in Neonatal Intensive Care Unit (NICU), Tanta university hospital. The aim of this study was to evaluate the effectiveness of educational intervention on nurse's performance to control infection at neonatal intensive care unit, Tanta University Hospital. The sample was consisted of all nurses working in the unit and all high risk neonate who were admitted over a period of 3 months. Two tools were used to collect data. Checklist for nurse's performance and health assessment sheet for high risk neonate. The result shows that, before intervention 70.49% of nurses had unsatisfactory grade, while after intervention two-thirds of them (63.39%) were good and 21.31% of nurses were satisfactory in their performance. This difference was statistically significant ( $p < 0.05$ ). According to condition on discharge, it was found that 76% of study group improved, compared to 60% of control group. In Conclusion: Risk of infection can be controlled, if the health team and other workers have understood the principles and methods of controlling infection. Nurses at NICU need pre service as wells in-service educational program to refresh their knowledge and improve their skills.

### INTRODUCTION:

The neonatal period is a highly risk means an infant exposed to any vulnerable period during which many of the condition that makes their survival in physiologic adjustments required for extra danger. They include infant of diabetic uterine existence are completed. (1) High mothers, neonatal jaundice, neonatal

---

\*Pediatric Nursing Department, Faculty of Nursing, Tanta University.

\*\*Nursing Services Administration Department, Faculty of Nursing, Tanta University.

sepsis, respiratory distress syndrome, congenital anomalies, low birth weight, pre term, and post term baby.<sup>(2,3)</sup> Nursing care of high risk neonate requires critical care nursing which has created a need for highly skilled personnel trained in art of neonatal intensive care.<sup>(1,4)</sup> The neonatal intensive care unit (NICU) is technology focused and crisis drive. Working there demands technical competence as well as the emotional attitude to ensure that neonates are cared in an environment that value their basic human needs.<sup>(5, 6)</sup>

Modern technology and expert nursing care have made important contributions to improving the health and overall survival of high risk neonates. Nursing care can be made easier by the provision of special equipment.<sup>(4)</sup> The nursing staff must be trained in the use of such equipment, in order to give a high standard of care that those infants need. So nurses need a continuous health educational intervention to restore their stability and prevent

complications.<sup>(7, 8)</sup>

The term infection is generally used to mean the deposition and multiplication of bacteria and other micro-organisms in tissues or on surfaces of the body.<sup>(9)</sup> The commonest infections transmitted to neonates by hospital staff, a part from upper respiratory viral infection, staphylococcal sepsis, streptococcal, sore throat, and infective diarrhea. The likelihood of transmission clearly depends on the activities of the infected person. Symptomless carriers of virulent pathogenic organisms among members of staff are also a potential hazard of infection to child.<sup>(10)</sup> Newborns infected (symptomatic or asymptomatic) with any organisms constitute a real danger on other newborns and personnel working in these units.<sup>(11)</sup>

The incidence of infection is more frequent, due to their immature immune system which renders the neonate especially vulnerable one to infectious organisms. It's considered the most serious

complications and represents about 60% of neonatal death in NICU unit, at Tanta University hospital.<sup>(12)</sup> Hospital mission is to promote a healthy and safe environment by preventing transmission of infections agents among children, staff, and visitors.<sup>(13)</sup> Infection transmission in care settings can happen because of accidents, carelessness, poor practice, poor working conditions, and lack of barrier protection. All of these risks can be controlled if health team and other workers have some knowledge of the facts and problems of cross infection and understand the principles and methods of controlling infection.<sup>(14,15)</sup>

One of the most important component of the infection control programme is education and training of health care workers.<sup>(16)</sup> They should be equipped with requisite knowledge, skills, and attitudes for good infection control practices.<sup>(17,18)</sup> Staff training is important to understand the principles and methods of controlling

infection.<sup>(9)</sup> Education is a large part of infection control practice. Careful design, implementation and evaluation of educational program will hopefully be reflected in lowered infection rates in health care facilities.<sup>(19)</sup>

### **AIM OF THE STUDY**

To evaluate the effect of educational intervention on nurse's performance to control infection in neonatal intensive care unit, at Tanta University Hospital.

### **MATERIAL AND METHODS**

**Setting:** The study was conducted in neonatal intensive care unit at Tanta University Hospital. The capacity of the unit was 45 incubators.

