

Nursing Management of Fever in Neonatal Intensive Care Units: Evidence Based Practice

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Abstract: Nursing evidence-based practice in management of fever of neonates has improved the quality and consistency of care for neonates with fever. **Aim of the Study:** The present study aimed to assess nurses' knowledge, practice and attitude regarding evidence-based practice in managing fever in neonatal intensive care units. Moreover, to adapt, implement and evaluate the effect of evidence-based practice for fever management in neonatal intensive care units. **Study Design:** A quasi- experimental design was utilized. **Setting:** The study was carried out at the neonatal intensive care units in Benisuef General Hospital, Benisuef Health Insurance Hospital and Children's Hospital affiliated to Ain shams University Hospitals. **Subject:** The study included all available staff nurses (50 nurses) providing care for neonates at the previously-mentioned settings regardless their ages, years of experiences or qualifications. **Tools of the Study:** Involved structured interview questionnaire sheet to assess the study sample's socio-demographic characteristics and their knowledge regarding evidence-based practice and fever in neonates pre- and post-intervention; observational checklist to assess nurses' practices toward evidence-based practice for fever management in neonates pre- and post-intervention; and Likert type rating scale to assess nurses' attitude regarding evidence-based practice for fever management in neonates pre- and post-intervention. **Results:** More than half of the studied nurses had satisfactory knowledge and nearly three quarters of them were competent in their practices regarding management of fever for neonates, post-intervention of evidence-based practice nursing management. There was a statistically significant difference between total nurses' knowledge, total practice and total attitude regarding evidence-based practice for fever management in neonates. **Conclusion:** The application of evidence-based practice for nursing management of fever in neonatal intensive care units had a positive effect on improvement of nurses' knowledge, practice and attitude after intervention. **Recommendations:** Raising the awareness of nurses regarding evidence-based practice for nursing management of fever in neonatal intensive care units.

Keywords: fever, neonates, and evidence based practice.

1. INTRODUCTION

Heat regulation is most critical to the neonate's survival. Thermal protection of the neonate remains a global concern and a challenge for healthcare providers (Knobel and Holditch-Davis, 2007 and Zingaretti *et al.*, 2009). Although neonates are usually able to conserve heat, they may have difficulty in dissipating heat in an overheated environment, which may increase the risk of hyperthermia (Brown, 2015).

Fear of fever can lead to aggressive and dangerous practices, including overdosing with antipyretics and sponge bathing with alcohol. There is a need for pediatric nurses to understand the physiology of the febrile response, as well as the

common misconceptions regarding fever, to promote safe and evidence-based fever management for neonates (**Patricia, 2014**).

Evidence-based practice (EBP) is important for the professional development, responsibility, and capabilities of the nurse. Consequently, it has become an important subject in nursing and has been integrated into daily nursing practices (**Friesen-Storms et al., 2015**). As a result, nurses who practice based on scientific evidence can make better decisions in services' delivery (**Stokke, 2014**).

Significance of the Study

The care and treatment of neonates with fever occupies a considerable amount of time for many nurses. Despite the extensive experience with fever, there are important questions about it that remain unanswered. Moreover, some healthcare professionals have misconceptions about the adverse effects of a fever and when and how it should be treated. As a result, the most recent evidence-based practice should be employed (**Demir and Sekreter, 2012; Schortgen, 2012 and Bartlett, 2013**).

The need for immediate assessment, septic workup and treatment for the neonate infants with fever must be recognized, as the neonatal condition can deteriorate quickly. It is important that the nurse caring for such neonates be aware of the evidence-based practice implications for measuring temperature, or fever, in neonates. Promoting excellence in nursing care can be achieved through research and the implementation of evidence-based practice based on education and research (**Asher and Northington, 2008**).

AIM OF THE STUDY

The current study aimed to study the effect of evidence based practice for nursing management of fever in neonatal intensive care units. This aim was attained through the following objectives:

- Assess nurses' knowledge, practice and attitude regarding evidence based practice in managing fever in Neonatal Intensive Care Units.
- Adopt and implement of evidence based practice for fever management in Neonatal Intensive Care Units.
- Evaluate the effect of implementation of evidence based practice for fever management in Neonatal Intensive Care Units.

