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A study to assess the knowledge and practice of staff nurses to prevent and control neonatal nosocomial infections in maternal and neonatal units of selected hospital, Ernakulam district

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Abstract: A study was done to assess the knowledge and practices on prevention and control of neonatal infections among staff nurses working in NICU and Maternity ward in a selected hospital at Ernakulam district, Kerala during 02-01-2012 to 30-01-2012. The main objective of the study was to assess the knowledge level and practice on prevention and control of neonatal nosocomial infections among staff nurses and to find out the association between selected socio demographic variables and knowledge and practice of staff nurses on prevention and control of neonatal nosocomial infection. The research design adopted for this study was non-experimental descriptive design. The conceptual frame work adopted was Pender's Health Promotion model. The staff nurses working in neonatal intensive care unit and maternity ward in a selected hospital were taken as samples .Data was collected using convenient sampling technique. Structured knowledge questionnaire and two different observational checklists were used to assess the knowledge and practice of staff nurses. The data gathered were analysed by descriptive and inferential statistics and interpreted in terms of objectives of the study. The statistics used to interpret the data were descriptive (mean, standard deviation) and inferential statistics (chi-square and mann-whitney test). The findings revealed that there was no significant association between selected demographic variables with knowledge and practice of staff nurses. The study concluded that majority of staff nurses had good knowledge regarding prevention and control of neonatal nosocomial infections whereas none of them had good practice in the same aspect.

Key Words: NICU; Nosocomial infection; Prevention and control; Knowledge; Practice.

1. INTRODUCTION:

Nosocomial infections occur worldwide, both in the developed and developing world which cause a significant burden to patients and public health. They are the major cause of death and increased morbidity in hospitalized patients. Neonatal nosocomial infections cause increased functional disability and emotional stress that may lead to conditions that reduce quality of life. Not only do they affect the general health of patients, but they are also a huge burden financially. Often nosocomial infections become apparent while the patient is still in the hospital but in some cases symptoms may not show up until after the affected patient is discharged.[i]

2. NEED AND SIGNIFICANCE OF THE STUDY:

Neonates constitute vulnerable segments of the population and their mortality and morbidity status is considered to be a sensitive indicator of health and efficiency of medical care. NICU is one of the most important but infection prone area of the hospital and nosocomial infection rate has increased over the past decade. It is not the treatment but the prevention which is the goal of infection control for the newborn. This goal is affected through good prenatal screening, immunization and early therapy of the mother prior to or during her pregnancy. Cautious care of neonate with its well known immature host defences require scrupulous

hand washing, adequate staffing, ample space, isolation facilities monitoring equipment and active employee health programme along with a conscious effort to minimize invasive support.[ii, iii]

Each year, about 4 million neonates die within first four weeks of life; 98% in developing countries. Neonatal deaths contribute to 40% of all childhood deaths and more than 50% of infant mortality. The largest numbers of neonatal deaths (1.4 million per year) occur in south East Asia region. In India neonatal mortality constitutes nearly two–third of the infant mortality and about half of the under- five child mortality rates. Over one third of all neonatal deaths occur on the first day of life, almost half within three days and nearly three fourths in the first week. Most of the neonatal deaths take place due to infections (52%), birth asphyxia (20%), and prematurity (15%). The significance of nosocomial infection lies not only in its ability to substantially alter morbidity and mortality statistics, but also in its economic implications. Nosocomial infection prolongs duration of hospitalization, increases the cost of health care, emergence of multiple antibiotic resistance micro-organisms and reduces the chances of treatment for others.[iv, v]

3. LITERATURE REVIEW:

Nosocomial infections occur worldwide and affect both developed and resource-poor countries. Infections acquired in health care settings are among the major causes of death and increased morbidity among hospitalized patients. Nosocomial infection is an infection occurring in a patient in a hospital or other health care facility in whom the infection was not present at the time of admission. This includes infections acquired in the hospital but appearing after discharge and also occupational infections among staff of the facility" They are a significant burden both for the patient and for public health. The most frequent nosocomial infections are infections of surgical wounds, urinary tract infections and lower respiratory tract infections.[vi]

