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Original Article

The Effect of Seven Developmental Care Models on Mothers' Stress and Premature Infants' Length of Hospitalization

Andi Fatmawati Syamsu[1]*, Fajrillah Kolomboy[2], Rizkaningsih[3]

[1] Department of Nursing, Poltekkes Kemenkes Palu, Palu, Indonesia

(Correspondence author's e-mail, fatmaandif@gmail.com / +62 811-4505-216)

ABSTRACT

The Neonatal Integrative Developmental Care Model (NIDCM) is a holistic model of premature infant care that refers to the seven neuroprotective developmental care cores involving the family. This study aimed to assess the effect of the application of NIDCM on mothers' stress response and length of stay in the neonatal care unit. This study used quasi-experimental with nonequivalent control group pre and posttest design. This study was carried out in the neonatal care unit at RSUP Dr. Wahidin Sudirohusodo Makassar from January 2020 to April 2021. The samples were 76 subjects consisting of 38 premature infants (19 controls, 19 interventions) and 38 mothers (19 controls, 19 interventions) ethical clearance by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Hasanuddin No. 938/UN4.6.4.5.51/PP36/2009. The results show 1) NIDCM is proven to be able to reduce maternal stress more compared to routine Developmental Care (DC); 2) NIDCM is proven to shorten the length of stay compared to routine DC in infants with a gestational age of ≥33 weeks with BW ≥1800 grams (Median : 1900 grams), while in infants with a gestational age of <33 weeks and BW <1800 grams (Median : 1650 grams), NIDCM and routine DC are not proven to shorten the length of stay. It can be concluded that applying NIDCM reduces the stressors felt by mothers while their infants are in the neonatal room. In addition, the condition of infants with birth weights less than 1800 grams needs special attention with NIDCM intervention.

Keywords: NIDCM, Routine DC, Maternal Stress, Length of Stay.

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INTRODUCTION

A child begins to grow and develop from the beginning of conception and continues until birth to the next stage of life. Naturally, after an infant is born, adjustments to the environment outside the uterus take place within the first 24 hours of birth. However, these adjustments are more difficult to make if the infant is born with diseases, congenital abnormalities and infections—and there are complications during delivery, or if the infant is born prematurely and is a low birth weight. This condition occurs in all infants born at high risk, such as premature infants and low birth weight infants [1].

Statistical data show that Indonesia is ranked fifth as the country with the most cases of premature birth. Indonesia's population is around 225 million people, with premature birth rates reaching 675,700 cases per year from around 4.5 million live births per year [2].

In South Sulawesi, the percentage of infants with Low Birth Weight (LBW) in 2010

was 1.73% of live births, then in 2011, it increased to 2.35%. In 2012, it increased again to 3.12%, but in 2013 it decreased to 2.94%. In 2014, it increased to 3.02%, and in 2015 it increased again to 8.13% of live births. In the neonatal care unit at RSUP Dr. Wahidin Sudirohusodo Makassar in 2017, there were 229 premature infants with a mortality rate of 21.8%. Whereas in 2018, there were 195 infants with LBW with a mortality rate of 13.3% [3].

The infant care environment, especially in the NICU, not only causes stress for infants but also causes stress and anxiety for parents. Parent-infant bonding is difficult to occur when the infant is in the NICU. Mothers who have experienced premature births and their infants are treated in the NICU will experience stress. This will eventually affect the growth and development of their infants [4].

The involvement of family in caring for infants in the neonatal care unit is inseparable from the involvement of nurses. Nurses can provide education/guidance to families in any interventions performed on infants. A study by Arshadi, et al. (2017) states that the birth of premature infants treated in the NICU is a stressor phenomenon for parents and family support can help reduce the stress felt. Providing education to families, especially parents, can increase parents' confidence in caring for infants after being discharged from the hospital returning home [5].

RSUP Dr. Wahidin Sudirohusodo Makassar is one of the Referral Center Hospitals in Indonesia[3]. From the initial data collection through interviews with the head of the unit, it was revealed that nurses in the neonatal care unit had implemented developmental care since 2010. Education was carried out for parents while their infants were being cared for, such as kangaroo care and breastfeeding methods. However, the involvement of family (parents) while the infant was being cared for is still lacking as the majority of parents don't take care for their infants for 24 hours. There is no common perception between nurses in providing education to parents and no common understanding regarding family involvement in caring for infants, or regarding family centered care (FCC).

One strategy that can be developed is developmental care, namely care that can facilitate the development of infants through adequate environmental management which will increase physiological stability and reduce infant stress [6].

Developmental care includes adjusting the care and capabilities of the infant which involves the family. The aim is to improve the developmental potential of infants through the management of an intensive neonatal care environment. Developmental care is applied by looking at the infant's behavioral response, increasing physiological stability, improving sleep patterns, increasing the growth and development of the infant and reducing environmental and harmful stimuli in the infant [7].