The Research Hypothesis:

There is a positive effect of evidence based practice for fever management among nurses in Neonatal Intensive Care Units.

2. SUBJECTS AND METHOD

Research design:

A quasi-experimental design was utilized in this study.

Setting:

The study conducted at the neonatal intensive care units in Benisuef General Hospital, Benisuef Health Insurance Hospital & Ain Shams (Children's Hospital) affiliated to Ain shams University Hospitals.

Sampling:

- The study included all available nurses' staff (50 nurses) providing care for neonates in the above mentioned settings regardless their ages, years of experiences or qualifications.

Tools and data collection:

- I. **A structured questionnaire:** By interviewing (pre-/ post-evidence-based practice (EBP) intervention). It was designed by the researcher based on relevant scientific literature review and written in simple Arabic language to gather data about:

- a. Characteristics of the studied nurses (such as: age, sex, qualifications and years of experience).
- b. Nurses' knowledge regarding EBP for fever management in neonates (definition, goals, benefits, barriers, facilitating factors, steps and nursing role) in addition to definition, manifestations, causes, complications and management of fever.

This part consisted of 32 questions (closed- and open-ended). The total score was (40) distributed according to the importance of each item. According to nurses' responses, their knowledge scores were classified into satisfactory ($\geq 80\%$) and unsatisfactory ($<80\%$).

Content validity:

- a. The questionnaire sheet was assessed and ascertained by a panel of five experts in pediatric nursing to validate its format, layout, consistency, accuracy and relevance.

II. Observation checklists adopted from Bowden and Greenberg (2012) to assess the nurses' practices regarding EBP in managing fever for neonates in NICUs (pre- and post-EBP). It included the following:

- a. **Axillary temperature to manage fever in neonates:** This tool was used to assess nurses' practice in measuring axillary temperature of neonates. It contained 7 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (7).

NA: n=50, where the procedure was applicable only by 41 nurses.

- b. **Rectal temperature to manage fever in neonates:** This tool was used to assess nurses' practice in measuring rectal temperature of neonates. It contained 10 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (10).

NA: n=50, where the procedure was applicable only by 9 nurses.

- c. **Sponge bath to manage fever in neonates:** It consisted of 17 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (17).

NA: n=50, where the procedure was applicable only by 18 nurses.

- d. **Tub bath to manage fever in neonates:** It consisted of 12 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (12).

NA: n=50, where the procedure was applicable only by 32 nurses.

- e. **Oral medication administration to manage fever in neonates:** It consisted of 13 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (13).

NA: n=50, where the procedure was applicable only by 7 nurses.

- f. **Parenteral antipyretic (Intravenous) medication administration to manage fever in neonates:** It consisted of 20 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (20).

NA: n=50, where the procedure was applicable only by 43 nurses (18 IV. push and 25 using syringe pump).

- g. **Rectal antipyretic medication administration to manage fever in neonates:** It consisted of 15 steps which were checked either done competent (1 score) or incompetent (0 score). The total score was (15).

NA: Rectal antipyretic medication administration to manage fever in neonates was not applicable.

Then the total practices of every procedure was scored either competent ($\geq 85\%$) or incompetent ($<85\%$).

III- Attitude Likert type rating scale: This tool was designed by the researcher based on Likert type scale to assess nurses' attitude regarding EBP for fever management in neonates pre- and post-intervention. There were 12 items regarding nurses' attitude about EBP, with responses ranging from: strongly agree (5 scores), agree (4 scores), indifferent (3 scores), disagree (2 scores) and strongly disagree (1 score). The total scores were (48). Then the total attitude was scored negative ($<50\%$), indifferent ($50-<75\%$) and positive ($\geq 75\%$).