**Samples:** The sample consisted of two groups:

#### 1- Nurses:-

All nurses working in the previously mentioned setting. Their numbers was 61 nurses, (16 Bachelor nurses and 45 diploma nurses).

## 2- High Risk Neonates:-

All high risk neonate who were admitted to the unit over a period of 3 months 2008. Their total numbers 50 were divided into two equal groups (Control and study group).

### Tools:

Two tools were used to collect data.

#### 1- Checklist for nurses:

To assess the achievement of nursing competencies.

#### It includes:-

- Biosocial data of nurses (age, education and years of experience).
- Activities of nursing care procedures focus on infection control activities, (Hand washing, scrubbing technique, bottle and gavage feeding, hygienic and skin care, cord care, photo therapy care,..., etc.).

#### 2- Health assessment sheet:

For high risk neonates includes:-

- Biosocial data (age, sex, and birth order), reasons of admission, length of

stay, incidence of infection, and condition on discharge.

#### Scoring of nursing performance:

Critical care nurse provides safe and appropriate nursing care for high risk neonate. It includes different nursing care procedures which are translated into activities. The total performance score was 50 points. It was distributed as:

- Infection control protection as general, such as scrubbing & hand washing technique, wearing gown, mask, and over shoes. (10 points).
- Steps to prevent infection from one neonate to others (8 points).
- Breast feeding technique (6 points).
- Bottle feeding aseptic technique (4 points).
- Gavage feeding techniques (4 points).
- Daily care and skin assessment (6 points).
- Phototherapy care (6 points).
- Perennial and diaper care (3 points).

- Mother health teaching and discharge instruction (3 points).

Score for each step performance was distributed as follows:

If the activity was correctly done, one point was given. If incorrectly done or not done, zero score was given. These zero score was resulted to because if the activity was not done, it will affect the survival of the neonate.

Since the numbers of activities for each procedure were different, the performance score was calculated for each one independently. Nurse's performance was considered unsatisfactory when their total score is less than 35 points because of the seriousness of high risk neonate condition.

#### **Method:**

- 1- Permissions for data collection were obtained from the responsible director after explanation of the purpose of the study.
- 2- Personal communication with attending pediatrician and nurses were

carried out to ensure their cooperation.

- 3- Tools were constructed after review of literature.
- 4- Nurses were observed before intervention using the performance check list.
- 5- Educational intervention was given based on the previously detected needs.
- 6- Data were collected for the control group before giving any instruction to nurses.
- 7- Available nurses (61 nurses) were observed for half an hour every hour for 3 hours during morning and afternoon shifts.
- 8- Every nurse was observed for two times during different shifts (morning and afternoon shift).

#### **Educational intervention construction:**

The educational intervention was developed as followed:

Objective:

To enhance nurses' knowledge about

infection control.

To change nursing care activities focusing on infection control.

Content:

Related to the objective and nurses needs as well as available facilities, it contains:

- General procedure of infection control.
- Prevent infection of high risk neonate feeding technique.
- Providing hygienic care and skin assessment of high risk neonate.
- Specific therapies of high risk neonate and health instruction.

Strategies:

Different strategies were implemented as short lecture, role play, demonstration, and group discussion.

Educational sessions:

The instructional scheme was conducted in 8 sessions for 6 weeks. The time of each session ranged from 25 – 30 minutes.

Evaluation:

Evaluation of nurses' performance: was

carried 2 times before and after the educational intervention.

Includes:

- Nurses performance in different activities according to score given.
- High risk neonate condition as: length of stay, incidence of infection (diarrhea, skin infection as "diaper rashes or bed sores") and condition on discharge.

**Statistical Analysis:**

Data were collected, coded, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS). Chi square test was used for statistical correlation. P value was statistically significant at level <0.05%.

## **RESULTS**

Part I: Data related to Nurses:

Table 1 shows biosocial data of nurses. It was found that three quarters of nurses (78.68%) were in the age group 20 to less than 25 years, while those of age group 25+ constitute 21.22%. The majority of them had Diploma (73.77%) and 26.23%

had Bachelor. 27.87% of Diploma nurses had 3 to less than 5 years experiences, while Bachelor nurses had 1 to 2 years only.