A prospective analysis was to determine the prevalence of nosocomial infection and associated risk factors in a neonatal intensive care unit from November 2004 through October 2005. Prevalence of nosocomial infection and infection site definitions were according to the national nosocomial infection surveillance system of the Centers for Disease Control and Prevention. The results showed that among 528 infants enrolled, 60(11.4%) had 97 nosocomial infections. The survival rate was 92%. The prevalence of nosocomial infections was 17.5%. Blood stream infection rate was 4.7%, clinical sepsis 6.3% pneumonia. 5.7% urinary tract infections 4.7% surgical site infections.[vii] A study was conducted to assess the effect of neonatal intensive care unit environment on the incidence of hospital-acquired infection in neonates. Hospital acquired infections surveillance was performed during a four-year period when the neonatal intensive care unit was moved initially from an old facility to temporary accommodation and then eventually to a new and better-designed facility. The rate of hospital acquired infections rose significantly from 12.8 to 18.6% ($p<0.01$) after moving to the temporary unit, which had a lower sink, cot ratio and a higher monthly admission rate. In contrast, the rates of catheter-associated staphylococcal bacteraemia decreased significantly after moving to the new neonatal intensive care unit ($P<0.0001$). Moving to a temporary neonatal intensive care unit with poor washing facilities and higher admission activity resulted in higher rates of hospital acquired infections.[viii]

A retrospective study was conducted in a newborn intensive care unit, in a hospital in South Korea to determine the occurrence of nosocomial infections. The subjects were 489 neonates who were admitted to the neonatal intensive care unit. The most common infections were pneumonia (28%), bloodstream infection (26%), and conjunctivitis (22%). There's no statistical difference in discharge status between two groups, but hospital stay was longer in subjects with nosocomial infection than those without infection.[ix]

A study was conducted on knowledge and practices of Staff nurses regarding infection control in MCH area of a selected hospital in Punjab, where samples were selected purposively. The final result was majority of staff nurses (56.66%) had adequate knowledge regarding infection control measures. Staff nurses working in nursery had higher knowledge score (45.7) than labour room and postnatal ward (39.97). Most of the staff nurses had unsatisfactory practices (61.66%) regarding infection control measures.[x]

4. MATERIALS AND METHODS: The research design selected for the study was Non-experimental descriptive design. .The sample consisted of 37 staff nurses working in maternal and neonatal health units of selected hospital, who fulfilled the criteria for sample selection. The samples were selected based on their availability.

TOOLS AND TECHNIQUE

In this study two tools were used. First tool consisted of a personal data sheet to assess the socio demographic variables of the subject. The first section consisted of seven questions on selected demographic factors such as age, sex, religion, education, area of clinical experience, total years of experience and continuing nursing education on infection control. The second section was the structured knowledge questionnaire consisting of 35 multiple choice questions and were categorized as follows: knowledge on infection and nosocomial infection (7 items), care of newborn (6 items) and prevention and control of infections (22 items). Each correct response carried one mark and each incorrect response carried zero mark. The maximum possible score was 35 and the minimum possible score was zero. The same knowledge questionnaire was administered among the staff nurses of NICU and maternity unit.

Second tool consists of the checklist used in neonatal intensive care unit consists of 25 items which are categorized under the areas such as universal precautions (7 items), care of newborn (6 items) and infection control practices (12 items). Each correct practice carried one mark and each wrong practice carried zero mark. The maximum possible score was 25 the minimum possible score was zero. In this study, convenient sampling technique was used .

