

Symptom assessment training based on adult learning theory Evaluation of the application effect in improving the evaluation ability of new nurses in NICU

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Abstract. *Objective:* To improve the ability to assess the symptoms of new nurses in NICU by training them in symptom assessment. *Methods:* Based on adult learning theory, a training program for symptom assessment was developed and new NICU nurses were trained. The training effect was evaluated from three aspects: knowledge, skill and behavior. After the training, the new nurses' satisfaction with the symptom assessment training was investigated. *Results:* A total of 34 new nurses completed symptom assessment training. In terms of knowledge, the difference in scores before, after and three months after training was statistically significant ($F = 100.632$, $p = 0.000$). In terms of skill, the training professionals randomly checked the clinical symptom assessment skills of 10 persons before and after the training, and the In terms of behavior, self-evaluation changes in symptom assessment behavior of new nurses before and after training showed that the behavior of new nurses after the training was significantly higher than that before the training, and the difference was statistically significant ($p=0.000$). The overall satisfaction of the new nurses with the symptom assessment training was 100%. *Conclusion:* The training of symptom assessment based on adult learning theory can effectively improve the assessment ability of new NICU nurses.

Key words: adult learning theory, symptom assessment, training, nurse, newborn

Introduction

Due to the special physiological characteristics of the newborn, the disease symptoms are not typical and the disease progresses quickly. The symptom assessment starts from the various symptoms of newborn babies and systematically collects patient information through methods such as visual

touch and listening, so as to find out the symptoms, analyze the causes and deal with them (1). Because of the lack of self-expression ability, once the newborn condition changes, often through changes in respiratory heart rate, skin color, abdominal distension and abnormal body movements. Nurses are the most direct observers of the clinical condition, and their ability to assess the condition is particularly

important, which is of positive significance to the promotion of patients' health. The new nurse lacked the ability to assess her condition due to her lack of clinical experience. As adults, the learning of nurses is a special learning process, which is not only a process of mastering knowledge and skills in an organized and planned way based on teacher guidance, but also a process of self-education, self-improvement and self-practice (2, 3).

Therefore, the study and application of symptom assessment will be an important part of the training of new nurses' disease assessment ability (2). Based on this, in February 2019, our department developed an exploratory training program of symptom assessment based on the adult learning theory, and applied it to the clinical training of new nurses, achieving satisfactory results. This study to assess the symptoms of new nurses in NICU by training them in symptom assessment and ability improve their expertise.

Methods and Materials

Based on adult learning theory in the "adult experience provides a rich resource for adult learning, experience is the foundation, resources and advantage, is also the shackles" (4), the training object is selected for the work of half a year later (that is, through the probation appraisal) of new nurses, have professional knowledge, through internships and part half a year's work experience accumulated clinical experience, is in rapid growth stage, the acceptance of the new method for new knowledge/high, their previous experience can make it accessible to absorb new knowledge and new methods. In addition, the new nurse has not formed the thinking set of clinical condition evaluation, which avoids the rejection of the new way of clinical condition evaluation due to the long-term experience of clinical condition evaluation.

Inclusion criteria: new nurses from our hospital who will work in the department of neonatology in 2018. Exclusion criteria: [1] resignation before the end of all training; [2] less than half a year into the course; Refuse participants. Training time was March 2019 to December 2019.

Symptom assessment tools

In reference to the national emergency physicians trauma evaluation pattern, on the basis of our nursing department formulated the condition assessment framework, "ABCD + OPQRST".

Symptom assessment tools contains airway, breathing, circulation, consciousness, time/place, aggravating/alleviating factors, nature, with symptoms, severity, duration, to guide nurses from occurrence of clinical symptoms, systematic and comprehensive assessment, collect information. Our department chose "illness assessment framework" as the tool for symptom assessment, and organized the application learning of the tool before the formal training.

Training content and methods

In accordance with the practical neonatology list of 15 common neonatal disorder symptoms, and connecting with the frequency of symptoms in newborn care clinical practice to increase or decrease, the final 18 symptoms, including breathing, cyanosis, difficulty breathing, abdominal distension, vomiting, feeding intolerance, hematochezia, anemia, cardiac arrhythmias, shock, low reaction, intracranial hemorrhage, convulsions, fever, low temperature, purpura, crying, yellow dye.

