Quick Evaluation on Preterm Baby Developmental Care Model Focusing on the Suitable Component and Intervention in Indonesia

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ABSTRACT

Introduction: The neonatal stage is important because of its high mortality risk. Neonatal Intensive Care Unit (NICU) is both an important and dangerous place for preterm babies since it can increase the developmental disorders in the baby. Various programs containing several early interventions for preterm babies are implemented and combined into a developmental care model. **Objective**: This study identified the components, contents, and interventions in the developmental care model for preterm babies that is suitable for Indonesia. **Method:** This qualitative research was done through Rapid Assessment Procedures (RAP) to produce information quickly to help decision-making, continued by content analysis using Microsoft Excel through several stages, namely case classification, condensing, streamlining meaning, and compiling, hence producing subcontent. **Results**: The DSC developmental care model looks more detailed, while NIDCM has core components of teamwork and collaboration that are not found in the DSC, thus complementing each other. **Conclusion**: The NIDCM developmental care model is more applicable than DSC since it can be done in the NICU with limited human resources or staff that are not yet fully trained. Both interventions need to be made shorter, and terms can be created as a combination of both so that they become alternative developmental care.

INTRODUCTION

World Health Organization reported that 15 million preterm birth occurred annually in the world, and Indonesia ranks the fifth highest preterm birth with 675,700 cases. *Net Death Rate* (NDR) of neonatal preterm case in NICU occurred due to unprepared service from the resources that have not met the Man, Money, Material, method, Machine, Market, Technology, Time, Information (6M 2T 1I) factors. Preterm baby contribute to 60% to 80% of neonatal mortality and has mortality risk rate of 20 times higher than baby born with normal weight (Syamsu, 2021)

Various programs consisting of early intervention for preterm baby have been done and combined with certain developmental care model. However, the implementation of this developmental care in various hospital in Indonesia has not been optimal due to many obstacles encountered, particularly by Regional General

Hospital of Undata (RSUD Undata) and Regional General Hospital of Anutapura (RSUD Anutapura) Palu. The health workers in charge of neonatal ward in RSUD Undata Anutapura Palu ideally must have a certificate of developmental care competences. Globally, the certification is obtained through *The Wee Care Neuroprotective NICU Program.* However, such program and the similar ones are not provided in Indonesia yet, hence becoming the primary trigger of the suboptimal implementation of developmental care in neonatal ward.

Developmental care includes the adjustment of baby care and ability that involves the family. There are currently 5 preterm developmental care model, including *Developmental Supportive Care* (DSC), *Newborn Individualized Developmental Care and Assessment* Program (NIDCAP), *Infant Behavioral Assessment and Intervention Program* (IBAIP), *Model Universal Developmental Care* (UDC), and *Neonatal Integrated Developmental Care Model* (NIDCM).

In addition to the implementation of the preterm baby developmental care model, Indonesia also does not have *the Wee Care Neuroprotective NICU Program* or other program, hence it becomes the main trigger of the suboptimal developmental care implementation in neonatal ward. Previous research found that the human resources competence in several NICU room of hospital, particularly some of the pediatrician do not have *Newborn Life Support* certificate yet and the nurses do not have NICU certificate yet. In this case, the strategic issue for the medical staff who do not have the competence needed are participating in a training (Syamsu, 2021).

Globally, this certification is obtained from *the Wee Care Neuroprotective NICU Program 10. Wee Care Neuroprotective* training program in NICU room is effective in improving seven main nerve protection measures for the development focusing on preterm neonatal families. This program improves neonatal care and practice as a whole and shall be widely implemented in NICU, particularly for the preterm babies. Research concerning the most preterm baby developmental care model needed in Indonesia, in addition to its effectiveness, has not been done. Furthermore, no research has been done on the efforts to improve the quality of the developmental care model implementation by human resources in NICU through training, so that it is assumed as a novelty aspect of this research, that is by looking at the implementation of integrated and applicative preterm baby developmental care. Therefore, this research aims identify the component content and intervention in preterm baby developmental care in Indonesia.

