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Quality Improvement initiative for Intravenous catheterization in NICU

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Abstract
Introduction: Intravenous (IV) therapy is an important and unavoidable part of therapy in NICU. Catheter related infections (CRI) were associated with IV therapy where we uses IV catheters. In the United States of America CRI ranged from 6.4 to 8.3 episodes per 1,000 patient days in neonatal intensive care unit (NICU). The skills and techniques and number of attempts for putting IV line were deciding CRIs. Many studies showed educational intervention on nursing staff knowledge and to improve aseptic technique while performing IV cannulation in NICU
Methodology: a prospective interventional study done in a tertiary care hospital from January to june 2017 study participants were nursing population working in hospital who were willing. The study conducted in two phases included pre and postintervention phases
Results: The number of nurses who had high knowledge level about intravenous cannulation was just 20%, while after intervention this percentage improved to 90%. There was huge improvement in quality care element of intravenous cannula insertion after intervention.

Keywords: intravenous (IV), catheter related infections (CRI), NICU

Introduction
Intravenous (IV) therapy is an important and unavoidable part of therapy in NICU [1-4]. Catheter related infections (CRI) were associated with IV therapy where we uses IV catheters [5-8]. In the United States of America CRI ranged from 6.4 to 8.3 episodes per 1,000 patient days in neonatal intensive care unit (NICU) [9-12] the skills and techniques and number of attempts used in inserting IV catheter also have an impact on IV CRIs. [13-14] In most centers nursing staff will insert cannulas. Educational intervention on nursing staff knowledge will improve asepsis technique.

Aims and objectives
Assess the effect of an educational intervention on nursing staff knowledge and to improve aseptic technique while performing IV canulation in NICU

Materials and methods
This is single group pre- and post-intervention design study done to explore the level of knowledge and skills on intravenous canalization among nurses in tertiary care hospitals at Hyderabad, India.
Study conducted by our neonatal fellow, six months from Jan to April 2017. Study population was nurses and neonates with IV canula. Study done in niloufer hospital. We are included neonates with IV cannula and nurses who were willing to participate. We are excluded nurses who were not willing. Sample size was 40 staff nurses who were willing sample calculated assuming 10% improvement in nurses knowledge after structured educational intervention by computer based software assuming 10% drop out rate at 80% power and 5% alpha error Study was conducted in two phases
Our intervention was structured education of nurses. Phase I was Pre-intervention (1 month) during this phase, Nurses Knowledge was assessed using 10 multiple choice questionnaire (Annexure II). All questionnaire was checked for its consistency and accuracy. Baseline data was collected about Insertion technique by using care bundle. (Annexure III).Randomly two observation was done in a day and care bundle checklist was tick accordingly. Intervention phase about 3 months during this period establishing IV management guidelines (Annexure I) Training Nurses, Supportive supervision to help nursing staff was done. Reboost Phase was about one month during this period nurses were trained who were not up to the mark
Phase II was about 1 months during this phase, Nurses Knowledge was re-assessed using same10 multiple choice questionnaire.(Annexure I) Assesed the Insertion technique by using care bundle. (Annexure III). Randomly two observation was done in a day and care bundle checklist was tick accordingly.
The data was analyzed using SPSS version 20 for windows. For comparing pre and post intervention paried T test was used.

Results
The total population participated in study was 40 nurses staff. As displayed in Table 1, all the participant was females i.e. (100%).
Depending upon age 70% of nursing staff was in age group of 22-27 years and only 5 % was above 33 years. Depending upon Educational Qualification, 82.5% of nursing staff done

GNM (Diploma course in General Nursing) and only 7 staff i.e. 17.5% done BSc nursing. Depending upon work experience, 67.5% nursing staff have work experience between 1 – 5 years, 25% have work experience between 6 – 10 years and 7.5% have work experience above 11 years. Pre and post intervention knowledge level of nursing staff (Table2) participated in study according to which, 90% of nursing staff had high level of knowledge about peripheral intravenous catheterization as compare to pre intervention where only 20 % had high level of knowledge, 80 % of nursing staff had moderate level of knowledge in preintervention phase, while there was no staff was with inadequate level of knowledge in both pre and post intervention phase. This difference in knowledge is statistically significant (p-0.001). There was huge improvement in quality care element of intravenous cannula insertion after intervention (Table3). In care element I there was 24% quality improvement, 35.33%, 17.76%, and 77. 10%, 9.51% in care elements II III IV V respectively. In pre-intervention phase 10 (18.18%) times' single staff took more than 1 attempt to insert cannula (Table 4), while after intervention rate of taking more than 2 attempt to insert intravenous cannula was reduced. on an average there was 08.02% quality improvement after intervention

Table 1: Distribution of the Study Participants (N=40)

Variables	Frequency(N)	Percentage
Sex		
Male	00	00
Female	40	100
Age		
22-27years	28	70
28-32 years	10	25
33years and more	02	5
Level of Academic Qualification		
Basic Diploma in General Nursing	33	82.5
Specialized Diploma in paediatric Nursing	00	00
BSc Nursing	7	17.5
Years of experience		
1 – 5 years	27	67.5
6 – 10 years	10	25
11 and more years	03	7.5

Table 2: Participants Knowledge Level on the Pre and Post intervention.