Table 2 presents nurses' performance in infection control procedures as a general such as, hand washing, wearing gown, mask and overshoes. It was observed that before educational intervention, three quarters of nurses (77.05%), their performance was unsatisfactory, while after intervention 70.49% of them had good score. The difference was statistically significant ( $P < 0.05$ ,  $X^2 = 35.715$  and  $53.078$ , respectively).

Table 3 shows nurses' performance to prevent infection related to feeding technique. It was found that, before intervention the majority of nurses' performance (80.33%) was unsatisfactory in feeding technique. while after intervention 72.13% had good score. The difference was statistically significant ( $P < 0.05$ ,  $X^2 = 40.175$ ,  $58.662$ , respectively).

Regarding to bottle feeding procedure, before intervention, nearly half of nurses' performance were between satisfactory and unsatisfactory (47.54% and 49.18% respectively), while after intervention nurses' performance were between good and satisfactory (81.97% and 18.03%, respectively). The difference was statistically significant  $P < 0.05$ .

In relation to gavages feeding procedure, 77.07% of nurses were unsatisfactory in their performance, while after intervention, half of them (49.18%) were good and the difference was significant ( $X^2 = 45.189$  and  $33.906$ , respectively).

Table 4 presents nurse's performance in providing hygienic care to high risk neonates such as (bath, eye, mouth, buttocks, cord and skin care to prevent infections). It was clear from this table that before intervention, about three quarters of nurse's (72.13%) were unsatisfactory in providing hygienic care procedures,

compared to 27.87% of nurses were good in their performance after intervention. There was statistically significant difference  $P < 0.05$ . The majority of nurses (91.80%) were unsatisfactory in providing skin care, compared to 88.52% were good after intervention. There was highly significant difference  $P < 0.05$  ( $X^2 = 99.851$  and  $93.327$ , respectively).

Table 5 presents nurses' performance to prevent infection in specific therapies, it was found that before intervention, nearly three quarters of nurses (70.49%) were unsatisfactory in doing their task to prevent infection during phototherapy, while as nearly same percent (72.13% ) were good in their performance after intervention. There was statistically significant difference at  $P < 0.05$ . Concerning discharge plan and health instruction to mother about "feeding, vaccination, hygienic care, and the important follow up visit". It was observed that all these activities were not carried out by three quarters of nurses (73.77%) in the

initial assessment and had unsatisfactory grade. After educational intervention the most of them did this task good or satisfactory (32.79% and 60.66% respectively). There was statistically significant difference  $P < 0.05$ .

Table 6 shows nurses' performance according to total score of all nursing procedure in infection control. It was found that before intervention 70.49% of nurses had unsatisfactory grade, compared by two-thirds of them (63.39%) were good and 21.31% were satisfactory in their performance after intervention. The difference was statistically significant  $P < 0.05$ .

#### Part II: Data related to high risk neonate:

Table 7 shows the percentage distribution of high risk neonates according to general characteristics. In control group, male constitute 56% and 44% were female. In study group they constitute 52%, 48%, respectively. Their age ranged from 1 to 4 days, 40% was 3 to 4 days. 44% and 52%



were the third one respectively.

Regarding to high risk progress, table 8 revealed that the length of hospital stay was 5 to less than 10 days among 32% of control group, compared to 48% of study one. Diarrhea was higher among control group (32%), than study one (12%). Skin infection was double percent among control group (44%), compared to 20% in study one. There was statistically significant difference.  $P < 0.05$  ( $X^2 = 10.519$  and  $39.035$ , respectively).

Regarding to high risk neonate

condition on discharge, it was found that

76% of study group improved, compared to 60% of control group. On the other hand, 40% of control group died, which nearly double percent of study one (24%).

Figure (1): presents reasons for admission of high risk neonates. It was observed that respiratory distress syndrome presents 28% in both groups. Followed by neonatal sepsis was 28% in control group and 24% in study group. The lowest proportion was the hypothermia; it was 8% and 4%, respectively.

