Minimum Requirements for Physical Assessment of Patients Conducted by Nurses Newly Assigned to NICUs

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ABSTRACT

Aims: To clarify the minimum requirements for physical assessment of patients conducted by nurses newly assigned to NICUs.

Methods: A questionnaire survey was administered to 333 certified neonatal intensive care nurses. The questionnaire inquired about the minimum requirements for nurses newly assigned to NICUs in order for them to care for pediatric patients by themselves. The items considered "absolutely necessary" by 80% of the subjects or more were regarded as the minimum requirements for physical assessment in NICUs.

Results and Conclusion: A total of 85 subjects completed the questionnaire with effective answers (25.5%). From the initial 170 items (17, 129, 10, and 14 for basic information, visual examination, auscultation, and palpation, respectively), 18 were extracted (3, 9, and 6 for basic information, visual examination, and auscultation, respectively). Of the 18 items, 10 concerned respiration. Our study suggests that respiratory management is important to care for high-risk newborns, and this is one of the minimum requirements for NICU nurses performing physical assessment.

Introduction

The birthrate of low-birth-weight infants - the most common type of high-risk newborns, in Japan was 9.4% in 2005, and there had been no significant change since then until 2013 (9.6%). However, as the total number of births decreased during this period, the birthrate of low-birth-weight infants increased. However, a 2009 report by the Ministry of Health, Labour and Welfare, "Meeting for Ensuring Perinatal and Emergency Care and Their Collaboration", noted the following problems with current perinatal care in Japan: "It is necessary to further improve NICUs because there has been a decrease in their capacity to accept infants in recent years due to a lack of NICU beds and neonatal care specialists, as well as deterioration of working conditions for hospital staff". The response to this was "it is necessary to secure the required number of physicians and nurses who provide neonatal care by encouraging the training of specialized and certified nurses, and improving their skills to ensure the quality of neonatal medicine and nursing as a

measure to address this issue" [1,2]. In Japan, "Neonatal Intensive Care" was established in 2003 and implemented in 2004 as a nursing-related profession to certify specialized nurses. There are 414 certified neonatal intensive care nurses in Japan as of March 2019. However, this is insufficient considering that there are only 3,052 NICU beds [3,4] and the number of infants admitted to NICUs is increasing. In other words, a large number of nurses who have not undergone professional neonatal care training provide nursing care for high-risk newborns.

Nursing care in NICUs is based on life and developmental support for infants. Infants admitted to NICUs include very-or-extremely-low-birth-weight infants who require respiratory management and status epilepticus infants who require high-level medical treatment. As these high-risk infants are significantly immature and fragile, their medical conditions may suddenly change or become severe, which may threaten their lives or significantly influence their growth and development. Therefore, nurses who provide NICU care are required to have assessment skills to identify the problems of infants whose medical conditions may suddenly change or become severe and make decisions to respond to these changes,

in addition to higher levels of expertise and physical assessment, and other skills [5]. In their previous study, Yokoo et al. suggested that all NICU nurses are expected to conduct tasks related to minimally invasive procedures implemented in daily clinical practice, emergency treatment, and daily life support in both acute and convalescence stages, and all of these tasks require skills to carefully conduct physical assessment. However, no studies have been conducted on systematic physical assessment indices to assess the medical conditions of infants in NICUs. Most concepts and scales developed in countries other than Japan are also associated with care, which is consistent with those adopted in Japan such as the concept of a better understanding of the behaviors of infants by nurses and therapists involved in their developmental support, the Neonatal Behavioral Assessment Scale (NBAS), which is useful for designing plans to provide specific developmental care to facilitate the behaviors of infants and intervention support for parents, and Assessment of Term and Preterm Infant Behavior (APIB) [6].

According to a report by Yokoo [5], as acute-phase care for high-risk newborns requires highly professional knowledge and skills, it is difficult to teach a level of acute-phase neonatal care in basic nursing education higher than the level of "basic understanding". Therefore, nurses have to depend on education and training conducted in each clinical setting to learn neonatal nursing. Japanese nurses have few opportunities to learn about or experience high-risk newborns while in school; therefore, new nurses who have just been assigned to NICUs have difficulty using their acquired skills.