IV- Assessment sheet of neonates: The researcher developed the assessment sheet to assess neonates' age, gender, weight, medical diagnosis, range of temperature, duration of fever, complications and nursing management of fever pre- and post-EBP intervention to assess its effectiveness.

V- The evidence-based clinical intervention: The evidence-based clinical guidelines for the care of neonates with fever was previously formulated by the National Institute for Health and Care Excellence (NICE): Clinical guidelines, (CG160) - May 2013. This clinical guideline updates and replaces NICE clinical guideline 47 (published in May 2007). It offers an evidence-based advice on the care of young children with feverish illness. New and updated recommendations have been included in areas relating to assessment and initial management in children younger than 5 years with no obvious cause of feverish illness.

The contents of the clinical guidelines were:

- Thermometer and detection of fever.
- Clinical assessment of neonates during fever.
- Management of neonatal fever.
- Uses of antipyretics.

Filed work:

The implementation phase:

The implementation phase of the intervention involved 9 sessions through 5 weeks, each ranging from 30-45 minutes, including time of discussion. The session covered the following practices: measurement of axillary and rectal temperatures, respiration and apical pulse; performing sponge and tub baths; oral, intravenous (I.V.) and rectal administration of medication.

At the beginning of the first session, an introduction about objectives of EBP was given. Each session started with summary and feedback regarding previous sessions. Simple words and Arabic language were used to suit the nurses' level of understanding. Different methods of teaching were used (lectures, demonstration and re-demonstration). Suitable teaching aids were prepared and used during the EBP intervention (real equipment, posters and pictures).

The intervention of EBP was carried out at the previously mentioned settings. Nurses' knowledge and practice were evaluated pre-EBP to get a baseline assessment for nurses prior to the development of the EBP and post-EBP intervention by using the same tools to determine the effect of implemented EBP intervention.

The evidence-based practice evaluation:

The EBP evaluation was done by comparing the nurses' knowledge, practices and attitude pre- and post-intervention.

III. Statistical design:

The collected data were organized, tabulated, categorized and statistically analysed by using computer software, SPSS. Data were presented in tables as numbers and percentage. Mean and standard deviation, Chi-square test and t-test were used to estimate the statistically significant differences between the study variables. No significance was observed at $P > 0.05$, and significance was observed at $P < 0.05$.

3. RESULTS

Table (1) shows that, number and percentage distribution of the studied nurses according to their total knowledge regarding evidence-based practice for nursing management of fever in neonatal intensive care units (pre- and post-intervention) (n=50). This table illustrated that, there was a marked improvement in nurses' total knowledge regarding EBP for nursing management of fever in NICUs, after EBP intervention, with highly statistically significant difference ($X^2 = 20.5$ and $P = 0.000$).

Table (2) shows that, number and percentage distribution of the studied nurses according to their total attitude regarding evidence-based practice for nursing management of fever in neonatal intensive care units (pre- and post-intervention) (n=50). This table, highlighted a marked improvement in total nurses' attitude regarding EBP for nursing management of fever in NICUs post-EBP intervention, with highly statistically significant difference ($X^2=45.4$ and $P = 0.000$).

Table (3) shows that, number and percentage distribution of the studied nurses according to their total practice regarding evidence-based practice for nursing management of fever in neonatal intensive care units (pre- and post-intervention) (n=50). There was a marked improvement in nurses' total practices in management of fever in NICUs post EBP intervention with highly statistically significant difference ($X^2 = 10.4$ and $P = 0.000$).

Table (4) shows that , Correlation between the studied nurses' total knowledge and their total practice regarding evidence-based practice for nursing management of fever in neonatal intensive care units (pre- and post-intervention) (n=50). This table illustrated that, there were statistically significant differences between total knowledge of the studied nurses and their total practice pre-EBP intervention ($X^2 = 7.10$ and $P = 0.007$). While there were statistically significant differences between total knowledge of the studied nurses and their total practice post-intervention ($X^2 = 4.27$ and $P = 0.038$).