Studies on developmental care have been carried out in Indonesia, but it is limited to each part of the seven developmental care cores so that it has not been integrated into one whole concept. Thus this is thought to be novelty from this study by looking at the application of premature infant developmental care integrated with the family in the concept of the Neonatal Integrative Developmental Care Model (NIDCM).

Based on the background explained, researchers wanted to know the effect of implementing the Neonatal Integrative Developmental Care Model (NIDCM) which is related to the seven neuroprotective developmental care cores by involving the family on mothers' stress response and (premature infants') length of stay in the neonatal care unit. This study aims to assess the effect of NIDCM implementation on maternal stress response and length of stay in the Neonatal Care Unit.

METHOD

This study used quasi-experimental with nonequivalent control group pre and post test design. The only difference was in the sample allocation for the Neonatal Integrative Developmental Care Model (NIDCM) and routine Developmental Care (DC) groups. This study was carried out in the neonatal care unit: level IIA, IIB and III RSUP at RSUP Dr. Wahidin Sudirohusodo Makassar

This study was carried out from January 2020 to April 2021. The sample selection in this study used a consecutive sampling technique with a total sample of 76 subjects consisting of 38 infants (19 controls, 19 interventions) and 38 mothers (19 controls, 19 interventions). The

instrument used in this study was a maternal stress questionnaire using the Parental Stressor Scale Neonatal Intensive Care Unit (PSS: NICU). Data analysis was carried out using the Independent t-test. This study has received ethical clearance by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Hasanuddin No. 938/UN4.6.4.5.51/PP36/2009.

RESULTS

The neonatal integrative developmental care model refers to seven basic neuroprotective developmental care involving the family including: 1). environmental healing, 2). working with family, 3). set position and handling, 4). keep sleep, 5). minimize stress and pain, 6). protect the skin and 7). optimize nutrition. However, of the 7 (seven) basic developmental care, the interventions that can be carried out optimally are 5 (five). The 2 (two) basic care for neuroprotective development that have not been maximally implemented are: 1). environmental healing which includes noise and 2). working with family.

Table 1. Characteristics of Research Subjects.

Mother	Head of table column		
	Control (n=19)	**Intervention (n=19)**	***p-value***
Age, median (min-max)	32 (15-39)	27 (18-40)	0.518
Parity			
Primipara	10 (52.6%)	6 (31.6%)	0.333
Multipara	9 (47.4%)	13 (68.4%)	
Education			
Low	10 (52.6%)	1 (5.3%)	
Intermediate	2 (10.5%)	10 (52.6%)	0.148
High	7 (36.8%)	8 (42.1%)	
Experience of having			
a premature infant			
Yes	1 (5.3%)	2 (10.5%)	
No	18 (94.7%)	17 (89.5%)	0.560
Type of delivery			
SC/using	10 (52.6%)	13 (68.4%)	
tool	9 (47.4%)	6 (31.6%)	0.333
Normal vaginal	32 (15-39)	27 (18-40)	
Infant			
Gender			
Male	12 (63.2%)	9 (47.5%)	0.524
Female	7 (36.8%)	10 (52.6%)	
Gestational Age			
Median (min-max)	34 (27-36)	33 (38-36)	0.837
Birth Weight			
Median (Min-max)	1650 (1100-2450)	1900 (1190-2490)	0.936

Table 1. presents the characteristics of the research subjects including the characteristics of the mother and the characteristics of the infant. The characteristics of the mother consisted of mother's age, parity, education, experience of having a premature infant and type of delivery. Whereas the characteristics of the infant consist of gender, gestational age and birth weight. The results of the homogeneity test showed that the variance of the data was the same or homogeneous between the neonatal integrative developmental care model and routine developmental care groups.

Table 2. The Effect of Neonatal Integrative Developmental Care Model intervention (Mothers' Stress Response before and after the intervention)

Group	**Mothers' Stress Response (Mean ± SD)**		**Delta**	**p-value**
	Pre	Post		
NIDCM	2.97±0.37	2.61±0.23	0.36	<0.001
Routine	2.82±0.68	2.74±0.55	0.08	0.268[a]

DC			
p-value	0.296[b]	0.347[b]	0.005

Based on the data in Table 2, it can be seen that in the NIDCM group there is a decrease in the mothers' Stress Response by 0.36 (p <0.05) meaning that there is a significant difference before and after the NIDCM intervention. Whereas in the routine DC group, there is a decrease in the mothers' stress response by 0.08 (p>0.05) meaning that there is no significant difference before and after routine DC. The delta value shows that there is a significant difference in the mothers' stress response before and after the intervention.