A previous study conducted by Nakanishi et al., "Confusion experienced by nurses with clinical experience who have just been assigned to NICUs", also suggested that new nurses who had just been assigned to NICUs had difficulty in conducting physical assessment of newborns, premature babies, and low-birth-weight infants. Their comments included "I have no knowledge of normal newborns", "I have difficulty distinguishing normal from abnormal newborns", and "It is difficult for me to assess newborns". By conducting physical assessment, problems with infants and their medical conditions can be identified and understood for diagnosis, and decisions can be made regarding the appropriate care required to protect the lives of infants, and to support their growth and development. Assessment can be performed by nurses with a wealth of knowledge and experience. The lives of infants and their growth/development should not be influenced by differences in the assessment skills of individual nurses. Therefore, it is important to develop the physical assessment skills of nurses who have just been assigned to NICUs in order for nurses, regardless of their experience as NICU nurses, to be able to properly protect the lives of infants and prevent their medical conditions from deteriorating, and to ensure the quality of medical/nursing care in NICUs.

Purpose
The objective of this study was to clarify the minimum necessary items, i.e., the minimum requirements, for conducting physical assessment by a nurse newly assigned to the NICU.

Definition of terminology
- Nurses newly assigned to NICUs: Nurses who were assigned to the NICU for the first time with or without experience.
- Physical assessment ability: Ability to collect, integrate, and analyze physical information of children who entered the NICU.

Methods
Subjects and Survey Methods
The subjects of the survey were neonatal intensive care certified nurses - experts of high-risk neonatal nursing. In December 2016, an anonymous self-completed questionnaire survey was conducted, and its forms were sent by mail to 333 of 360 nurses certified in neonatal intensive care who were registered in the Japanese Nursing Association (as of December 2016) and whose affiliations had been published.

Survey Items and Analysis Methods
The author presented 170 initial task items (basic information - 17, visual inspection - 129, auscultation - 10, and palpation - 14) extracted based on the NICU manual (NICU manual: neonatal medical liaison meeting [7], Physical Assessment of the Newborn 5th Edition: Ellen P. Tappero [8], Physical assessment by neonatal symptoms: Ooki S), and asked the nurses whether each of the 170 items is a task that should be performed by a new nurse who has just been assigned to NICUs in order to be able to be solely in charge of pediatric patients. The nurses were asked to choose from <4: absolutely important>, <3: important>, <2: relatively important>, and <1: unimportant>, and the rates of task items viewed as <absolutely important> by the nurses were calculated. Task items viewed as <absolutely important> by 80% or more of nurses were defined as the minimum requirements for physical assessment in NICUs.

Ethical Considerations
The present study was conducted after approval by the research institution to which the author belongs (Approval number: 2016N-6). The subjects received explanations of the objectives of the study, privacy protection, data handling, that the survey was anonymous, that participation was based on their own free will, and that the results of the study would be published. Resending the survey form was regarded as consent to the study.

Results
Valid responses were collected from 85 of the 333 neonatal intensive care certified nurses (25.5%), experts in high-risk neonatal nursing.

Basic Information
The number of subjects aged 40 to 49 years old was 41 (48.2%), being the largest, and there were 21 (37.6%) and 10 (11.7%) subjects aged 30 to 39 and 50 years or older, respectively. The mean period of working as a NICU nurse was 14.1 years (M13 ± SD4.8). The number of nurses with NICU experience of 11 to 15 years was 33 (39.2%), being the largest, including those with 35 years of experience or more. The mean period of working as a

certified neonatal intensive care nurse was 5.4 years (M5 ± SD2.8); nurses with the longest period of experience had started working from the initial year of the certification system, and there were nurses who had become certified six months ago.

Table1:Basic Information

Variable		n.(%)	MEDIAN±SD
Age	30–39	32(37.6)	
	40–49	41(48.2)	
	50–	10(11.7)	
	No ansuer	2(2.4)	
Length of nursing experience in NICUs			
	5–10	20(23.8)	
	11–15	33(39.2)	M14.1±SD4.8
	16–20	24(28.5)	
	21–	7(8.3)	
Length of clinical experience as a certified NICU nurse			
	0.5–3	19(23.8)	
	4–6	38(47.5)	M5.4±SD2.8
	7–9	13(16.3)	
	10–	10(12.5)	

Minimum requirements for physical assessment in NICUs
Among the 170 task items that nurses newly assigned to NICUs are required to conduct to be solely in charge of infants, the following 18 items were considered to be <4: absolutely important> by 80% or more of the nurses:

I. Seventeen items associated with basic information collection, including <fetus week number> 95.2% (81), <status of growth (such as the estimated body weight)> 87.0% (74), and <course of delivery (such as a prolonged rupture of membranes, meconium stain, fetal bradycardia, and premature separation of the placenta)> 84.7% (72).