Level of Knowledge	Pre/N -10 (%)	Post/N-10(%)
> 75%: high level of knowledge	08 (20%)	36(90%)
50% to 75%: moderate level of knowledge	32 (80%)	04(10%)
< 50%: inadequate level of knowledge	00 (00%)	00(00%)
Total	40 (100%)	40(100%)

Table 3: Participant Performance level on Intravenous cannula insertion (Pre intervention and Post intervention phase)

Care elements	Jan 2018 N-55(%) Pre-intervention	March 2018 N-59(%) Post- intervention	April 2018N-54(%) Post- intervention
Care element I (Hand hygiene)	35(63.64%)	51(86.44%)	48(88.88%)
Care element II(Personal protective equipment)	33(40%)	43(72.88%)	42(77.77%)
Care element III (Skin preparation)	39(70.91%)	50(84.75%)	50(92.59%)
Care element IV (Dressing)	00(00%)	44(74.58%)	43(79.62%)
Care element V (Documentation)	43(78%)	53(89.83%)	46(85.18%)
Total Element performed	00	43(72.88%)	42(77.77%)

Table. 4: Number of attempt for Intravenous cannula insertion

Attempts	Jan 2018 N55 (%) Pre-intervention	March 2018 N-59(%) Post-intervention	April 2018 N-54(%) Post-intervention
< 2 attempts	45(81.82%)	55(93.22%)	49(90.74%)
>2 attempts	10(18.18%)	04(06.78%)	05(09.26%)

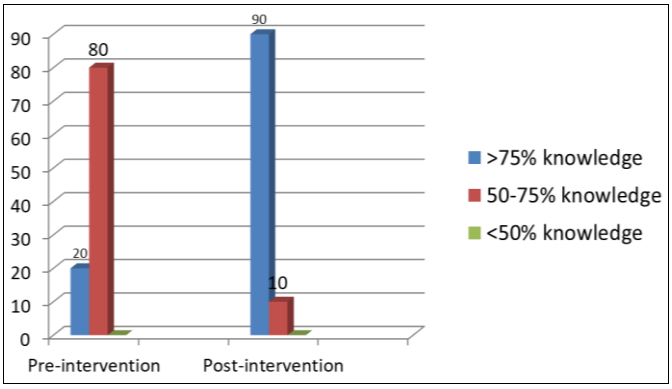

Fig 1: Participants Knowledge Level on the Pre and Post intervention

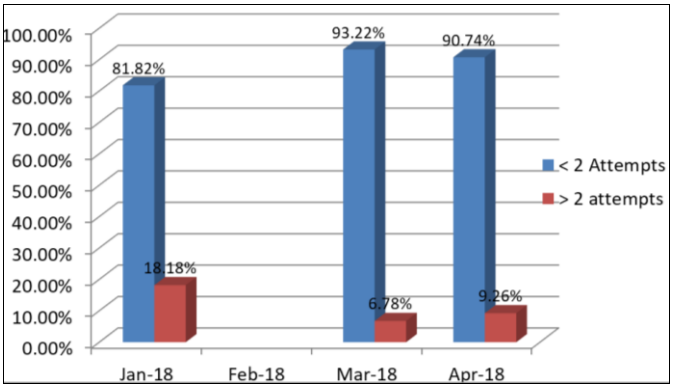

Fig 2: Number of attempts pre intra post intervention

Discussion

A small number of clinical studies were found that focused on factors that influenced the life span of PIVs in infants, specifically within the context of the NICU. Various factors influence the length of time a peripheral intravenous catheter remains in situ. The material the catheter is made of, its gauge in relation to the size of the vein, insertion site, osmolality, pH, and chemical properties of infusates, all directly affect the efficacy and duration of PIVs (Pettit, 2006; Evans & Dixon, 2006; Pettit, 2003) [15, 16]. Nurses play a very important role in care of Babies in NICU. This study was conducted to explore the knowledge and practice on IV cannulization among staff nurses. The results of the study significantly increases the knowledge skill and management canula after intervention. A quasi – experimental study conducted by Deshmukh and Shinde (2014) [17] with the pretest – posttest design showed that knowledge and practice of staff nurses regarding venous access device care was improved by structured education17.A preexperiment study design (preintervention, intervention, and postitervention) conducted by Shrestha to determine the effectiveness of the educational intervention in improving nurses' knowledge regarding the care of patients with CVC among nurses showed knowledge score (p=.039). Was improved after intervention [18].

Pushpakala and Ravinath (2014) [18] used the self-instructional module for improvement of knowledge they showed good results [19]. El Nemr, Fahmy, El Razek, and El Salam (2013**)** [20] showed that, simple education will increase the knowledge and skills of healthcare providers as well as reduced CRBSI by 50% in ICUs [20]. It was observed that there was a change in knowledge and management of intravenous cannulation, as percentage improvement in desirable response in pre and post intervention.