Another observational checklist was used to assess practices of staff nurses regarding prevention and control of neonatal nosocomial infections in maternity unit.The checklist used in maternity unit consists of 22 items which are categorized under the areas such as universal precautions (7 items), care of newborn (5 items) and infection control practices (10 items). Each correct practice carried one mark and each wrong practice carried zero mark. The maximum possible score was 22 in maternity unit. The minimum possible score was zero in both areas.

VALIDITY AND RELIABILITY

The structured questionnaire and observational checklists developed by the researcher was validated by 5 experts. They included two paediatricians with DCH with more than 20 years of experience, one nurse administrator, one infection control nurse with more than 10 years and one Associate Professor qualified with Msc. Nursing degree in Child Health Nursing. Reliability of structured knowledge questionnaire was assessed by split half method by using Pearson's correlation co-efficient. The reliability co-efficient was 0.71 and was found to be reliable. The observational checklist was assessed by inter-rater method.

ETHICAL CONSIDERATION

The study was conducted in a selected hospital after obtaining permission from the Ethical Committee and management. The study was conducted among 37 staff nurses working in the neonatal intensive care unit and maternity unit from the period 02-01-2012 to 30-01-2012. The staff nurses enrolled for main study was 13 and 24 from neonatal intensive care unit and maternity unit respectively. The duration of data collection was 4 weeks. The knowledge questionnaire was administered as per the staff nurse's convenience. The questionnaire was filled in a room adjacent to neonatal intensive care unit. They filled the questionnaire separately and took nearly 20 minutes. Similarly nurses in Maternity unit were taken to a room near to the nurse's station during break time and questionnaire was administered separately. Most of them completed within 30 minutes. Practices of staff nurses on prevention and control of neonatal nosocomial infections was assessed without their knowledge by using an observational checklist. Separate checklist was used to assess practices of 13 staff nurses in neonatal intensive care unit and 24 staff nurses in maternity ward. It took nearly 1 to 2 days to assess practices of each staff nurse.

5. ANALYSIS AND FINDINGS:

Data analysis was done by descriptive statistics (mean, median, mode, percentage and standard deviation) to summarize the findings. Inferential statistics (chi-square, mann-whitney test) was used to find out the association between knowledge and practices of staff nurses with the selected demographic variables.

The data presented under following headings;

Section I - Description of demographic variables of staff nurses

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Table 1: Frequency and percentage distribution of staff nurses according to age, gender, religion and educational status

(n=37)

	Variables	Characteristics	(f)	(%)
	Age in years	21-30	28	75.7
		31- 40	7	18.9
		Above 40	2	5.4
	Gender	Male	0	0
		Female	37	100
	Religion	Christian	30	81.1
		Hindu	3	8.1
		Muslim	4	10.8
	Educational status	Diploma Nursing	32	86.5
		BSc.Nursing	5	13.5

Table 2

Frequency and percentage distribution of staff nurses according to total years of experience, area of experience and participation in continuing nursing education program

(n=37)

	Variables	Characteristics	(f)	(%)
	Total experience	Below 1 year	11	29.7
		1-5 years	15	30.5
		6-10 years	4	10.8
		Above 10 years	7	18.9
	Area of clinical experience	Neonatal ICU	13	35.1
		Maternity unit	24	64.9
	Participation in CNE program	Yes	10	27
		No	27	73