METHOD

This qualitative research was carried out through *Rapid Assessment Procedures* (RAP) aiming to produce quick information that can assist the decision making. RAP has been used in organization evaluation studies and healthcare service administration (Vindrola-Padros & Vindrola-Padros, 2018). Furthermore, it also provides information about cultural values, beliefs, and perspectives needed to effective design health education program or curriculum (Amadio, 2013; Palinkas & Zatzick, 2019). This research involved six experts, including the practitioners and academics specialized in pediatric care throughout Indonesia. In this case, the data collection method applied in RAP is structured interview to identify the component and its contents in the developmental care model as well as formative evaluation to obtain agreement concerning the suitable intervention to be used in Indonesia. Expert was first invited through invitation letter to participate in this research, containing the objective and brief explanation of the research. After the experts agreed to participate, time contract for the interview was distributed, and they filled the instrument in the forms of checklist of

the components, component contents, and intervention in the preterm baby developmental care model containing DSC (Coughlin, Gibbins, & Hoath, 2009; Jannes et al., 2020; Klug et al., 2020; Liaw, Yang, Chang, Chou, & Chao, 2009; Mohammed, Khamis, & Sabry, 2018; Mohammed, Bayoumi, & Mahmoud, 2014; Sathish et al., 2019) and NIDCM (Altimier & Phillips, 2016, 2013; Kim & Shin, 2014; Syamsu, 2021) as the references. The data collected were then processed through content analysis using Microsoft excel in several stages, including case classification, condensation of meaning downsizing, and compilation so that content and sub-content are obtained. This research has received ethical approval with number 0030/KEPK-KPK/II/2023 in Poltekkes Kemenkes Palu.

RESULTS

In this research, six experts participated with education level of graduate program and specialized in pediatric care. Among them, 4 experts are academics (66.7%), while the other two are practitioners in NICU room (33.3%). We juxtapose the main developmental care component in DSC and NIDCM models, then asked the experts to choose or provide the most suitable term as preterm baby developmental care. The results are provided in the following table:

Table 1. Experts' agreement concerning the components and their content in developmental care suitable in Indonesia

Content		Sub-content
Eight main components of preterm baby developmental care	1	Sleeping period surveillance
	2	Minimizing stress and pain
	3	Cooperating with the family
	4	Recovery environment
	5	Position setting and treatment
	6	Nutrition optimization
	7	Protecting skin
	8	Team-cooperation and collaboration
Varied component content	1	Modification of component content: assessing the status of baby sleeping-caking up; baby pain; family interaction; interdisciplinary care – optimal baby positioning
	2	Combination of DSC & NIDCM component contents

Table 1 above shows that NIDCM Model term is more dominant based on the condition of Indonesia because 7 of 8 terms were chosen by the experts. Meanwhile, in DSC term, there is only 1 term used, that is "nutrition optimizing". Related to the component content, several experts suggested modification for the conformity and combination of the component content of DSC and NIDCM. However, NIDCM model is more dominant and all of its components can be adopted. This matter is strengthen by the statement from the expert as follow:

"It shall be adopted and modified so that it can complete each other. It is difficult to involve the parents in the baby care in NICU. It is also difficult to assess the status of baby sleeping-waking up. It is difficult to assess the baby pain in each procedure or treatment. It is difficult to involve the family to interact with the baby, to evaluate the competence of the parents. In addition it is difficult to be adopted for the interdisciplinary care each week. The limitation of NICU human resources is the reason why optimal baby positioning cannot be carried out" (E4, E5, E6)

"*Description of both is similar. DSC seems more detailed, while NIDCM has main components of team cooperation and collaboration that are not met in DSC, hence they can complete each other. Another term can be made as the combination or the best version of the existing term so that it can be the developmental care alternative, thus both model can be combined.*" (E1, E2, E4, E5)

"*NIDCM is more applicative and can be carried out at NICU condition with limited human resources or NICU whose staffs have not been completely trained. NIDCM is more flexible and gives more spaces for the family. Therefore, NIDCM is more suitable to be applied holistically*" (E4, E5, E6)

Furthermore, experts were required to evaluate the conformity of the intervention with the competences that must be owned by NICU staff in providing preterm baby developmental care. The conformity refers to whether the intervention provided is suitable to be applied by the healthcare staff in the NICU room based on the facilities, condition, and situation of Indonesia. There were 149 intervention in the developmental care, consisting of 18 interventions for the sleeping period surveillance, 11 interventions for minimizing stress and pain component, 23 interventions for family cooperation, 30 interventions for recovery environment component, 20 intervention for positioning setting and treatment component, 17 interventions for nutrition optimizing component, 15 interventions for skin protection, and 15 interventions for team cooperation and collaboration. The intervention agreed by the experts are provided below:

Table 2. Experts' agreement related to the intervention in developmental care model suitable for Indonesia