A training team for symptom assessment was set up, with the department head nurse, teaching professionals and clinical backbone as trainers and teaching quality control management. Based on adult learning theory in the "adult independent self-concept, learning more autonomy" (4) this study uses three staged teaching mode, give full play to the new nurses' learning autonomy: 1) The new nurse symptom assessment report: randomly selected 18 new nurses as each symptom assessment report person, choose by report person symptoms corresponding clinical cases, application condition assessment framework to complete symptoms assessment related data collection, analysis of the causes and symptoms and report the courseware making. 2) The instructor's report: 9 clinical backbone (CN3 or CN2) were selected as the instructor of each new nurse in a paired way, and the new nurses were

instructed to complete the selection of clinical cases, the improvement of evaluation materials and the modification of PPT before the training; During the training, I presided over the training and learning of this symptom, and summarized the clinical nursing experience and made comments. 3) Supervision training: the head nurse, as the supervisor of each symptom evaluation training, puts forward modification Suggestions to the symptom evaluation cases and PPT production made by the informants before the training, so as to ensure that the training content is closely related to the theme and emphasizes the key points of evaluation; Training at the same time, to find the field corresponding to other clinical symptoms of real cases, reoccupy condition assessment framework to evaluate symptoms to implement the present interpretation of the essence, and in the light of the related pathophysiological of symptoms and causes, key points and difficulties assessment in-depth analysis, to nurse the implementation of the depth of understanding and methods of assessment and evaluation, and understand through exploring the cause of the symptoms, highly understand the meaning of the doctor's advice, so as to efficiently convert the doctor's advice to care behavior, effectively perform the doctor's advice, the desired therapeutic effect, promote children disease recovery, and therefore overall improving the quality of training, strengthen the training effect.

Evaluation index

The training effect was evaluated from three aspects: knowledge, skill and behavior.

Theoretical test scores before and after the training and three months after the training. Two days after each symptom assessment before the training and the training respectively extend test (a total of 10 points each time, a total of 180 points), the determination of knowledge level, three months after the training, all from all symptoms in proportion to extract some questions in the assessment test paper, a test paper (100 points), testing and training objects related knowledge level of training after the end of march.

Skill score level of clinical symptom assessment in terms of skills. According to the condition assess-

ment framework, training team to make examination form, and after repeated revision, form the symptom assessment progress review, review new nurses clinical symptoms when evaluating whether the evaluation of each right, a total of 14 projects, "ABCD + OPQRST" represent "airway, breathing, circulation, consciousness, and the time of the symptoms/parts, aggravating/alleviating factors, properties, with symptoms, severity, duration," every 2 minutes, "know the related reasons," right to know the reason and analysis two every five minutes, "right, know next focus" two every 5 points, with a total score of 40 points, some new nurses were selected before and after the training to conduct a spot check on the new nurses for a certain symptom, and their scores were recorded.

Behavior of new nurses before and after the self-evaluation training, they took the initiative to carry out the behavior score of symptom evaluation. Use homemade clinical symptoms of behavior change self-reported questionnaire survey new nurses' behavioral changes, this table includes 11 items, top 10 entries by nurses self-reported symptoms before and after the training evaluation activities, by using the method of grade 0 to 10 points, a total of 11 grade, the higher the score on behalf of the implementation of the behavior of the higher the frequency, the last entry by nurses ability to assess self-reported symptoms improve. Finally, the satisfaction degree of the new nurses to the symptom evaluation training was investigated. Likert grade 5 was used to score the degree of satisfaction = (number of very satisfied cases + number of satisfied cases)/total number of cases *100%.

Statistical methods

SPSS 22.0 was used for data analysis. Measurement data showed as $\bar{x} \pm s$, ANOVA for repeated measurement of differences in knowledge scores before, after and three months after training, LSD Pairwise comparison of post mortem. The paired t test analyzed the changes in ability and behavior before and after the training. The enumeration data is expressed as the number of examples (percentage). $P < 0.05$ was considered statistically significant.