Table (5) shows that, correlation between nurses' total knowledge and their attitude regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50). It was clear that there were highly statistically significant differences between total knowledge of the studied nurses and their total attitude pre EBP intervention ($X^2 = 17.70$ and $P = 0.000$). Also, there were highly statistically significant differences between total knowledge of the studied nurses and their total attitude post-intervention ($X^2 = 10.30$ and $P = 0.005$).

Table (6) shows that correlation between nurses' total practice and their attitude regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post and post intervention (n=50). It was found that, there were statistically significant differences between total practice of the studied nurses and their total attitude pre EBP intervention ($X^2 = 8.14$ and $P = 0.017$). Meanwhile, there were highly statistically significant differences between total practice of the studied nurses and their total attitude post-intervention ($X^2 = 13.97$ and $P = 0.000$).

Table (1): Number and percentage distribution of nurses according to their total knowledge score regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total knowledge	Satisfactory		un satisfactory	
	No	%	No	%
Pre	7	14.0%	43	86.0%
Post	26	52.0%	24	48.0%
t. test	14.1			
P-value	0.000**			

Table (2): Number and percentage distribution of nurses according to their total attitude score regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total attitude	Negative		Indifferent		Positive	
	No	%	No	%	No	%
Pre	38	76%	7	14%	5	10%
Post	6	12%	10	20%	34	68%
X ²	45.4					
P-value	0.000					

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Table (3): Number and percentage distribution of nurses according to their total practice regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total practice	Competent		Incompetent	
	No	%	No	%
Pre	20	40.0%	30	60.0%
Post	36	72.0%	14	28.0%
X ²	45.4			
P-value	0.000			

Table (4): Correlation between nurses’ total knowledge and their total practice regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total practice	Total knowledge pre/post				X ²	P-value
	Satisfactory		Unsatisfactory			
	No	%	No	%		
Pretest						
Competent	6	12.0%	14	28.0%	7.10	0.007*
Incompetent	1	2.0%	29	58.0%		
Posttest						
Competent	22	44.0%	14	28.0%	4.27	0.038*
Incompetent	4	8.0%	10	20.0%		

Table (5): Correlation between nurses’ total knowledge and their attitude regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total attitude	Total knowledge pre/post				X ²	P-value
	Satisfactory		Unsatisfactory			
	No	%	No	%		
Pretest						
Negative	1	2.0%	37	74.0%	17.70	0.000**
Indifferent	4	8.0%	3	6.0%		
Positive	2	4.0%	3	6.0%		
Posttest						
Negative	1	2.0%	5	10.0%	10.30	0.005*
Indifferent	2	4.0%	8	16.0%		
Positive	23	46.0%	11	22.0%		

Table (6): Correlation between nurses’ total practice and their attitude regarding evidence based practice for nursing management of fever in neonatal intensive care units pre and post intervention (n=50).

Total attitude	Total practice pre/post?				X ²	P-value
	Competent		Incompetent			
	No	%	No	%		

Pretest						
Negative	11	22.0%	27	54.0%	8.14	0.017
Indifferent	5	10.0%	2	4.0%		
Positive	4	8.0%	1	2.0%		
Posttest						
Negative	2	4.0%	4	8.0%	13.97	0.000
Indifferent	4	8.0%	6	12.0%		
Positive	30	60.0%	4	8.0%		

4. DISCUSSION

Lack of knowledge and presence of conflicting information regarding fever and febrile illness continue to be of the most prevalent public health issues encountered by neonatal nurses. Despite increased efforts by guideline writers and national organizations, evidence-based fever management practices continue to be misunderstood or misinterpreted by a section of the health caregivers. These levels of misinformation and inappropriate management remain a primary concern to those attempting to improve the neonate's health and well-being and decrease unnecessary burden on healthcare services (**Kelly et al., 2017**).

The findings of the present study illustrated that the majority of the studied nurses had unsatisfactory knowledge regarding EBP for nursing management of fever in NICUs before implementation of the intervention, but a marked improvement in their knowledge was observed immediately post-intervention, with highly statistically significant difference. This might have been due to the great responsibilities of nurses in NICU, lack of time to read literature, absence of in-service training programs in fever management and the absence of formal hospital policies for fever management.