Figure 1. Error Bar diagram of changes in maternal stress in the neonatal care unit between the NIDCM and routine DC Intervention and control group.

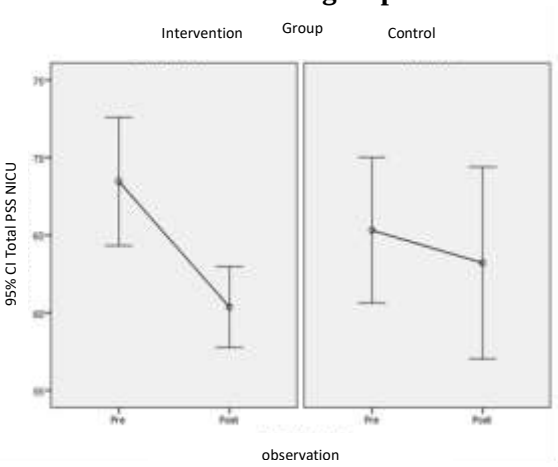


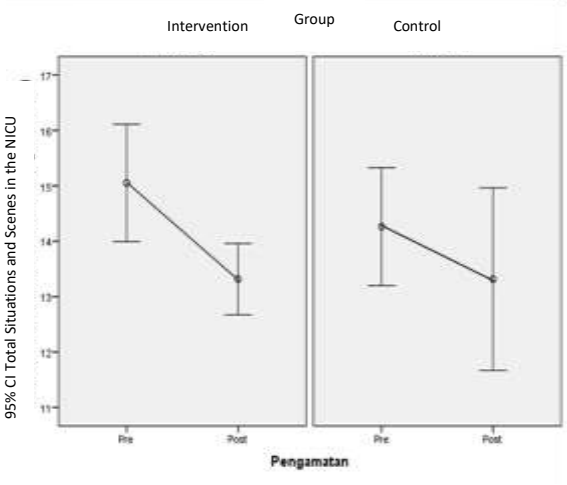
Figure 1 shows that there is a greater decrease in maternal stress in the NIDCM group compared to the routine DC group.

Table 3. Mothers' Stress Response for specific situations and scenes in the neonatal care unit before and after the intervention.

Group	Situation and view (Mean ± SD)		Delta	p-value
	Pre	Post		
NIDCM	3.01±0.43	2.66±0.26	0.35	0.006
Routine DC	2.85±0.44	2.66±0.68	0.19	0.193
p-value	0.277	0.931	0.163	

Based on the data in Table 3, it can be seen that in the NIDCM group there is a decrease in the mothers' stress response for specific situations and scenes by 0.35 (p <0.05), meaning that there is a significant difference before and after the NIDCM intervention. Whereas, in the routine DC group, there is a decrease by 0.19 (p>0.05), meaning that there is no significant difference in the mothers' stress response for specific situations and scenes before and after routine DC.

Figure 2. Error Bar diagram of changes in maternal stress for specific situations and scenes in the neonatal care unit between the NIDCM and routine DC groups.



The observation rs' stress response is the situations and scenes in the neonatal care unit. Figure 2 shows that there is a greater decrease in stress in the NIDCM group compared to the routine DC group. There are 5 (five) statement items from the mothers' stress response for specific situations and scenes, namely 1) presence of monitors and their equipment; 2) appearance of a sudden sound from the monitor alarm; 3) presence of other premature infants; 4) number of health workers; 5) presence of a breathing machine.

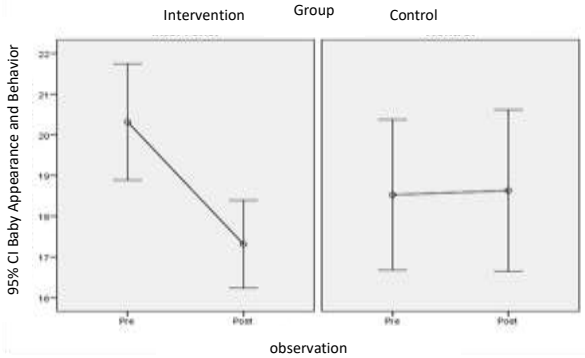
Table 4. Mothers' stress response specifically to the appearance and behavior of the infant in the neonatal care unit before and after the intervention.

Group	Appearance and behavior of the infant (Mean ± SD)		Delta	p-value
	Pre	Post		
NIDCM	3.38±0.49	2.87±0.36	0.51	0.001
Routine DC	3.09±0.64	3.10±0.68	0.01	0.752
p-value	0.138	0.223	<0.001	

Based on the data in Table 4, it can be seen that in the NIDCM group there is a decrease in the mothers' stress response by 0.51 (p <0.05) meaning that there are significant differences specifically to the appearance and behavior of the infant before and after the

NIDCM intervention. Whereas in the routine DC group there is a decrease in the mothers' stress response by 0.01 (p>0.05) meaning that there is no significant difference specifically to the appearance and behavior of the infant before and after routine DC. The delta value indicates that there is a significant difference in the mothers' stress response specifically for the appearance and behavior of the infant before and after the intervention.