II. A total of 129 items associated with visual examination, including the following nine items: <respiratory pattern/rhythm> 82.3% (70), <respiratory rate> 88.2% (75), < retracted breathing> 82.9% (79), <effort for breathing (nasal alar breathing and grunting)> 94.1% (80), <movements of the thoracic cage> 83.5% (71), <oxygen saturation level (SpO2) (right upper and lower limbs)> 89.4% (76), <skin color> 87.0% (74), <size of the abdomen (volume, swelling, tension, and gloss)> 80.0% (68), and <defecation/fecal condition> 82.1% (69).

III. Ten items associated with auscultation, including the following six items: <breath sounds (such as lateral symmetry, intensity, and accessory murmurs)> 88.0% (74), <grunting> 90.4% (76), <stridor and wheezing> 85.5% (71), <heart rate> 89.2% (75), <heart murmurs> 83.3% (70), and <peristaltic sounds> 83.3% (70).
There were 18 task items that 80% or more of the nurses viewed as <4: absolutely important>.

IV. Among the 14 task items associated with palpation, no items were viewed as <4: absolutely important> by 80% or more of the nurses.

Among the 18 task items that 80% or more of the nurses viewed as <4: absolutely important>, three items were viewed as <4: absolutely important> by 90% or more of the nurses, including <I. Basic information: fetus week number> (95.2%, the highest) and the following two respiratory-related items: <II. Visual examination: labored breathing (nasal alar breathing and grunting)> (94.1%) and <III. Auscultation: grunting> (90.4%).

Table 2: Physical Assessment Items with the Rate of Choosing <4. Absolutely Important> at 80% or Higher

Procedure	Assessment		Rate of Choosing <4. Absolutely Important> (%)
I. Basic information collection	Information regarding the fetus	Fetus week number	95.2
		Status of growth (such as the estimated body weight)	87
	Status of delivery	Course of delivery (such as a prolonged rupture of membranes, meconium stain, fetal bradycardia, and premature separation of the placenta)	84.7
II. Visual examination	Respiratory / chest status	Respiratory pattern/rhythm	82.3
		Respiratory rate	88.2
		Retracted breathing	82.9
		Effort breathing(nasal alar breathing and grunting)	94.1
		Movements of the thoracic cage	83.5
		Oxygen saturation level (SpO2) (right upper and lower limbs)	89.4
		Skin color	87
	Abdominal condition	Size of the abdomen (volume, swelling, tension, gloss)	80
		Defecation/fecal condition	82.1
III. Auscultation	Respiratory / chest status	Breath sounds (such as lateral symmetry, intensity, and accessory murmurs)	88
		grunting	90.4
		Stridor and wheezing	85.5
	Cardiovascular condition	Heart rate	89.2
		Heart murmurs	83.3
	Abdominal	Peristaltic sounds	83.3

Discussion
Physical examination tasks that one nurse who has just been assigned to the NICU is required to perform to be solely in charge of one pediatric patient were extracted from among 170 items according to the following criteria: (tasks conducted by more than 80% of nurses certified in neonatal intensive care - experts of high-risk neonatal nursing): I. three tasks associated with basic information, II. nine tasks associated with visual examinations, and III. six tasks associated with auscultation (a total of 18 tasks). The tasks that should be conducted according to more than 80% of the nurses are discussed in the following paragraphs according to the type of required care.

Basic information
Basic information was classified into <mother's body information> (nine items), <information regarding the fetus> (four items), <status of delivery> (three items), and <birth state> (one item) (a total of 17 items), and these items were grouped into two (information regarding the fetus) items (fetus week number and status of growth such as the estimated body weight) and one (status of delivery) item (course of delivery). As suggested by Nishida [9], "the medical history of a baby who has just been born is considered to be information of the mother who has given birth, the baby, and other related information at the time of childbirth", and "most neonatal problems can be diagnosed based on prenatal

information" because the conditions of a baby who has just been born are significantly influenced by the condition of the mother, and information of pregnant females is important for assessing risks in their babies following childbirth. However, according to the present survey, the nurses placed emphasis on "information regarding the fetus", including "fetus week number" and "status of growth", rather than "mother's body information". This is presumably because the degree of maturation of babies, including their functions, at the time of childbirth and their risks can be predicted to prepare for the risks. The nurses placed emphasis on "course of delivery" for a similar reason: risks can be predicted based on the course of delivery and risks can be monitored. Ooki [10] suggested the importance of "mother's body information": "information on pregnancy and delivery courses, fetal abnormality, and development is important for physical assessment of newborns immediately after childbirth." The nurses did not place importance on "mother's body information", although this information is necessary to assess fetal development because it is a significant influencer. This may be because "fetus week number" and the development of infants reflect "mother's body information", and the nurses may have thought that the "mother's body information" was included.