These findings were in agreement with those of **Khalifa (2007)**, who described shortage of nurses' evidence-based knowledge regarding fever. These findings were also supported by those of **Leaton (2010)**, who mentioned that most nurses lacked knowledge about fever associated with infective processes that required cultures to be obtained.

The current study's assessment of nurses' attitude regarding EBP for nursing management of fever in NICUs, concluded that there was a marked improvement in nurses' attitude regarding EBP for nursing management of fever in NICUs post-intervention with highly statistically significant difference. These findings were supported by those of **Greensmith (2013)**, who mentioned that nurses' lack of knowledge and inconsistent attitudes affected the care of febrile neonates, and may fuel parents' fever phobia. Moreover, **Edwards et al. (2007)**, proved that nurses' negative attitudes influenced their practice, irrespective of additional pediatric education or experience. As a result, inappropriate attitudes need to be challenged and addressed in an effort to promote evidence-based care for febrile neonates.

Regarding total nurses' practices about EBP for nursing management of fever in NICUs; there was a marked improvement post-intervention with highly statistically significant difference. This may have been due to shortage of staff, work overload, and limited hospital supplies.

These findings were supported by **Khalifa (2007)**, who reported incorrect practices related to management of fever. This was reflected by the nurses' continuing use of cold compresses, application of alcohol and vinegar on the skin of feverish neonates, and frequent cold-water showers/baths to feverish children. Also, **Sadek (2010)**, supported these findings and mentioned that nurses' performance regarding care of neonates with respiratory distress was incompetent, and that the implementation of evidence-based guidelines had a positive effect on the improvement of nurses' performance.

Regarding the correlation between the study variables, there was a statistically significant difference between total knowledge and total practice of the studied nurses and their total attitudes regarding EBP for fever management in neonates. This agreed with **Sadek (2010)**; **Abou-Zaid (2014)** and **Hegazy (2014)**, who stated that there was a statistically significant difference between total knowledge and total practice of the studied nurses and their total attitudes. This may

have been due to the effect of EBP intervention and the nurses gained knowledge and practice regarding EBP for fever management in neonates.

5. CONCLUSION

Based on the study findings, it can be concluded that the implementation of evidence-based practice intervention for nursing management of fever in NICUs had a positive effect on the improvement of nurses' knowledge, practice and attitude immediately after program implementation.

6. RECOMMENDATIONS

This study recommended to:

1. Periodical continuous on-job training programs and evaluation for neonatal nurses to improve their practices considering evidence-based practice for nursing management of fever in NICUs.
2. Dissemination of a procedure book based on evidence-based practice containing all nursing activities related to fever management of neonates in NICUs.
3. Facilitating the scientific searching for nurses to update their knowledge and practice in the light of EBP for fever management in neonates.
4. Supplying hospitals with libraries containing recent references, and internet access to continuously update their practice of fever management in neonates.