### Part I: Data related to nurses.

**Table 1: Percentage distribution of nurses according to biosocial data.**

Biosocial Data	Number	%
Age in years:		
20 –	48	78.68
25+	13	21.22
Education:		
Diploma nurse	45	73.77
Bachelor nurse	16	26.23
Years of experiences:		
Diploma nurse		
< 1 year	11	18.03
1-	10	16.39
3-	17	27.87
5+	7	11.48
Bachelor nurse		
1year	7	11.48
2 years	9	14.75
Total	61	100.00

**Table 2: Nurse's performance according to general procedure of infection control.**

Nurse's Performance	Before intervention		After intervention		X <sup>2</sup>	P
	No.	%	No.	%		
Good	3	4.92	43	70.49	53.078*	0.00
Satisfactory	11	18.03	5	8.20	1.798	0.18
Unsatisfactory	47	77.05	13	21.31	35.715*	0.00
Total	61	100.00	61	100.00		

**Table 3: Nurses' performance to prevent infection of high risk neonate feeding technique.**

Nurse's performance related to feeding technique	Before intervention		After intervention		X <sup>2</sup>	P
	No.	%	No.	%		
<b>Breast feeding</b>						
Good	2	3.28	44	72.13	58.662*	0.00
Satisfactory	10	16.39	4	6.56	2.017	0.156
Unsatisfactory	49	80.33	13	21.32	40.175*	0.00
<b>Bottle Feeding</b>						
Good	2	3.28	50	81.97	74.038*	0.00
Satisfactory	29	47.54	11	18.03	10.749*	0.001
Unsatisfactory	30	49.18	00	00.00	37.175*	0.00
<b>Gavage Feeding</b>						
Good	1	1.64	30	49.18	33.906*	0.00
Satisfactory	13	21.31	22	36.07	2.564	0.109
Unsatisfactory	47	77.05	9	14.75	45.189*	0.00
<b>Total</b>	61	100.00	61	100.00		

**Table 4: Nurses' performance to prevent infection in providing hygienic care and skin assessment of high risk neonate.**

Nurse's performance related to	Before intervention		After intervention		X <sup>2</sup>	P
	No.	%	No.	%		
<b>Hygienic Care</b>						
Good	5	8.20	17	27.87	6.710*	0.01
Satisfactory	12	19.67	44	72.13	31.721*	0.00
Unsatisfactory	44	72.13	00	00.00	65.728*	0.00
<b>Skin Assessment</b>						
Good	00	00.00	54	88.52	93.327*	0.00
Satisfactory	5	8.20	7	11.48	0.092	0.761
Unsatisfactory	56	91.80	00	00.00	99.851*	0.00
<b>Total</b>	61	100.00	61	100.00		

**Table 5: Nurses' performance to prevent infection in specific therapies of high risk neonate and health instruction.**

Specific Therapies	Before intervention		After intervention		X <sup>2</sup>	P
	No.	%	No.	%		
<b>Phototherapy</b>						
Good	7	11.48	44	72.13	49.897*	0.00
Satisfactory	11	18.03	17	27.87	1.159	0.282
Unsatisfactory	43	70.49	00	00.00	63.352*	0.00
<b>Health Teaching of Mothers about Neonate Discharge</b>						
Good	00	00.00	20	32.79	21.589*	0.00
Satisfactory	16	26.23	37	60.66	13.344*	0.00
Unsatisfactory	45	73.77	4	6.55	54.571*	0.00
<b>Total</b>	<b>61</b>	<b>100.00</b>	<b>61</b>	<b>100.00</b>		

**Table 6: Total score of infection control in all nursing procedures.**

**“Total score 50”**

Total Score of Nurse's Performance	Before intervention		After intervention		X <sup>2</sup>	P
	No.	%	No.	%		
Good 50-44	3	4.92	39	63.39	44.479*	0.00
Satisfactory 43-35	15	24.59	13	21.31	0.046	0.83
Unsatisfactory <35	43	70.49	9	14.75	36.499*	0.00
<b>Total</b>	<b>61</b>	<b>100.00</b>	<b>61</b>	<b>100.00</b>		

**Part II: Data related to high risk neonates:****Table 7: General characteristics of high risk neonate. (N=25 each)**

General characteristics	Control group %	Study group %	X <sup>2</sup>	P
<b><u>Sex</u></b>				
Male	56	52	0.181	0.670
Female	44	48	0.181	0.670
<b><u>Age in hours</u></b>				
< 24	36	32	0.201	0.654
24-	12	16	0.374	0.541
48-	20	12	1.823	0.177
72-96	32	40	1.063	0.302
<b><u>Birth order</u></b>				
First	16	12	0.374	0.541
2 <sup>nd</sup>	24	4	14.992*	0.000
3 <sup>rd</sup>	44	52	0.982	0.322
4 <sup>th</sup> +	16	32	6.168	0.013
Total	100.00	100.00		