Results

General information

A total of 51 new nurses participated in the training, excluding those who did not complete the training due to resignation or personal reasons. A total of 34 nurses completed the entire 18-session symptom assessment training.

Knowledge

Due to the absence of the data of apnea, fever, cyanosis and abdominal distension before the training, the total score before the training was 140 points, and the total score after the training was 180 points. Therefore, the data of the total score of personal assessment before and after the training were adjusted to 100 points before statistical analysis. The results of variance analysis showed that the differences of scores before, after and three months after training were statistically significant. LSD post-test results showed that there was a statistically significant difference between the assessment scores after training and those before and three months after training, but there was no statistically significant difference between the assessment scores before and three months after training, as shown in table 1.

Skills

The training team members randomly checked 10 people before and after the training to assess their skills in clinical symptoms. The scores of the random check before the training were (26.70±2.58) and (31.80±1.40).

The paired t-test results showed that the differences were statistically significant ($t=-5.489, p=0.000$).

Behavioral aspects

A total of 44 people completed the self-assessment of behavioral changes in the symptom assessment (including those who participated in the whole training and a few who only participated in part of the training), and the results showed that the clinical symptom assessment behavior of new nurses after the training was significantly higher than that before the training, with a statistically significant difference, as shown in table 2. Among the participants in the self-assessment, 24 (54.55%) believed that their symptom assessment ability had been greatly improved, 17 (38.64%) believed that their symptom assessment ability had been partially improved, 3 (6.82%) believed that their symptom assessment ability had been slightly improved, and no one believed that their symptom assessment ability had been little or no improved.

Satisfaction

41 to participate in the training of new nurses completed the satisfaction survey, overall satisfaction was 100%, among them, choose appropriate “symptoms”, “condition assessment framework clearly, help master symptom assessment method” “can exercise the critical thinking ability”, “helps strengthen the links of theory and practice, deepen their grasp of specialized knowledge” of four items such as degree of satisfaction was 100%, the lowest satisfaction for the reasonable arrangement of the training time, at 70.73%.The specific results are shown in table 3.

Table1. Analysis of assessment scores before and after training(n=34)

	Correction of scores (original scores)	F	p	LSD
① before	73.55±5.56(102.97±7.79)	100.632	0.000	② >
② after	91.24±2.52(164.24±4.55)			① >
③ three months	74.97±6.18			③

Discussion

Application of adult learning theory in training program design

The American educator Knowles put forward the adult learning theory (5-7), which analyzed the characteristics of adult learning from the perspective of the differences between adult learning and children's learning. The theory mainly includes the following four points: first, with the continuous maturity of individuals, adults have independent self-concept; Second, the adult's experience provides a rich resource for adult learning, experience is a foundation, the individual experience and the effect of the link between the new knowledge affect learning, experience is a resource, can be used for yourself and others, experience is an advantage, accessibility to absorb new knowledge, new methods, experience and chains, make people form the path dependence, form a mind-set, a negative impact on learning; Thirdly, adult learning aims to be problem-oriented; Fourth, adult learning programs are closely related to their social roles.

According to the "adult of adult learning theory has an independent self concept", this training is provided by the organizers training schemes, the new nurses in each symptom assessment report person, choose by report person in clinical symptoms of the corresponding case, complete data collection and analysis, report making courseware, fully embody the autonomy of adult learning. According to the "adult of adult learning theory provides a rich experience for adult learning resources", the symptom assessment training object for after six months of work in the frequency of new nurses, nursing professional knowledge base, and accumulated some experience in clinical, met these common clinical symptom, clinical experience to help understand and grasp the symptoms of evaluation. Work half a year later the nurse is in rapid growth stage, this stage of the nurses ability to receive new knowledge, new method is high, with half a year clinical experience to evaluate symptoms nurse training, which is to ensure that it has a certain clinical experience, help to understand the symptom assessment, and avoid the long-term clinical work experience form the mind-set and exclusive new method clinical evaluations.