REFERENCES

- [1] Abou-zaid, S. (2014): Improving the quality of nursing care for neonates receiving total parenteral nutrition. MD. Thesis, Faculty of nursing Ain Shams University,
- [2] Asher C. and Northington L. (2008): Society of Pediatric Nursing; Position Statement for Measurement of Temperature/ Fever in Children. Available at: http://www.google.com.eg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=14&cad=rja&uact=8&ved=0CFEQFjADOAo&url=http%3A%2F%2Fwww.pedsnurses.org%2Fpdfs%2Fdownloads%2Fgid%2C126%2Findex.pdf&ei=HVxuU7fSLIGv7Abs-IHYCw&usg=AFQjCNFf132shPLoCSHPgmLF9TMxOtUm_w&bvm= bv.66330100,d.ZGU 25/4/2014
- [3] Bartlett D. (2013): Fever: Evidence Based Practice. Available at: <http://www.ceufast.com/courses/viewcourse.asp?id=270 1/5/2014>
- [4] Bowden, V. and Greenberg, C. (2012): Pediatric nursing procedures, (3rd ed.), Wolters Kluwer, Lippincott, Williams and Wilkins, Pp. 86-779.
- [5] Brown T., (2015): Pediatric nursing interventions and skills. Fever, in Wilson H.: Wong's nursing care of infants and children. (10th. ed). Evolve. Elsevier. Com. pp. 898-900.
- [6] Demir F. and Sekreter O. (2012): Knowledge, Attitudes, and Misconceptions of Primary Care Physicians Regarding Fever in Children: A Cross-Sectional Study. Italian Journal of Pediatrics. 38: 40-46.
- [7] Edwards, H., Walsh, A., Courtney, M., Monaghan, S., Wilson, J. and Young, J. (2007): Improving pediatric nurse's knowledge and attitudes in childhood fever management. Journal of Advanced Nursing, 57(3): 257-69.
- [8] Friesen-Storms, H. et al. (2015): Systematic Implementation of Evidence Based Practice in A Clinical Nursing Setting: A Participatory Action Research Project, Journal Of Clinical Nursing; 24(1) 57-68.
- [9] Greensmith, L. (2013): Nurses' knowledge of and attitudes towards fever and fever management in one Irish children's hospital. Pub Med. Available from: https://www.researchgate.net/publication/235776895_Nurses'_knowledge_of_and_attitudes_towards_fever_and_fever_management_in_one_Irish_children's_hospital. Accessed on 25-July-2015.
- [10] Hegazy, A. (2014): Nurses' knowledge versus their performance in caring for neonates having respiratory distress syndrome MD. Thesis, Faculty of nursing Ain Shams University, 153-179

International Journal of Novel Research in Healthcare and Nursing

 Vol. 6, Issue 1, pp: (277-285), Month: January - April 2019, Available at: www.noveltyjournals.com

- [11] Kelly, M., Sahm, L., Shiely, F. and Mccarthy, S. (2017): Parental knowledge, attitudes and beliefs on fever: A cross-sectional study in Ireland. PMJ. Available at: https://www.researchgate.net/publication/318341466_Parental_knowledge_attitudes_and_beliefs_on_fever_A_cross-sectional_study_in_Ireland. Accessed on 30-April-2017.
- [12] Khalifa M (2007): Impact of an Educational Program Based on Evidence Related to Fever Management. Faculty of Nursing, Menoufiya University. J Egypt Public Health Assoc Vol. 82 No. 5 & 6, 2007
- [13] Knobel, R. & Holditch-Davis, D. (2007): Thermoregulation and Heat Loss Prevention after Birth and During Neonatal Intensive-Care Unit Stabilization of Extremely Low birth Weight Infants. J. Obstet. Gynecol. Neonatal Nurs.; 36(3):280-287.
- [14] Leaton, M. (2010). Critical Care Nurses' knowledge and Perception of Fever Assessment and Management. Am J Crit Care. 2010; 19(3):e15-e28.
- [15] National Institute of Health and Care Excellence (NICE) (2013): Feverish illness in children: Assessment and initial management in children younger than 5 years. Available at: <http://publications.nice.org.uk/feverish-illness-inchildren-cg160>. Accessed 4-October-2013
- [16] Patricia, C. (2014): Evidence-Based Management of Childhood Fever: What Pediatric Nurses Need to Know? Journal of Pediatric Nursing; 29(4):372–375.
- [17] Sadek, B. (2010): Evidence based practice for care of neonates with respiratory distress, MD. Thesis, Faculty of nursing Ain Shams University, 143-172
- [18] Schortgen F. (2012): Fever in Sepsis. Minerva Anesthesiologica. 78(11): 1254-1264.
- [19] Stokke, K. (2014): Evidence based practice beliefs and implementation among nurses: a cross-sectional study, BMC Nursing J.; 13(1)8.
- [20] Zingaretti M, Crosta f, and Vitali A. (2009): the presence of UCPI demonstrates that the metabolically active a dipose tissue in the neck of adult humans