**Table 8: Percentage distribution of high risk neonates according to their progress. (N= 25 each)**

Criteria of Progress	Control group %	Study group %	X <sup>2</sup>	P
<b><u>Length of Stay</u></b>				
One day	20	12	1.823	0.177
5 –	32	48	4.688	0.030
10 –	24	24	0.027	0.868
15 –	16	12	0.374	0.541
20 -25	8	4	0.798	0.372
<b><u>Incidence of infection</u></b>				
Diarrhea	32	12	10.519*	0.001
Skin infection	44	20	39.035*	0.000
No problems	24	68	37.218	0.600
<b><u>Condition on discharge</u></b>				
Improved	60	76	5.170	0.023
Died	40	24	5.170	0.023
Total	100.00	100.00		

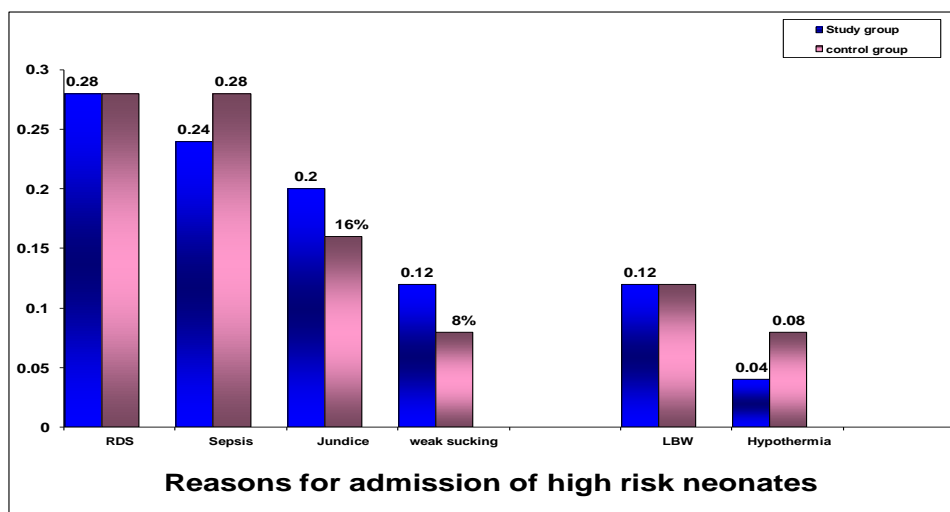


Figure (I): Reasons for admission of high risk neonates.

## DISCUSSION:

In infection control, nurses need safe knowledge and proper skills about the importance of preventing infection. Nurse is an important member of the health team that should follow and apply aseptic technique in all procedures that are related directly or indirectly to nursing management of high risk neonates.<sup>(20,21)</sup> Morgan *et al.*,<sup>(2003)</sup><sup>(22)</sup> mentioned that risk factor related to infection among neonates in neonatal intensive care unit (NICU) are asymptomatic but later develop handicaps

or mainly neurological disturbances. They recommended that workers and employees in the NICU must be informed about the dangers, mode of transmission and preventive measures of infection. Nursing care of the high risk neonates requires critical care nursing, which has created a need for highly skilled personnel trained in the art of neonatal intensive care. They demand team work of highest order, have adequate knowledge, and proper training in providing critical care nursing.<sup>(20)</sup>

The present study showed that the most common diagnosis of high risk neonates admitted to NICU unit is RDS which constitute more than quarter in both groups. Followed by neonatal sepsis and neonatal jaundice. Before the educational intervention most nurses' performances were unsatisfactory and had a score less than 70% in infection control procedures as a general such as hand washing and wearing "gown, mask and overshoes". After the intervention, they showed improvement in their performances as well as the progress of neonates. These results were in harmony with other researches, <sup>(23)</sup> they were found nearly the same finding.

Regarding to nurses performance according to total score in all nursing procedures to prevent infection, it was observed that the total average percentage of nurses' performance after intervention was good by 63.39 % and 21.31% was satisfactory. Same finding was detected in other researches. <sup>(23, 24)</sup> This showed the

effect of in-services training program on improving nurse's care provided to high risk neonate.