Recommendations

Motivation of staff nurses working in neonatal unit to have up-to-date knowledge of intravenous cannulation and management technique is very important. Hence there is need to evaluate, educate and train nurses periodically to have up to date knowledge and management skill of intravenous cannulation

Limitations

Effectiveness of the intervention like estimation of CRIs not included. Randomization not done. Only single unit was selected to increase the power of study better to add more units

Conclusion

By structured education of staff nurses we can improve knowledge, skills and management of intravenous cannulation

References

1. Arnow PM, Quimosing EM, Beach M. Consequences of intravascular catheter sepsis. Clinical Inf. Diseases. 1993; 16:778-84. PMid: 8329510. http://dx.doi.org/ 10. 1093/ clind/16.6.778
2. Bakr AF. Intravenous lines related sepsis in newborn babies admitted to NICU in a developing country. J Trop paed. 2003; 49(5):295-297.
3. Kibogora hospital report. Annually report on different activities performed in Kibogora Hospital. Data manager office, 2015.
4. Soub HA, Estinoso W. Hospital-acquired candidaemia: experience from a developing country. Journal of Hospital Infection. 1997; 35(2):141-7. http://dx.doi.org/ 10.1016/S 0195-6701(97)90102-X
5. Mac Gillivray. The father of intravenous infusion therapy. Journal of infection prevention. 2009; 10(suppl.1):3-6. http://dx.doi.org /10.1177/1757177409342141
6. CDC. Guidelines for the Prevention of Intravascular Catheter-Related Infections. Morbidity and Mortality Weekly Report. Available from, 2002. http://www. cdc. gov /mmwr/preview/mmwrhtm l/rr5110a1.htm
7. Munchkhof WJ. Intravenous catheter-associated staphylococcus aureus bacteraemia: a common problem that can be prevented. Internal Medicine Journal. 2005; 35: 315-318. PMid: 15892759.http://dx.doi. Org/10. 1111/j. 1445-5994.2005.00848.x
8. Haley RW, Culver DH, White JW, *et al*. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. American Journal of Epidemiology. 1985; 121(2):182-205. PMid: 4014115.
9. Paulson PR, Miller KM. Neonatal peripherally inserted central catheters: recommendations for prevention of insertion and post insertion complications. Neonatal Netw. 2008; 27:245-57. PMid: 18697655. http://dx.doi. org/10. 1891/0730-0832.27.4.2
10. Abramczyk ML, Carvalho WB, Carvalho ES, *et al*. Nosocomial infection in a paediatric intensive care unit in a developing country. Brazilian Journal Infect Dis. 2003; 7(6):375-380. PMid: 14636476. http://dx.doi.org/ 10. 1590/S1413-86702003000600004
11. Barbut F, Pistone T, Guiguet M, *et al*. Complications due to peripheralvenous catheterization, prospective study. Presse Med. 2003; 32(10):450-6. PMid: 12733305.
12. Schwab F, Geffers C, Bärwolff S, *et al*. Reducing neonatal nosocomial bloodstream infections through participation in a national surveillance system. J Hosp Infect. 2007; 65:319-25. PMid: 17350730. http://dx.doi. org/10.1016/j. jhin.2006.12.020
13. Mermel LA, Allon M, Bouza E, *et al*. Clinical practice guidelines for the diagnosis and management of intravascular catheterrelated infection Update by the Infectious Diseases Society of America. Clin Infect Dis. 2009; 49:1. PMid: 19489710.http://dx.doi.org/10. 1086/ 599376
14. Raad I, Hanna H, Maki D. Intravascular catheter-related infections: advances in diagnosis, prevention, and management. Lancet Infect Dis. 2007; 7:645-57. http://dx. doi.org/10.1016/S1473-3099(07)70235-9
15. Pettit J. Assessment of the infant with a peripheral intravenous device. Advances in Neonatal Care. 2003; 3:230-240.
16. Pettit J. Fostering a new era of vascular access device selection in neonates. Newborn and Infant Nursing Reviews. 2006; 6(4):186-192.
17. Deshmukh M, Shinde M. Impact of structured education on knowledge and practice regarding venous access device care among nurses. International Journal of Science and

Research. 2014; 3(1):895-901. Retrieved from http://www.ijsr.net/archive/v3i5/MDIwMTMxOTYw.pdf
18. Pushpakala KJ, Ravinath A. Effectiveness of self-instructional module on central venous catheter care among ICU nurses. Journal of Nursing and Health Science. 2014; 3(5):32-34. Retrieved from www. iosrjournals.org
19. Shrestha R. Impact of educational interventions on nurses' knowledge regarding care of the patient with central venous line. Journal of Kathmandu Medical College. 2013; 2(1):3. DOI: http://dx.doi.org/ 10. 3126/jkmc.v2i1.10553
20. El Nemr WA, Fahmy HH, El Razek GMA, El Salam N. MA. An interventional study to decrease central venous catheter-related blood stream infection in intensive care units at Zagazig University Hospital. Zagazig University Medical Journal, 2015, 19(6).