Figure 3. Error Bar diagram of changes in maternal stress specifically to the appearance and behavior of the infant between the NIDCM and routine DC groups



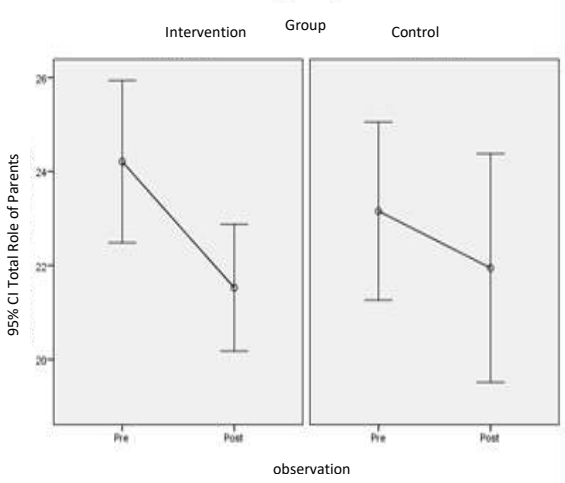
The second subscale of the mothers' stress response is the appearance and behavior of the infant in the neonatal care unit. Figure 3 Shows that there is a greater decrease in stress in the NIDCM group compared to the routine DC group. There are 6 (six) statement items from the mothers' stress response specifically to the appearance and behavior of the infant, namely 1) unusual skin color changes in the infant; 2) very small size of the infant; 3) wrinkled skin of the infant; 4) attached hose and needle; 5) helpless look of the infant; 6) suddenly pale and blue skin of the infant.

Table 5. Mothers' stress response specifically to the role of parents in the neonatal care unit before and after the intervention.

Group	The role of parents (Mean ± SD)		Delta	p-value
	Pre	Post		
NIDCM	3.03±0.43	2.71±0.35	0.51	0.002
Routine DC	2.91±0.48	2.74±0.62	0.01	0.103
p-value	0.405b	0.799b	0.181	

Based on the data in Table 5, it can be seen that in the NIDCM group there is a decrease in the mothers' stress response by 0.33 (p <0.05) meaning that there is a significant difference specifically to the role of parents before and after the NIDCM intervention. Whereas in the routine DC group, there is a decrease in the mothers' stress response by 0.16 (p>0.05) meaning that there is no significant difference specifically to the role of parents before and after routine DC.

Figure 4. Error bar diagram of changes in maternal stress specifically to the role of parents in the neonatal care unit between the NIDCM and routine DC groups.



The third subscale of mothers' stress response is the role of parents in the neonatal care unit. Figure 4 shows that there is a greater decrease in stress in the NIDCM group compared to the routine DC group. There are 8 (eight) statement items from the mothers' stress response specifically to the role of parents, namely: 1) sad to part with the infant; 2) unable to hug and hold the infant; 3) feeling unable to protect the infant; 4) do not have time with the infant; 5) sometimes forget to see the infant; 6) the infant cannot be with other family members; 7) afraid to touch the infant; 8) health workers are closer to their infants.

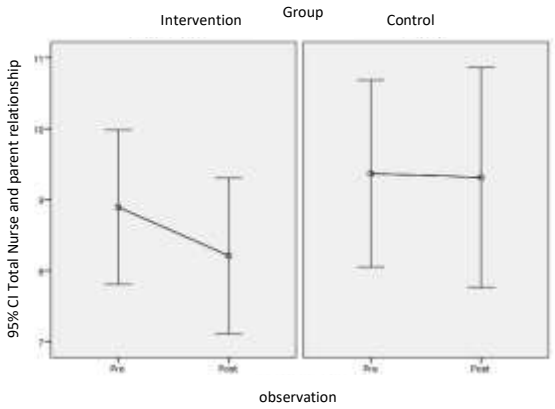
Table 6. Mothers' stress response, specifically the communication relationship between nurses and parents in the neonatal care unit before and after the intervention.

Group	Communication relationship between nurses and parents (Mean ± SD)		Delta	p-value
	Pre	Post		
NIDCM	2.25±0.55	2.07±0.55	0.51	0.121
Routine DC	2.35±0.69	2.34±0.81	0.01	0.939
p-value	0.506	0.242b	0.297	

Based on the data in Table 6, it can be seen that in the NIDCM group there is a

decrease in the mothers' stress response by 0.36 (p>0.05) and in the routine DC group, there is a decrease in the mothers' stress response by 0.07 (p>0.05) meaning that there is no significant difference before and after the intervention.