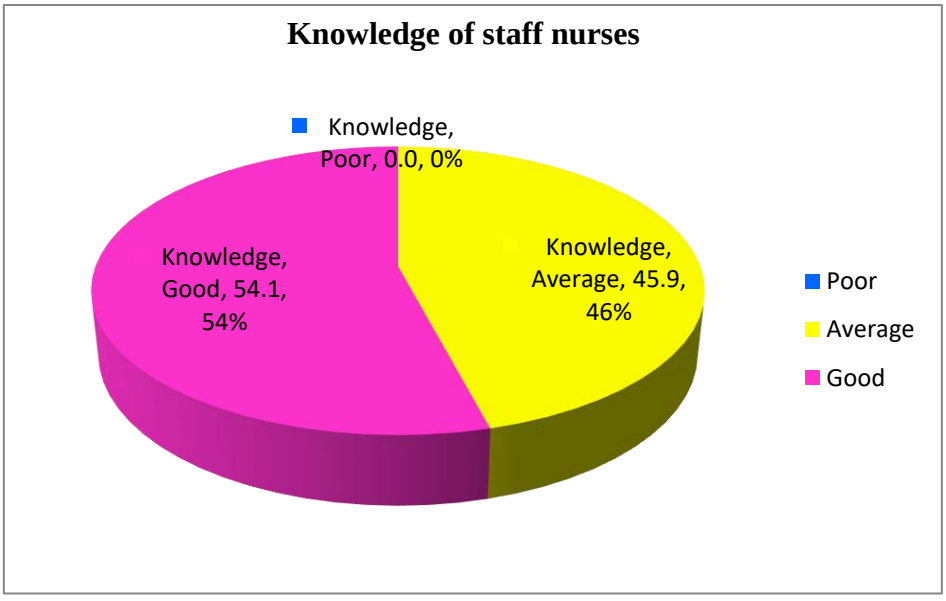

Figure 1: Percentage distribution of staff nurses according to level of knowledge.

Table 3
Area wise distribution of overall level of knowledge of staff nurses.
(n =37)

Area	Level of knowledge					
	Poor		Average		Good	
	f	%	f	%	f	%
General information	2	5.41	9	24.35	26	70.34
Care of Newborn	9	24.3	14	37.0	14	37.0
Prevention and Control	0	0.0	9	24.3	28	75.7

In table 3 to analyse the data, the overall knowledge was categorized under three areas such as general information, care of new born and prevention and control of neonatal nosocomial infection.

Higher knowledge was found in the area of prevention and control with a majority of 28(75.7%) with good knowledge, 9(24.3%) with average knowledge and no one with poor knowledge. Similarly in the area of general information regarding nosocomial infection 26(70.34%) were graded as good knowledge, 9(24.3%) were graded as average and 2(5.41%) were graded as poor.

Lower level knowledge was found in the area of newborn care, graded equally as good and average 14(37.0%). In this 9(24%) was graded to have poor knowledge.

Table 4
Area wise mean, standard deviation and mean percentage of staff nurses knowledge.
(n=37)

Area	Maximum possible Score	Mean	SD	Mean %
General information	7	4.97	1.323	71
Care of newborn	6	3.78	1.336	63
Prevention and control	22	16.16	2.523	73
Total	35	24.91	5.182	71

Section 2: Practice of staff nurses on prevention and control of neonatal nosocomial infections in neonatal intensive care unit and maternity unit.

Table 5
Frequency and percentage distribution of overall practice of staff nurses in Maternity Unit (MU) and Neonatal Intensive Care Unit (NICU).

Level of practice	MU (n=24)			NICU (n=13)		
	Range of score	F	%	Range of score	F	%
Good	15-22	0	0.0	17-25	0	0.0
Average	8-14	24	100.0	9-16	13	100.0
Poor	0-7	0	0.0	0-8	0	0.0

Table 5 shows the level of practice among staff nurses in the NICU and maternity unit which is graded as poor, average and good practice.

Here all 24 (100%) the staff nurses working in the maternity unit had an average level practice on prevention and control of neonatal nosocomial infections.

Similarly all the 13(100%) staff nurses in the neonatal intensive care unit also had an average level of practice on prevention and control of neonatal nosocomial infections. None of the staff nurses were graded to have good or poor level of practice in both units.