Content		Sub-content
Intervention for sleeping period surveillance	1	Measurement of sleeping-waking up condition
	2	Protecting the sleeping cycle
	3	Maintaining the room calm
	4	Avoiding sleep interruption
	5	Flexible care schedule
	6	Method to waking the baby up
	7	Assisting the baby to sleep
	8	Closing the incubator
	9	Avoiding the use of sedative
	10	Position that support sound sleep
	11	Making sure that the sleep pattern is normal
	12	Guiding the parents in baby sleeping transition
Intervention to minimizing stress and pain	1	Training the parents to know the symptoms of stress and how to overcome it
	2	Using the pain measurement tools
	3	Evaluation of intervention causing stress and pain
	4	Non-pharmacological support
	5	Aids for positioning setting
	6	Directing the parents to minimizing stress and pain
	7	Inviting the parents to be involved in the procedure that may cause pain
	8	Training the parents to reduce stress and pain

Content		Sub-content
Intervention to cooperate with the family	1	Training the family to participate actively in baby care
	2	Family support
	3	Adhering to HIPPA and security in NICU
	4	Administering the needs for baby care
	5	Supporting the breastmilk release and breastfeeding
	6	Improving the parents' confidence in taking care for the baby
	7	Sharing information with NICU staff concerning the principles and method of family-based care
Intervention for recovery environment	1	Training the parents to realize recovery environment
	2	Providing neat and clean room
	3	Planning single family room
	4	Tactile - facilitating skin contact
	5	Setting the room humidity – if there is any ELBW case
	6	Change the baby position carefully
	7	Smelling – maintaining the room free from odour
	8	Feeding colostrum/ breastmilk
	9	Realizing positive breastfeeding experiences
	10	Hearing – maintaining the room to make it calm and quiet
	11	Being careful in making noise
	12	Setting the noise level at about 45 dB
	13	Avoiding alarm sound
	14	Visual – provides lighting at maximum of 60 fv
	15	Close the baby eye when expose to light
	16	Setting the baby view area
	17	Avoid visual stimulus
	18	Recovery environment – pay attention to all light, sound, movement, and aroma sources. Remove unnecessary stimulation sources.
	19	Provide guidance for parent about how to realize and maintain the recovery environment
	20	Suggesting environment renovation that provides facilities and infrastructures that support the family support
Intervention for positioning setting and treatment	1	Facilitating skin contact
	2	Guiding the parent of how to set the position and hold the baby
	3	Assisting the optimal baby positioning
	4	Making sure that the baby position is correct
	5	Providing stomach pad
	6	Using a mat while bathing/weighing
	7	Avoid prone position
	8	Providing individual needs
	9	Sensitive to baby behaviour
	10	Carrying out care with the baby
	11	Changing the position of the baby in every four hours
	12	Bring the hand closer to the mouth of the baby
	13	When giving intervention, bring all tools closer
	14	Involving the parents during intervention
	15	Position self as the baby partner
Intervention for nutrition optimizing	1	Guiding the parents when giving oral stimulation
	2	Encouraging oral stimulation/ positive smelling
	3	Reducing negative perioral stimulation
	4	Considering the use of catheter
	5	Providing positive eating experience

Content		Sub-content
	6	Teaching the parents of the importance of breastfeeding
	7	Supporting the breastmilk release and breastfeeding
	8	Giving direct oral breastfeeding to mothers' breast
	9	Supporting the breastfeeding abilities before the baby go home
	10	Guiding the parents to give positive breastfeeding experience
Intervention for skin protection	1	Checking the position of nasal prong-if there is any
	2	Reduce the adhesive sticking the baby skin and being careful when removing it
	3	Avoid the use of soap and emollient
	4	Bathing the baby on bed or bathtub using warm water
	5	Bathing the baby once in every 72 – 96 hours
	6	Guiding the patents of how to protect the baby skin
Intervention for team cooperation and collaboration	1	Discussing the intervention period with the team
	2	Respect and support each other's role
	3	Making sure that all baby and families are treated well
	4	Teaching the staff to improve the developmental care
	5	Teaching the staff about the listening and communication abilities

Table 2 above shows that among 149 intervention in the developmental care, there are only 83 interventions most suitable for NICU room condition in Indonesia. It consists of 12 interventions for the sleeping period surveillance, 8 intervention for minimizing stress and pain component, 7 interventions for family cooperation component, 20 for recovery environment component, 15 interventions for positioning setting and treatment component, 15 interventions for nutrition optimizing component, 6 intervention for skin protection, and 5 interventions for team cooperation and collaboration.