Preventing infection that are relatively harmless to an adult, may be fatal to the neonates especially for high risk neonates, due to diminished immunity, and low resistance in their tissues.<sup>(21)</sup> The present study was noticed that the incidence of infection (diarrhea and skin infection) is less frequent among study group, compared to the control ones. This result reflects the effect of the intervention on improving their knowledge and their performance.

If mother can hold her baby, she may be able to breastfeed. Most NICUs have screens to allow mothers to breastfeed their babies at the bedside. He suggested that skin-to-skin contact can improve baby's recovery time.<sup>(6)</sup> Breast milk is easily digested and provides protection from infection. The main responsibility of the nurse is to instruct mothers about hand washing, scrubbing and nipples care before

nursing their baby, wearing gown, mask, over head, and shoes.<sup>(25)</sup> In the present study the nurses' performance about mother instruction was good by only 3.28% of nurses before intervention and the percentage become more than seventy percent after intervention. This finding goes with Bernath (2001)<sup>(26)</sup>, who found that the effectiveness' indication of the breast cleaning before breastfeeding decreases the infection in NICU.

Frequently, NICU neonates are unable to get as many calories as they need through regular feeding from a bottle, so the nurses will use a small feeding tube to deliver formula. However, if it is in place for a long time, it can cause erosions or infection, so it must be changed routinely to avoid such condition.<sup>(27)</sup> Also during bottle and gavage feeding she has to follow aseptic technique to prevent infection.<sup>(26)</sup> The result of the present study showed that improvement in nurses' performance of artificial feeding "bottle and gavage

feeding", 81.97% and 49.18%, respectively were good. These findings are consistent with the study of Bernath (2001),<sup>(26)</sup> who reported that sterilization of shared feeding equipment more effective in preventing cross infection in infants. The Food and Drug Administration said that powdered neonate formulas in NICU are not "commercially sterile products" because, unlike liquid formula products or they are not heated long enough to achieve sterility. They recommend that powdered neonate formulas not be used in neonatal intensive care settings unless there is no alternative available. The agency suggested that if powdered formula is the only option, some precautions done will reduce the risk of infection.<sup>(27)</sup>

Often, high risk neonate or those who have infections have jaundice, which was 20% in study group, phototherapy is used to help get rid of the bilirubin that causes jaundice. Usually they need routinely skin care to limit the risk of infection.<sup>(6)</sup> The

nurse role and goal during phototherapy are to protect neonate from infection by giving extra fluid, she must be alert to ensure optimal hydration, in addition she monitors neonate temperature and observe loose greenish stool.<sup>(22,27)</sup>

In studying effect of the educational intervention on high risk neonate's progress, it was found that 76 % of study group improved on discharge compared to 60 % of the counter one. Centers for Disease Control and Prevention reported that a case in which the death of a neonates in NICU linked with infection.<sup>(7)</sup> Another study showed that the percent of mortality among neonates with infection in NICU was 20.0% and among neonates without infection was 6.54%.<sup>(8)</sup>

Incidence of infection is considered criteria for evaluating the effect of intervention on neonatal condition. It was observed that infection was less (32%) in study group than the control one (76%). Diarrhea was only 12% in study group

compared to 32% in the control group, while skin infection was twenty percent compared to double percent in control group. The incidence of infection is more frequent in neonates because of immaturity of immune system. The nurse role is to protect him from infection either directly or indirectly by following aseptic technique in all infection control procedures.<sup>(23)</sup>

As regards to the relation between neonatal infection and the period of stay of neonates in NICU, Morgan *et al.*, (2003)<sup>(22)</sup> found that the period of stay in neonates with infection is significantly longer than those without infection. Also, the present study revealed that 48% of study group stay from 5 to 9 days in the unit which is less than control one. It can be explained due to the improvement of nursing care provided to that group.

#### **CONCLUSION:**

Nursing care of high risk neonate requires critical care nursing which has created a need for highly skilled personnel,



trained in art of neonatal intensive care.

Risk of infection can be controlled, if health team and other workers have some knowledge of the facts and problems of cross infection and understand the principles and methods of controlling infection.

#### **RECOMMENDATION:**

- 1- Hospital should develop and implement a comprehensive program that meets the educational needs of all facility, staff, and clients in relation to infection control.
- 2- Neonatal Intensive Care Unit should include Baccalaureate degree nurses to provide competent nursing care especially to high risk neonate.
- 3- Nurses at NICU need pre service as well in-service educational program to refresh their knowledge and improve their skills.
- 4- All infection control policies to be monitored and reviewed every two years.