Figure 5. Error bar diagram of changes in maternal stress specifically to the communication relationship between nurses and parents in the neonatal care unit between the NIDCM and routine DC groups.



The fourth subscale on the mothers' stress response is the communication relationship between nurses and parents. Figure 5 Shows that the NIDCM and routine DC groups experience a greater decrease in maternal stress in the neonatal care unit. There are 4 (four) statement items from the mothers' stress response specifically to the communication relationship between nurses and parents, namely: 1) do not understand what the nurse conveys; 2) the nurse does not provide information when examining the infant; 3) (information) delivery of nurses varies; 4) not sure about the changes conveyed by the nurse.

Table 7. Differences in length of stay between the NIDCM and the routine DC groups.

Group	Mean (SD)	Median	95% CI	Min/ max	p-value
NIDCM	14,74 (4,74)	13.00	12.45-17.02	9/24	0.117
Routine DC	17.21 (8.24)	16.00	014.20-20.22	7/29	

Based on data in Table 7 the median length of stay in the NIDCM group is 13 days and the median length of stay in the routine DC group is 16 days. This means that the NIDCM group has a shorter length of stay compared to the routine DC group, but there is no significant difference (p>0.05).

Figure 6. Diagram Box plot length of stay of premature infants.

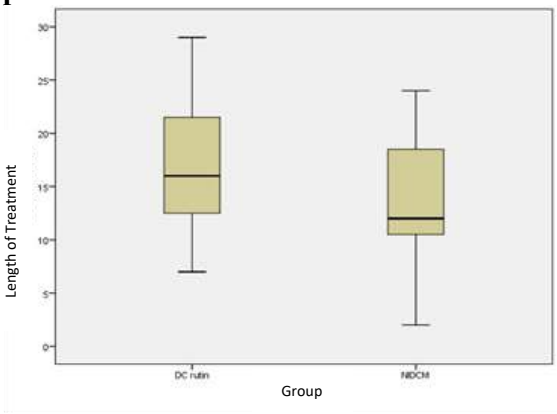


Figure 6 shows the representative length of stay of premature infants in the routine DC and NIDCM groups. In the routine DC group, the variance of the length of stay is longer compared to the NIDCM group.

Table 8. Differences in length of stay categories between the NIDCM and routine DC groups.

	2-13 days		14-29 days	
Group	n (%)	Median min-max	n (%)	Median Min-max
NIDCM	11(28.9)	11.0(2-13)	8(21.1)	20.0(14-24)
Routine DC	6 (15.8)	11.0 (7-13)	13(34.2)	20.0(14-29)
Total	17(44.7)	12.0(2-13)	21(55.3)	16.0(14-29)

Table 8 shows the results of a slightly longer length of stay in the routine DC group after the intervention and slightly shorter in the NIDCM group after the intervention.

Figure 7. Error bar diagram of length of stay in the neonatal care unit for premature infants.

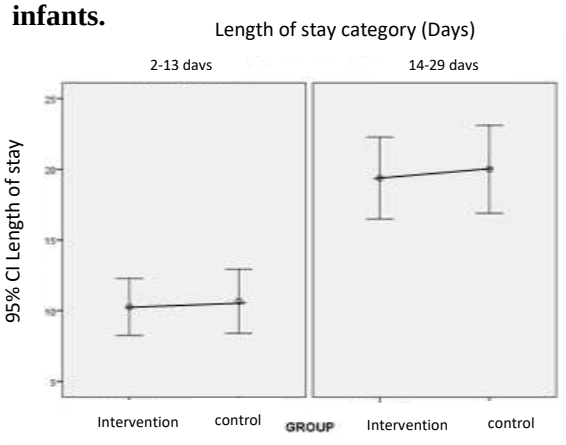


Figure 7 shows that in the NIDCM group, the length of stay (hospitalization days) is relatively short (7-<14 days) and in the routine DC group, the length of stay is long (14-

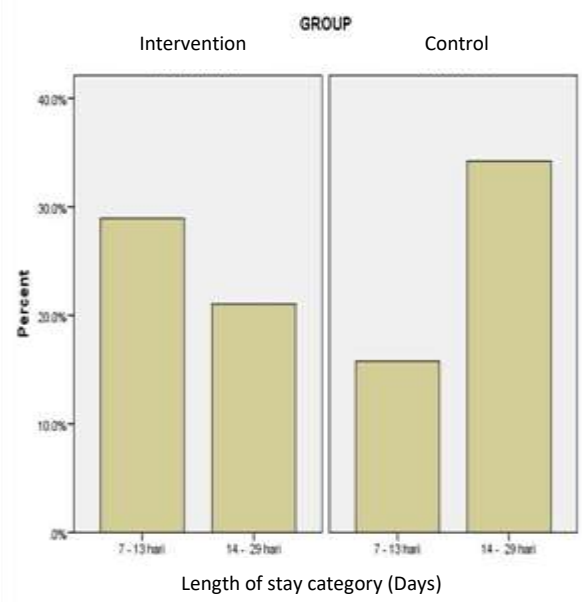
29 days). If categorical analysis is used with Chi-square and OR is calculated, the results can be seen in Table 8.