There are 66 interventions that are not suitable with the details of the seven similar interventions yet there are in different components. In addition, 59 interventions need to be reviewed because they are not supported by the facilities as well as NICU human resources and situation. This is supported by the statement from the experts as follow:

> *"The existing intervention are very complete but not all can be adopted and applied more due to the current NICU condition that has not met the standard and number of human resources, human resources' abilities, or facilities to support the care. I am disagree if the parents are involved as full participant in NICU because seeing the current NICU condition, it is impossible. Parents should not be given full access to medical record because the document is confidential."* (E4, E5, E6)

> "*The content of the components and the intervention must be made more briefly. Several interventions need to be reviewed and place in accordance with the components"* (E2, E6)

DISCUSSION

Components and its contents in preterm baby developmental care suitable for condition in Indonesia.

Developmental care is a method that aims to adjust the NICU room environment so that it can reduce the preterm babies' stress, improve their physiological stabilities, maintain their sleeping rhythm, and improve the baby's nerve growth and maturity (Altimier & Phillips, 2016; Sizun & Westrup, 2004). The developmental care methods

applied in this research are DSC and NIDCM in order to reach approval related to component and its contents in accordance with the care need in Indonesia.

This research found 8 components in accordance with Indonesia condition, and most of them are from NIDCM method. Conceptually, NIDCM has seven main neuroprotective treatments and illustrated as overlapping lotus petals consisting of 1) recovery environment, 2) family cooperation, 3) position & treatment, 4) maintaining sleep, 5) minimizing stress and pain, 6) skin protection, 7) optimizing the nutrition and one additional component, that is team cooperation and collaboration (Altimier, 2011; Altimier, 2015; Altimier & Phillips, 2016, 2013). This result is related to the results of the research carried out by Efendi & Rustina (2013) that *Basic Developmental Care* and *Complete Developmental Care* can be applied in NICU but does not affect the results of preterm baby development in long term.

The content of the component in developmental care is suggested to be modified aby combined between DSC and NIDCM because they complete each other. The main component of DSC model contains attribute and criteria, while the main component of NIDCM model contains standard, characteristics, and objectives. In addition, it was also found that the demand of involving the parents in baby care is difficult to reach, while the concept of developmental care emphasizes the training and participation of parents or family to support the social, emotional, and physical health of the baby, and are significant factor in the process of developmental care focusing on family (Rafiey, Soleimani, Torkzahrani, Salavati, & Nasiri, 2016; Symington & Pinelli, 2006).

Intervention in preterm baby developmental conditions suitable for the condition in Indonesia.

Optimal preterm baby growth and development in developmental care includes intervention that manage the NICU environment so that it can resemble the intrauterine environment and give integrated individual intervention with the healthcare staff and preterm baby family (Kim & Shin, 2014). Intervention of development care is proven effective to remove stress as well as to improve the sleep quality and nerve developmental results (Lavallée et al., 2019).

This research result shows that most of the intervention in NIDCM model can be adopted in Indonesia. However, 44% of the developmental care intervention assessed are not suitable yet due to facilities, infrastructures, and human resources. In order to give qualified developmental care for preterm baby, NICU system and personal characteristics of the service provider must be considered well. This is in line with the result of other research projects that work condition, financial support, manpower support, staff changing, and patient case burden in NICU are different, depending on the healthcare service system and the socio-cultural aspect of each country, and these matters become the obstacles of developmental care (Graven & Browne, 2008; Lavallée et al., 2019).

Developmental care that is not supported by the institution administration can increase the working intensity of the NICU medical staff, hence negatively affects the work environment (Altimier, 2015). Therefore, the most appropriate and suitable developmental care is needed in accordance with each healthcare services. When an intervention is carried out on baby who has risk of developmental disruption, then the intervention should have preventive focus and strategy to minimize the developmental complication. Various proofs have been found and show that developmental care intervention has appropriate effect on the developmental results, both in short and long-term (Syamsu, 2021; Syamsu, Febriani, Alasiry, Erika, & Rustina, 2020; Vanderveen, Bassler, Robertson, & Kirpalani, 2009).

CONCLUSION AND RECOMMENDATIONS

Developmental care model of NIDCM is more application and can be carried out in NICU condition with limited human resources or NICU with staff who have not been completely trained compared to DSC. These two interventions complete each other so that it needs to be made more briefly. In addition, another term is needed as the combination of both so that it can be developmental care alternative.

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