Visual examinations

Visual examinations were classified into <skin, mucous membrane color> (six items), <nourishment state> (two items), <gestational ages period> (seven items), <neurological status> (12 items), <respiratory / chest status> (nine items), <heart and cardiovascular states> (three items), <abdominal condition> (14 items), <head> (seven items), <eyes> (11 items), <ears> (four items), <nose> (four items), <mouth> (ten items), <neck> (four items), <sexual organs (male, female)> (14 items), <skin> (eight items), and <limbs> (14 items), and nine items were extracted from these 129 items. Visual examinations were conducted by a large number of nurses because the characteristics of each part of the body and their abnormalities can be clearly examined. Seven of the nine items were related to <respiratory / chest status>. These items were considered by many nurses to be tasks that should be conducted, presumably because they are indices to visually evaluate the respiratory status and identify respiratory abnormalities, as well as indicators significantly associated with life support and neurological prognosis. The two tasks associated with <abdominal condition> are visual observations to identify digestive tract problems and examine intestinal movement. It is important to conduct these tasks for visual observation to identify/ prevent abdominal distension - a cause of respiratory depression, meconium excretion-related problems - a cause of necrotizing enterocolitis, and other abnormalities.

Auscultation

Six of the following ten auscultation-related tasks were extracted: <neurological status> (two items), <respiratory / chest status > (three items), <heart and cardiovascular states> (four items), and <abdominal condition> (one item). Three of the six items were associated with <respiratory / chest status>, and all three were selected as auscultation-related items. Previous studies suggested that the skills to perform auditory diagnosis of adult patients' respiratory sounds are also used or required by nurses in daily clinical practice [11,12]. These items were viewed by many nurses as tasks that should be conducted, presumably because normal respiration and oxygenation are important as visual examinations for life support, neurological prognosis, and respiratory assessment. Tasks associated with abdominal conditions were extracted for reasons similar to those for visual examinations, i.e., they are important for the early detection/prevention of intestinal tract abnormalities and assessment of the status of digestion and absorption - functions essential for the growth of infants and infection control. Previous studies [13,14] suggested that, although valve diseases and other abnormalities may be identified in adult patients by examining cardiac murmurs, it is difficult to identify them by examining the <heart and cardiovascular states> or measuring the heart rate. However, these tasks are important for the early detection/treatment of congenital cardiac diseases in neonatal care, as suggested by Ooki [10]: "Although the causes of most heart murmurs in the early postnatal period are tricuspid regurgitation due to physiological pulmonary hypertension and patent ductus arteriosus, attention should be given not to overlook signs of pulmonary stenosis and aortic stenosis. Furthermore, gallop rhythm is an important finding suggestive of heart disease". <Heart rate> was selected by a large number of nurses because changes in the heart rate of pediatric patients represent changes in their respiratory conditions, which is inconsistent with physical assessment involving adult patients.

Palpation

There were 14 palpation-related items: one item each associated with <cardiovascular condition>, <abdominal>, <neck>, and <skin>, two items each associated with <body water state>, <vulva>, and <limb>, and four items associated with <head>, and the rate of nurses who considered any of these items as <absolutely important> was lower than 80%; no consensus on any item. This may have been because most of these 14 items are associated with morphological abnormalities, which do not pose a threat to life. However, <skin: temperature> and <limb: sense of heat> are considered to be important for newborns whose thermoregulatory function has not sufficiently developed because these items represent their body temperature. As the relative body surface area of newborns is larger than that of adults and they have a smaller amount of subcutaneous fat, they are unable to properly control their body temperature, and as a result, easily become hypothermic. Hypothermia influences the autonomic nerves of infants, causing acidosis, hypoxia, hypoglycemia, and other symptoms [9,15]. Body temperature control is markedly important for infants from the viewpoint of life support because it significantly influences their respiratory and cardiovascular functions. However, these items related with palpation were not considered necessary, presumably for the following reasons: Although information on vital signs can be acquired as objective value data (respiratory and heart rates through visual examinations and auscultation, respectively), body temperature assessed by palpation rather than measurement cannot be acquired as a numerical value. In addition, care provided to premature babies is limited to the minimal level

of care (minimal handling) in order to reduce stress. Therefore, information on body temperature, which significantly influences the lives of infants, should be acquired through measurement rather than the above-mentioned items, <visual examination>, <auscultation>, and <palpation>.