Table 9. Comparison of the incidence of length of stay in the NIDCM and routine DC groups.

Group	Short (7-13 days) n (%)	Long (14-29 days) n (%)	RR 95% CI	p-value
NIDCM	11 (57.9%)	8(42.1%)	1.83 (0.853-3.940)	0.192
Routine DC	6 (31.6%)	13(68.4%)		
Total	17(44.7%)	21(55.3%)		

Table 9 shows that the NIDCM group tends to have a shorter length of stay (hospitalization days), while the routine DC group tends to have a longer length of stay. The differences between groups are not significant, however, the NIDCM group has a 1.83 greater probability of experiencing a shorter length of stay compared to the routine DC group

Figure 8. Bar diagram of the difference in the percentage of length of stay of premature infants between the NIDCM and routine DC groups.



The bar diagram shows that there is a shorter length of stay in the NIDCM group, while the longer length of stay is more in the routine DC group.

Table 10. Comparison of NIDCM with the category of length of stay in the neonatal room after stratification based on the combined category of gestational age and birth weight of premature babies

UG + BBI	Category	Short	Slow	RR (95% IK)	p-value
(<33 weeks <1800) Routine DC	NIDCM	(20%)	4 (80%)	1,00 (0,084-11,931)	0.060
	DC routine	(20%)	4 (80%)		
(≥33 week BB ≥ 1800)	NIDCM	10 71,4%)	4 (28,6%)	2,00 (0,920-4350)	0.041
	DC routine	5 35,7%)	9 (64,3%)		

Table 10 it can be seen that the ratio of the incidence of short hospital stay between the NIDCM group and the routine DC group is 1:1 with RR = 1.0 if NIDCM is given to babies who have BBL <1800 and gestational age <33 weeks. If the babies were born with low birth weight and gestational age as above (gestational age ≥33 weeks and/or birth weight ≥1800 grams), then NIDCM gave twice the possibility of short length of stay (7-13 days) when compared with the routine DC group.

DISCUSSION

Effect of neonatal integrative developmental care model intervention on maternal stress response in the neonatal ward.

This study involved the mothers' stress response variable which is defined as the physical and emotional conditions experienced by the mothers due to the physical and psychological environment of the neonatal care unit and the condition of premature infants. In this case, the Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) instrument was used to measure the mothers' stress levels. This instrument consists of 23 statements with 4 answer choices, namely 1. Not Felt Very Much; 2. Not Felt; 3. Felt and 4. Strongly Felt.

The results of this study are supported by a previous study by Agrawal and Gaur (2016) that the most dominant aspect of causing stress to parents is their changing roles and their relationship with infants treated in the NICU. Therefore, to reduce the level of stress on parents, aspects of the role of parents, especially mothers, as well as regular family visits (must be increased). With this, the relationship

between parents and infants becomes more optimal, so that it can support the infant's further development.

Another aspect that can cause stress for parents is the appearance and behavior of the infant. These findings are in line with the results of a study by Dudek-Shriber (2004), that the appearance and behavior of the infant are one of the biggest factors causing stress to parents. This is because infants born prematurely show unstable physiology, so these infants have a different appearance and have less response when interacting than normal infants. Apart from these aspects of appearance and response, premature infants also need medical equipment and a long treatment period compared to infants born normally, to support their growth and development [8].

Besides, there is also the aspect of the situations and scenes in the neonatal care unit which can increase stress on parents, although not as big as the previous two aspects. The findings of this aspect are in line with the findings of a previous study by Franck et al., (2005) that the NICU room environment helps keep infants alive even though they have to be assisted by various sophisticated equipment, so parents must also adapt to the environment in the NICU room [9].

Furthermore, routine DC in the neonatal care unit cannot significantly reduce the mothers' stress levels due to the lack of family involvement during infant care. Therefore, this is believed to be a major cause of stress for parents because parents cannot carry out their roles as fathers and mothers during infant care in the neonatal care unit. This lack of involvement in their role causes parents to feel inadequate because they cannot protect and care for their infants [10]. This mainly occurs in mothers who cannot breastfeed, change diapers, bathe, hug, kiss, hold and caress their infants [11].