Table 2. Self-assessment of behavioral changes in symptom assessment before and after training(n=44)

Clauses	Before	After	t	p
Abnormal symptoms can be detected	5.09±1.24	8.18±1.04	18.710	0.000
Ability to assess symptoms using the disease assessment framework	4.32±1.62	8.05±1.18	15.842	0.000
Ability to assess and identify life-threatening symptoms based on ABCD	4.89±1.79	8.45±1.37	15.941	0.000
After the application of the disease assessment framework for symptom assessment, information about the cause of symptoms can be further collected	4.25±1.67	8.20±1.53	16.559	0.000
Can comprehensively analyze the causes of symptoms	4.20±1.61	8.14±1.15	16.103	0.000
When abnormal symptoms are found, they can be evaluated first	4.50±1.75	8.41±1.04	16.702	0.000
Can understand the meaning of the doctor's orders issued after the symptom assessment and implement the intervention measures efficiently	5.02±1.78	8.68±1.07	15.183	0.000
Ability to evaluate the effect of symptomatic interventions in a timely manner	4.89±1.78	8.45±1.07	14.240	0.000
Ability to continuously track and evaluate incomplete information collection at the time	4.36±1.95	8.18±1.17	14.764	0.000
To be aware of the symptoms related to the follow-up observation points, to give recommendations to colleagues	4.59±1.86	8.25±1.12	13.654	0.000

Table 3. Training satisfaction(n=41)

Clauses	Satisfaction
Appropriate selection of symptoms	100.00%
The disease assessment framework is clear to help master the method of symptom assessment	100.00%
Can exercise the ability of critical thinking	100.00%
It is helpful to strengthen the connection between theory and practice and deepen the knowledge of specialized diseases	100.00%
The training is purposeful and inspiring	97.56%
Impressed with the training content, able to master the training content	97.56%
Can broaden the thinking, improve the ability to analyze and solve problems	97.56%
The three-step report form of training is novel and reasonable	95.12%
Arrange the training schedule (once a week) reasonably	82.93%
Arrange the training time reasonably	70.73%
global satisfaction index	100.00%

This training is aimed at neonatal nurses, whose condition assessment is an essential basic skill for nurses. The content of the training is closely related to the role they should assume, so as to promote them to learn better, which is also consistent with the “adult learning plan is closely related to its social role” in the adult learning theory. “Problem oriented learning” is the view of adult learning theory and also the basic demand of this training. Condition assessment, is one of the most basic work of clinical nurses, new nurses lack of work experience, knowledge reserve enough reasons, such as has not in condition assessment, has the urgent need to raise the capacity of their own evaluations, the purpose of this training is to improve the condition of the nurses ability to assess, in accordance with the nurse’s appeal. Based on the common problems encountered in clinical practice, this training will be problem-oriented.

Symptom assessment training can effectively improve the knowledge, skills and behavior of new nurses’ condition assessment

According to the results in table 1 and table 2, the symptom assessment training based on adult learning theory can effectively improve the knowledge and skills of new nurses’ disease assessment, promote the establishment of new nurses’ disease assessment thinking and

the cultivation of clinical assessment behavior. The behavior model of “knowing, believing and acting” mentions that knowledge is the basis for behavior change and a necessary condition for behavior change (8).

In this training, the knowledge of symptom assessment of new nurses was firstly improved through training, and then the ability of symptom assessment was improved through case practice. Through the improvement of knowledge and skills, the behavior of symptom assessment was changed. To evaluate the effect of new nurses’ symptom evaluation training from three aspects of knowledge, skills and behavior, which is in line with the requirements of “knowing, believing and acting behavior mode”. As an innovative training model first proposed by our department, symptom assessment training starts with the common symptoms of neonates in the NICU and is related to the previous disease knowledge. It not only consolidates the previous disease knowledge, but also helps nurses to form a systematic knowledge system of disease assessment, so as to enhance the ability of nurses to evaluate common symptoms.

Analysis of satisfaction results

According to the survey results of satisfaction in table 3, except for “training schedule and training duration”, the satisfaction of all the other projects is

higher than 95%, indicating that the new nurses are highly satisfied with the overall training of symptom assessment. Collect new nurses' Suggestions on the training schedule and training duration. Some nurses hope that the training duration can be shortened appropriately, the interval between the two trainings can be extended appropriately, the training pressure can be reduced appropriately, and more time can be given to digest the training content. The symptom assessment training is to be the standard training program for new nurses in our department, which needs continuous improvement. In the next round of symptom assessment training, we will consider appropriate adjustment of the training schedule and training duration, so as to improve nurses' satisfaction with the training.