#### **REFERANCES:**

1. Neonate Merriam Webster Online Dictionary. Available from: <http://www.mw.com/cgi-bin/dictionary>. 2007.
2. Obstetric and newborn care. Available from: <http://www.booksidepren.org/products/obstetric>. 2007.
3. Wong's D. Nursing Care of Infant and Children. 9<sup>th</sup> ed. London: Mosby Company; 2008. 345
4. Chakravarty S. Neonatal Ventilation Made Easy. 3<sup>th</sup> ed. New Delhi: Jaypee Brothers Company; 2008. 2.
5. Hopkins J. Neonatal Intensive Care Unit. Available from: <http://www.Hopkinsbayview.org>. Baltimore. 2007.
6. Cloherty J. Manual of Neonatal Care. 6<sup>th</sup> ed. Philadelphia: Lippin Cot Company; 2008. 34-41.
7. Williams D. Hospital Discharge of High Risk Neonate. *Journal of Pediatric*. 2008; (122)5 Nov. 1119-26.
8. Seidel H. Primary Care of the Newborn, 4<sup>th</sup> ed. London: Saunders Company; 2008. 477.
9. Lam B. Infection Control in NICU. Recommended Standards. Available from: <http://www.nnsoc.ht.org/lcstd.ptf> 2001.
10. Castle M, Ajemian E. Hospital infection Control. USA: A Wiley Medical Publication; 1997.2.
11. Practical Guidelines for Infection Control in Health Care Facilities WHO. Searo Regional Publication; December 2003. 41.
12. Merenstein G. Hand Book of Neonatal Intensive Care. 6<sup>th</sup> ed. London: Mosby Company; 2006.
13. Hoffman K. Developing an Infection Control Program, Available from: <http://www.Hopinfnurse/FDA>. 2000.
14. Queensland Health Report. Infection Control Guidelines. Nov, Available from: <http://www.Hopinfnurs/FDA>. 2001.

15. Wongsawat J. Infection Control in Pediatrics. 2008; 25: 153-164. Available from: <http://www.infect/ant agent/morph>.
16. Office of Children and Family Services. Infection Control, Nov. Available from: <http://www.Mhtml/F hosp infec sec.mht>. 2008.
17. Bradford Teaching Hospital Report. Infection Control Annual Program 2007-2008. Available from: <http://www.De3contamin.nhs.uk>.
18. Hossini S. Establishing Standards for Prevention and Control of Nosocomial Infection in ICU at the Alexandria University Hospital, 1996. Doctorial Thesis, Faculty of Nursing. Alexandria University.
19. Office of Environmental Health and Safety Report. Infection Control Policies and procedures. Yale University. Available from: <http://www.Hosp infect/ant agent/morph>. 2007.
20. Donna I, Wong S. Nursing Care of Infant and Children. 8<sup>th</sup> ed. London: Mosby Company; 1995. 3-13, 288-331.
21. Marlow D. Text Book of Pediatric Nursing. 6<sup>th</sup> ed. Philadelphia: W.B. Saunders Company; 1996. 337-365.
22. Morgan M, El-Ghany E, Khalifa N. Prevalence of Cytomegalovirus Infection among NICU and Health Workers. The Egyptian Journal of Immunology. 2003; 10 (2), 1-8.
23. Wong L, Wilson D. Wrong Nursing care of Infant and Children. 9<sup>th</sup> ed. Philadelphia: Mosby Company; 2007.
24. Elsayed E. Designing and Evaluating an Educational program to Nurses at Premature Units. 1996. Doctorial Thesis, Faculty of Nursing. Tanta University.
25. The Nemours Foundation. When Your Baby's in the NICU. Available from; <http://www.Unc.edu/depts/spice>. 2008,
26. Beneath V. Cross Infection Associated with Shared Infant Feeding Equipment. Center for Clinical Effectiveness, Available from: <http://www.med.monashedu.au/health services./cce>. 2001.
27. Cidrap FDA. Warns of Infection Risk in Powdered Infant Formulas. Available from: <http://www.cfsan.fda.gov/dms/inf.html>. 2006.