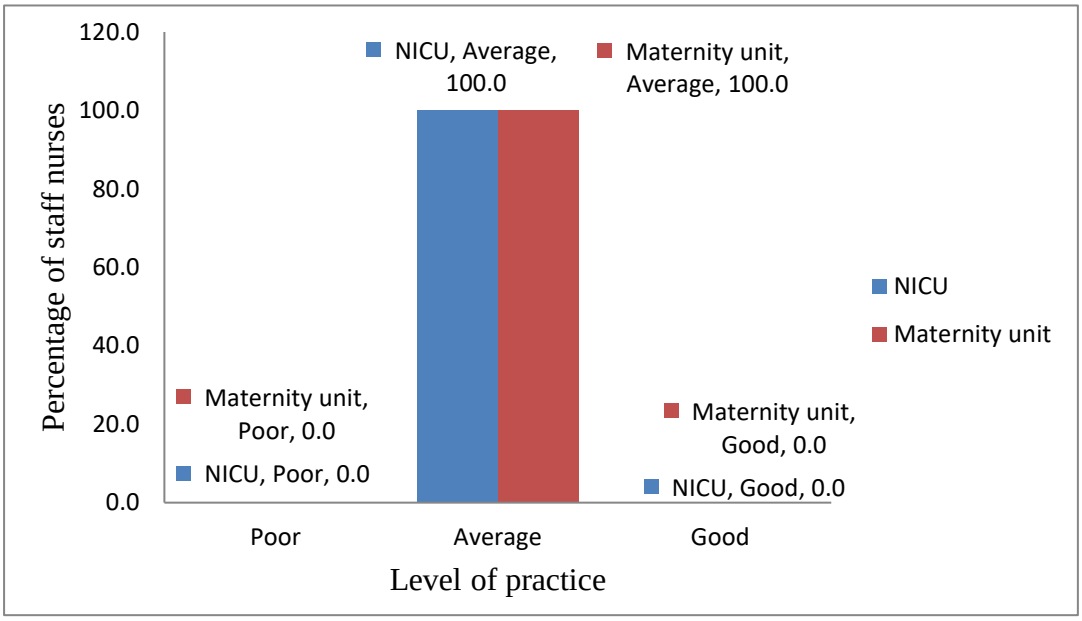

Figure 2: Percentage distribution of level of practice of staff nurses in NICU and Maternity Unit.

Table 13
Frequency and percentage distribution of maximum items practiced by staff nurses in NICU

(n=13)

Practices	f	%
Wearing gown before handling neonate	13	100
Advices the mother regarding breast feeding	13	100
Follows aseptic technique while preparation of feeds	13	100
Daily changes bed linen of neonate	13	100
Immediate changing of soiled bed linen	13	100
Immerse clean items in disinfectant solution	13	100
Aseptic handling of disinfected articles	13	100
Boiling of articles for disinfection	13	100
Disposes sharp in puncture resistant container	13	100
Segregation of waste materials according to colour code	13	100
Restriction of visitors in the unit	13	100
Uses clean gloves for clean procedure	11	84.6
Stores breast milk in aseptic manner	11	84.6

Table 13 shows the maximum practiced items by staff nurses in prevention and control of neonatal nosocomial infections in NICU.

Table 14
Frequency and percentage distribution of minimum items practiced by staff nurses in NICU

(n=13)

Practices	f	%
Uses sterile dressing for cannula	3	23.1
Hand washing before and after procedure	0	0.0
Proper disinfection of used needle	0	0.0
Insist hand washing to visitors before touching baby	0	0.0
Uses mask in the unit while caring baby	0	0.0
Uses sterile gloves for sterile procedure	0	0.0
Uses gloves while handling soiled items	0	0.0
Performs dry and damp dusting of the unit	0	0.0
Cleanse articles like thermometer, inch tape….after procedure	0	0.0
Follows aseptic technique while cannula insertion	0	0.0
Maintain proper care of hub before and after medication	0	0.0
Follow aseptic technique for cord care	0	0.0

Table 14 shows deficiency in certain practices by the staff nurses in prevention and control of neonatal nosocomial infections in NICU.