Enlightenment of knowledge assessment results to the later training

The training results showed that the difference between the exam results after the training and those before the training was statistically significant, and the difference between the exam results three months after the end of the training and those before the training was not statistically significant. According to the law of Ebbinghaus forgetting curve, the process of forgetting is uneven. At the beginning of memorizing, forgetting is fast, then gradually slow, and after a considerable period of time, forgetting is almost no longer. 2 days after the training, the retention rate of memory is only 27.8%. Two days after the training, the new nurses were tested on their knowledge after training, and the learning results of the new nurses were strengthened. However, three months after the end of the training, the test results were no different from those before the training, indicating that three months after the end of all the training, the new nurses had forgotten what they had learned. According to the Ebbinghaus forgetting curve, the retention rate of memory was only 21.1% one month after learning, which suggested that in the later training, we should not only strengthen the knowledge two days after the training, but also strengthen the review in January. Strengthening methods include but are not limited to: examination, practice, spot check, etc.

Limitations

This training part of the students did not participate, but the completed self-evaluation of symptoms assessment behavior change and satisfaction survey, considering that not all participants self-reported symptoms assessment of the behavior and satisfaction data still have reference value, therefore, included in the analysis, but this section personnel knowledge assessment results may not be accurate, and therefore not included in the analysis of knowledge, there may be some impact on the results.

Conclusion

Assessment ability is one of the core competencies of a NICU nurse. By organizing systematic special training of symptom assessment, it can help clinical nurses to establish assessment thinking, promote the development of clinical assessment behavior, facilitate the implementation of more detailed observation of the condition, and provide more reliable clinical information for the diagnosis and treatment plan of newborn babies. This also provides empirical basis for the construction of nurse core competency training system in late neonatal department. This training method is worth popularizing.

References

1. A. Fennessey and R. A. Wittmann-Price, "Physical assessment: a continuing need for clarification," (in eng), *Nurs Forum*, vol. 46, no. 1, pp. 45–50, Jan-Mar 2011.
2. M. L. De Roo, M. F. Tanghe, N. J. Van Den Noortgate, and R. D. Piers, "Development and Validation of the Symptom Assessment to Improve Symptom Control for Institutionalized Elderly Scale," (in eng), *J Am Med Dir Assoc*, vol. 19, no. 2, pp. 148–153.e5, Feb 2018.
3. A. Holland, F. Smith, G. McCrossan, E. Adamson, S. Watt, and K. Penny, "Online video in clinical skills education of oral medication administration for undergraduate student nurses: a mixed methods, prospective cohort study," (in eng), *Nurse Educ Today*, vol. 33, no. 6, pp. 663–70, Jun 2013.
4. S. S. Russell, "An overview of adult-learning processes," (in eng), *Urol Nurs*, vol. 26, no. 5, pp. 349–52, 370, Oct 2006.
5. J. W. Twaddell, "Educating Parents About Vitamin K in the Newborn Using Knowles' Theory of Adult Learning

- Principles as a Framework,” (in eng), *Crit Care Nurs Q*, vol. 42, no. 2, pp. 205–207, Apr/Jun 2019.
6. L. Cadorin, V. Bressan, and A. Palese, “Instruments evaluating the self-directed learning abilities among nursing students and nurses: a systematic review of psychometric properties,” (in eng), *BMC Med Educ*, vol. 17, no. 1, p. 229, Nov 25 2017.
 7. S. Henderson, M. Dalton, and J. Cartmel, “Using Inter-professional Learning for Continuing Education: Development and Evaluation of the Graduate Certificate Program in Health Professional Education for Clinicians,” (in eng), *J Contin Educ Health Prof*, vol. 36, no. 3, pp. 211–7, Summer 2016.
 8. K. D. Doekhie, M. Buljac-Samardzic, M. M. H. Strating, and J. Paauwe, “Who is on the primary care team? Professionals’ perceptions of the conceptualization of teams and the underlying factors: a mixed-methods study,” (in eng), *BMC Fam Pract*, vol. 18, no. 1, p. 111, Dec 28 2017.

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