Significantly, the NIDCM intervention involving family roles can reduce the mothers' stress levels, although this takes time because parents are still under pressure [4]. Parental involvement in infant care has indeed been proven to reduce the mothers' stress levels, especially with support from other aspects, such as staff providing clear and precise information, forming parent groups, providing educational materials about norms and daily infant care and parental participation in performing infant care procedures [12].

Santos et al., (2017) in a previous study show similar results, that the involvement of mothers assisted by health workers in caring for infants in the neonatal care unit can reduce their stress because in this case, they can finally achieve their desire to play an active role as a mother who is judged to be more competent in caring for their infant. However, in this case, health workers also have a role, namely by guiding and supervising mothers in carrying out their role to care for their infants with confidence [13].

Of the several factors causing stress in parents, the role of parents is the biggest stressor because when parents are separated from their infants, they feel helpless and unable to protect their infants from pain and painful treatment procedures. This is in line with a study by Wormald et al., (2015) that the most significant aspect of causing stress to mothers is the moment when they are separated from their premature infants and their inability to love and protect their infant from pain and painful treatment procedures[14].

The Effect of Neonatal Integrative Developmental Care Model on the length of stay of premature infants in the neonatal care unit.

In this study, the length of stay of premature infants refers to the number of days premature infants are hospitalized during a treatment period. The length of stay for the infant is calculated by looking at the difference between the date of discharge (discharge from the hospital) and the date of admission to the hospital. This measurement method has been carried out by Maier et al., (2018) to measure the duration of care for premature infants who stay in the hospital, where the measurement is carried out by calculating the date of birth until the final date of discharge [15].

Based on this study, it is found that the control group who received routine DC intervention was treated for a longer period than the group who received NIDCM intervention, namely 16 days while the NIDCM group was treated for 13 days. In addition, there were more infants who had short periods of stay in the group who received NIDCM intervention compared to the routine DC group. This means that the NIDCM group has a shorter length of stay (hospitalization days) compared to the routine DC group so it can be concluded that the NIDCM intervention can reduce the need to

care for infants in the neonatal care unit. If it is related to conservation theory, the NIDCM intervention is meant as part of social integrity conservation because of family involvement in the care of premature infants which results in reduced days spent in hospital for infants [16].

However, the differences that occurred are considered not significant. This is because the involvement of the family, especially the mothers, has not been maximized during the implementation of developmental care interventions due to restrictions on contact between infants and families due to the COVID-19 pandemic. As a result of this pandemic, family involvement in the intervention has decreased because interactions between mothers and infants cannot be carried out on an ongoing basis so the application of family-centered care has not been maximized. In addition, routine DC care in the neonatal care unit has been implemented and includes a subset of NIDCM intervention.

Furthermore, Numerato et al., (2017) show that the length of stay for premature and low birth weight infants in Europe differed from one area to another, where the shortest average length of stay for infants in the NICU occurred in the Netherlands for 11.5 days, in Hungary for 13.1 days and in Italy for 13.4 days. However, very premature infants born at 23-24 weeks of gestation have a long day of stay in the NICU ranging from 105.2 to 106 days [15]. This is in line with AlJohani, Qaraqei and Al-Matary (2020) who show that infants born at 23 and 24 weeks of gestation have an average hospitalization day of 122 and 119 days, respectively, slightly longer than infants born after 34-36 weeks of gestation [17].

Some literature has suggested that the mother's gestational age and infant medical conditions such as bronchopulmonary dysplasia and persistent apnoea are factors affecting the length of stay of premature infants in the NICU[18]. In this regard, it is stated that the younger the mother's gestational age, the longer the care for premature infants born, where premature infants born at less than 32 weeks of gestation have a length of hospitalization days of around 46.2 [19]. while premature infants born at 23-24 weeks of gestation receive longer care in the NICU, which is more than 100 days [20].

The results show that infants who were born with a gestational age of less than 33 weeks and a BW of less than 1800 grams receive longer care compared to infants with a gestational age of more than 33 weeks and a BW of more than 1800 grams. Therefore, premature infants in the NIDCM intervention group received shorter care than infants in the routine DC group.

The researchers argue that there is a close relationship between the length of care Kramer, M. S. (1987) Determinants of low birth weight: methodological assessment and meta-analysis. For the infant and the care they underwent while in the neonatal care unit, gestational age, and the infant's birth weight. Therefore, family involvement, especially parents, needs to be maximized in the care of premature infants because parents really understand the needs of infants and are more intense in providing individual care to infants, so that this can indirectly affect reducing the length of infant care in hospitals, especially in the neonatal care unit [2].