Minimum requirements for nurses newly assigned to NICUs to conduct physical assessment

There are 18 tasks that nurses newly assigned to NICUs are required to/should conduct to be solely in charge of infants or for physical assessment in NICUs. From among the vital signs-related tasks, most items associated with observation of respiratory status were selected. There were three items that more than 90% of the nurses viewed as <4: absolutely important>, and two of them were associated with the observation of respiratory status, particularly effort for breathing. Assessments of the respiratory status of newborns are important indices because invisible abnormalities in the body are reflected in the respiratory state. Stabilization of their respiratory state is significantly associated with the level of oxygenation, which markedly influences the lives of infants and their neurological prognosis. It is important for nurses to conduct systematic physical assessment of the respiratory status of patients, and respiratory assessment is an essential physical assessment skill in both adult and NICU care.

Shinozaki [16] reported that "in basic nursing education, students are only taught to evaluate normal conditions and identify abnormalities. However, actual clinical nursing settings require skills to appropriately conduct observations and make judgments". As respiratory support for infants admitted to NICUs is essential, it is important to conduct respiratory management to identify abnormalities as early as possible and ensure that breathing is stabilized by examining the heart rate and sounds, cardiovascular data, and observing the respiratory status. Therefore, it is necessary to develop methods to improve nurses' physical assessment skills based on the above-mentioned task items that new nurses who have just been assigned to NICUs are required to perform for physical assessment.

In the present survey, valid responses were collected from 85 of the 333 nurses certified in neonatal intensive care (25.5%), experts of high-risk newborns. Regarding the limitations of this study, the response rate was low due to the timing of the request for participation in the survey and its methods, and it is difficult to conclude that expert nurses who provide care for high-risk newborns reached a consensus. However, the acquired responses were given by neonatal expert nurses, after carefully considering them, as minimum requirement tasks that should be performed when conducting physical assessment in NICUs. It is necessary to develop methods to train nurses who have just been assigned to NICUs the required physical assessment skills based on the obtained results.

Conclusion
- There were 18 minimum requirements for physical assessment in NICUs.
- They were primarily associated with observation of the respiratory state.

References

1. Ministry of Health, Labour and Welfare. Council Report on securing the cooperation of the perinatal medicine and emergency medicine. 2009.
2. Yokoo K, Kusuda S, Bonno M, et al. Collaboration with Doctors and Nurses in Neonatal Medicine Perspectives for the Nurse's Job in NICU and GCU. Journal of Japan Society for Premature and Newborn Medicine. 2011; 23: 96-102.
3. www.mhlw.go.jp/toukei/saikin/hw/jinkou/kakutei14/dl/00_all.pdf
4. https://www.mhlw.go.jp/toukei/saikin/hw/iryosd/14/
5. Yokoo K. Neonatal Intensive Care Certified Nurses. Current information of maternal & child health. 2010; 62: 88-92.
6. Nakai A. Participation in introductory APIB training at the Colorado NIDCAP Center-Report on the training and its applicability to future studies. Journal of Graduate School of Nursing, Chiba University. 2014; 36: 9-32.
7. Neonatal medical liaison meeting. NICU manual 5th Edition. Tokyo KANEHARA & CO. LTD. 2014.
8. Ellen P. Tappero. Mary Ellen Honey field. Physical Assessment of the Newborn 5th Edition. 2015.
9. Nishida H, Introduction to neonatology 4th Edition. Tokyo IGAKU-SHOIN Ltd. 2014.
10. Ooki S. Physical assessment by neonatal symptoms. NEONATAL CARE 2015 Spring Special Issue. Osaka Medicus Shuppan, Publishers Co. Ltd. 2015.
11. Colwell CB, Smith J. Determining the use of physical assessment skills in the clinical setting Jounal of Nursing Education. 1985; 24: 333-339.
12. Sony SD. Baccalaureate nurse graduates' perception of barriers to the use of physical assessment skills in clinical setting The Jounal of Continuing Education in Nursing. 1992; 23: 83-87.
13. Iketani C, Takishima N, Sumimoto K. Kango kiso kyōiku de kyōju shite oku hitsuyō no aru physical Examination kōmoku ni tsuite no kentō shinjin kankoshi no kon'nan-do to katsuyōdo no shiten kara. Kawasaki City College of Nursing bulletin. 2015; 19: 83-90.
14. Watanabe M. Research on clinical nurses' process of acquiring physical assessment skills. Mejiro journal of health care sciences. 2017; 10: 23-32.
15. Kubota S. The effects of environmental temperature on the mechanism of thermo regulation in infants. Clinical Thermometry and Thermomedicine. 2005; 23: 20-34.
16. Shinozaki E, Yamauchi T. Minimum Essentials of Physical Assessment on Respiratory System in Basic Nursing Education. Japan Journal of Nursing Science. 2007; 27: 21-29.