Table 15
Frequency and percentage distribution of maximum items practiced by staff nurses in in maternity unit

(n=24)

Practices	f	%
Daily changes bed linen of neonate	24	100
Immerse clean items in disinfectant solution	24	100
Aseptic handling of disinfected articles	24	100
Disposes sharp in puncture resistant container	24	100
Segregation of waste materials according to colour code	24	100
Avoids mixing of sharps with other wastes	24	100
Uses separate gloves for every neonate	23	95.8
Boiling of articles for disinfection	21	87.5
Immediate changing of soiled bed linen	20	83.3

Table 15 shows the maximum items practiced by staff nurse on prevention and control of neonatal nosocomial infections in maternity unit.

Table 16
Frequency and percentage distribution of minimum items practiced by staff nurses in maternity unit

(n=24)

Practice	f	%
Restriction of visitors in the unit	9	37.5
Follows aseptic technique while preparation of feeds	3	12.5
Hand washing before and after procedure	0	0.0
Proper disposal of used needle	0	0.0
Insist hand washing to visitors before touching baby	0	0.0
Uses sterile gloves for sterile procedure	0	0.0
Uses gloves while handling soiled items	0	0.0
Follows aseptic technique for cord care	0	0.0
Performs dry and damp dusting of the unit	0	0.0
Cleanse articles like thermometer, inch tape… after procedure	0	0.0

Table 16 shows deficiency in certain practices by staff nurses on prevention and control of neonatal nosocomial infections in maternity unit.

6. Results :

The study findings revealed the demographic characteristics of variables such as majority (75.7%) of staff nurses were the age group of 21-30 years and were females.86.5% staff nurses were diploma holders. Half (40.5%) of the staff nurses clinical experience was between 1-5 years. Regarding continuing education program majority (73%) of staff nurses had never attended. The knowledge of staff nurses was assessed on three areas like general information regarding nosocomial infection, care of new born and prevention and control. Among thirty seven staff nurses more than half of them (54.1%) had good knowledge and remaining (45.9%) had average level of knowledge. (70%) of participants scored good knowledge regarding the general information. More or less same knowledge score (37.8%) was obtained from the area of new born care. The practice of staff nurses was assessed on three areas like universal precautions, care of new born and infection control practices. All staff nurses had average level of practice in NICU and Maternity unit. In both the units, staff nurses practiced correctly regarding infection control practice. (84%) of staff nurses in NICU and (8%) in Maternity unit had practiced new born care. None of the staff nurses in both units followed universal precautions in their practice. The results showed that there was no significant association between knowledge and practice of staff nurses with selected demographic variables like educational status, total years of experience, area of clinical experience and participation in continuing nursing education since p-valve is greater than 0.05.

7. DISCUSSION:

Nosocomial infections are a significant problem throughout the world and are increasing. In a prevalence survey involving 55 hospitals in 14 developing countries in four WHO Regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) found an average of 8.7% of all hospital patients had nosocomial infections. Thus at any time, over 1.4 million patients worldwide will have infectious complications acquired in the hospital. An infant with nosocomial infection has a median NICU stay of 88 days compared with a median hospital stay of 32 days for an infant without nosocomial infection. [8] Surgical site infections, urinary tract infections and lower respiratory (pneumonia) infections were the leading types reported with the highest prevalence of nosocomial infections.

8. RECOMMENDATIONS

- A descriptive study can be done with large sample size.
- A comparative study with control group in similar and different setting.
- Similar study can be done in different hospital settings to assess the quality of care.

9. CONCLUSION: Continuous vigilance, assessment and supervision of clinical performance of various levels of workers will help to start a multidimensional attack on the problem of nosocomial infection. Therefore, there is a need for a high degree of awareness, knowledge and skill in nursing practice to prevent nosocomial infections. This study is significant in the sense that it could improve the nurses health awareness and early prevention skills and methods thus, suppressing the possibility of spread and transmission of nosocomial infection as the researcher found a wide gap between knowledge and practice of staff nurses. It could also further contribute to the growth of the nursing profession thus allowing them to grow professionally.

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