CONCLUSIONS

The neonatal integrative developmental care model (NIDCM) intervention has been shown to be able to reduce maternal stress more compared to the routine developmental care (DC) intervention. The neonatal integrative developmental care model (NIDCM) intervention has also been shown to shorten the length of stay compared to the routine DC intervention in infants with a gestational age of ≥33 weeks with BW ≥1800 grams, while in infants with a gestational age of <33 weeks and BW <1800 grams, the NIDCM and routine DC interventions are not proven to shorten length of stay. It is recommended to carry out further research by observing the neonatal care unit nurses in carrying out the seven neuroprotective developmental care cores by involving the family.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Durham R, Chapman L. Maternal-newborn nursing: The critical components of nursing care. FA Davis; 2013 Oct 15.
2. Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. Bulletin of the World Health Organization.1987;65(5):663-

737. http://www.ncbi.nlm.nih.gov/pubmed/3322602
3. RSUP Dr. Wahidin Sudirohusodo Makassar. Medical Record of RSUP Dr. Wahidin Sudirohusodo Makassar, 2019.
4. Agrawal R, Gaur A. Parent stress in neonatal intensive care unit: an unattended aspect in medical care. International Journal of Contemporary Pediatrics. 2016 Dec 21;4(1):148-53.
5. Arshadi BM., Namdar AH., Balila, M., Asghari, M., Ravanbakhsh K. Effect of family-centered intervention in neonatal intensive care unit on anxiety of parents. International Journal of Pediatrics. 2017; 5(6): 5101–11.
6. Erman E., Wroblewski S. Developmental Care In The Neonatal Intensive Care Unit. International Journal of Medical and Biological Frontiers. 2017; 23(1).
7. Bingham RJ. Research on developmental care. Nursing for women's health. 2012 Feb 1;16(1):45-50. https://doi.org/10.1111/j.1751-486X.2012.01699.x
8. Dudek-Shriber L. Parent stress in the neonatal intensive care unit and the influence of parent and infant characteristics. The American journal of occupational therapy. 2004 Sep;58(5):509-20.
9. Franck LS, Cox S, Allen A, Winter I. Measuring neonatal intensive care unit-related parental stress. Journal of advanced nursing. 2005 Mar;49(6):608-15.
10. Baia I, Amorim M, Silva S, Kelly-Irving M, de Freitas C, Alves E. Parenting very preterm infants and stress in Neonatal Intensive Care Units. Early Human Development. 2016 Oct 1;101:3-9.
11. Fernandes JN, Guimarães AT, de Oliveira Toso BR, Machineski GG. < b> Avaliação do nível estresse de mães de pré-termo em hospital universitário/Evaluation of the stress level of preterm mothers in a university hospital< b. Ciência, Cuidado e Saúde. 2015;14(4):1471-9.
12. Kegler JJ, Neves ET, Silva AM, Jantsch LB, Bertoldo CD, Silva JH. Stress in parents of newborns in a neonatal intensive care unit. Escola Anna Nery. 2019 Jan 21;23.
13. Santos LF, Souza IA, Mutti CF, Santos ND, Oliveira LM. Forças que interferem na maternagem em unidade de terapia intensiva neonatal. Texto & Contexto-Enfermagem. 2017 Sep 21;26.
14. Wormald, F., Tapia, J. L., Torres, G., Canepa, P., González, M. A., Rodriguez, D., Escobar, M., Reyes, B., Capelli, C., & Menendez, L. Stress in parents of very low birth weight preterm infants hospitalized in neonatal intensive care units. A multicenter study. 2015.
15. Maier RF, Blondel B, Piedvache A, Misselwitz B, Petrou S, Van Reempts P, Franco F, Barros H, Gadzinowski J, Boerch K, van Heijst A. Duration and time trends in hospital stay for very preterm infants differ across European regions. Pediatric critical care medicine. 2018 Dec;19(12):1153.
16. Rachmaniah, D. Aplikasi model konservasi myra e levine dalam pengelolaan asuhan keperawatan pada anak dengan kekurangan cairan dan elektrolit di ruang infeksi RSUPN dr Cipto Mangunkusumo Jakarta Application of model conservation myra e levine in nursing management on children with deficit of fluid and electrolytes in RSUPN dr Cipto Mangunkusumo Jakarta. 2014.
17. Quintos JB, Boney CM. Transient adrenal insufficiency in the premature newborn. Current Opinion in Endocrinology, Diabetes and Obesity. 2010 Feb 1;17(1):8-12.
18. Eichenwald EC, Zupancic JA, Mao WY, Richardson DK, McCormick MC, Escobar GJ. Variation in diagnosis of apnea in moderately preterm infants predicts length of stay. Pediatrics. 2011 Jan;127(1):e53-8.
19. Perinatal Data Center. Special Care Nursery Admissions. 2011. Retrieved from www.npic.org
20. AlJohani E, Qaraqei M, Al-Matary A. Estimating the neonatal length of stay for preterm babies in a saudi tertiary

hospital. Journal of Clinical Neonatology. 2020 Jan 1;9(1):13.