Proceedings Series on Health & Medical Sciences, Volume 8
Proceedings of the 6th International Nursing and Health Sciences Universitas Muhammadiyah Purwokerto
ISSN: 2808-1021

The Development of Instant Nesting Bed for Low Birth Weight Infants

Tsalitsa Mungillya Pradina Nisa[1], Happy Dwi Aprilina[1], Atika Dhiah Anggraeni[1], Reni Purwo Aniarti[1]
[1]Faculty of Health Science, Universitas Muhammadiyah Purwokerto

ARTICLE INFO

Article history:

DOI:
10.30595/pshms.v8i.1983

Submitted:
July 29, 2025

Accepted:
Sept 22, 2025

Published:
Oct 23, 2025

Keywords:

Innovation; Low Birth Weight Infants; Nesting

ABSTRACT

Low Birth Weight (LBW) infants are those born weighing less than 2,500 grams, regardless of gestational age. LBW infants often experience hypothermia and sleep disturbances due to difficulty adapting. Nesting is a practice aimed at providing warmth and comfort. However, conventional nesting methods often result in reduced quality due to inefficiency, improper sizing, instability, and inability to fully envelop the infant's body. The development of Instant Nesting Bed aims to enhance the efficiency and quality of nesting practices by addressing common issues found in conventional nesting techniques. The study employed a Research and Development (RD) methodology, consist 5 steps, problem analyze, product development, expert validity, product revision and final product, product testing. The innovation process resulted in an efficient nesting design that is adjustable in size, fully encloses the infant's body, is structurally robust, and maintains its shape. The nesting device can be used both inside and outside incubators with additional warming features. It also includes fixation mechanisms to minimize uncoordinated infant movements. Validity testing by health experts, health academics, and perinatology nurses confirmed that the Instant Nesting Bed is feasible for use. Based on the testing results, the Instant Nesting Bed improves the efficiency and quality of nesting for LBW infants. However, the innovation has certain limitations, such as short-lasting warming features, testing restricted to infants without medical aids, and no evaluation of its overall impact on nursing care practices for nesting.

Corresponding Author:
Happy Dwi Aprilina
Faculty of Health Sciences, Universitas Muhammadiyah Purwokerto
Soepardjo Rustam Street KM. 7, Banyumas, Indonesia
Email: happydwiaprilina@ump.ac.id

1. INTRODUCTION

Low Birth Weight (LBW) infants are those born with a birth weight of ≤ 2500 grams regardless of gestational age (Azim et al., 2022). The global prevalence of LBW is 15% of total births (WHO, 2018), with 80% occurring in developing countries (Blencowe et al., 2019), including Indonesia, where it accounts for approximately 350,000 cases or 14% of total births (Kemenkes, 2021). LBW is responsible for 60–80% of infant mortality (Hadya, 2023), as these infants are more susceptible to illness and complications (Hamang & Nurhayati, 2022). LBW infants contribute significantly to neonatal morbidity and mortality (Prescott et al., 2024). These infants are vulnerable to hypothermia, infection, feeding difficulties, and developmental delays (Lawn et al., 2019; Khan et al., 2021). Commonly experienced impacts include hypothermia and sleep disturbances (Arfiana,

Sarjuningati, Idhayanti, & Saputra, 2024). Perinatology care units is essential to minimize these impacts on LBW infants.

The perinatology environment differs significantly from the intrauterine environment, requiring LBW infants to adapt to extrauterine life. One of the principles of developmental care is the nesting method, which supports the infant's adaptation process (Anggari, Kurniawan, & Lamak, 2022). Nesting aims to provide comfort, warmth, and maintain the flexed position similar to the intrauterine posture (Eliyanti & Hasta Noeraini, 2020). This intervention contributes to thermal stability (Damayanti, Deviana, & Primadani, 2024; Ginting et al., 2023; Suryani, Shifa, & Yuliza, 2023), improved sleep quality (Carneiro et al., 2024; Erawati & Ramandhani, 2021; Hayati et al., 2023; Vadakkan & Prabakaran, 2022), and supports weight gain (Gueye et al., 2023; Rabbani, 2022; Rohmah, Saputri, & Bahari, 2020). Recent neonatal care literature also highlights its role in reducing stress and enhancing neurodevelopmental outcomes (Ismail, Salaghor, Alshomrani, & Almodallal, 2024; Xing, Zhang, Cao, & Zhang, 2023) Furthermore, the use of nesting with added fixation mechanisms has been shown to enhance thermal stability and sleep quality (Noor, Hasanah, & Ginting, 2016; Tane, Rustina, & Waluyanti, 2019).

In addition to the prevalence and risks already described, improving the quality of care for LBW infants has significant global implications. The WHO has targeted a reduction in neonatal mortality as part of the *Sustainable Development Goals (SDGs) 2030*, and simple yet effective interventions such as nesting directly contribute to achieving this target (WHO, 2018). However, the implementation of nesting practices in clinical settings remains highly variable in terms of techniques, materials, and consistency, resulting in disparities in care quality across healthcare facilities. This challenge is even more pronounced in developing countries, including Indonesia, where limited resources and restricted access to advanced technologies such as incubators further complicate neonatal care.

Currently, nesting is still practiced using conventional methods, typically involving swaddling cloths arranged in a nest-like shape. This technique is considered complex and inefficient, often leading to frequent errors. According to Efendi et al. (2019), common errors in conventional nesting include loose arrangements that do not contact the infant's skin, nesting that is too small or too large for the infant's body, and structurally weak nests that lose shape easily and fail to support the infant's position. These shortcomings can negatively impact the overall quality of the nesting intervention. Thus, innovation is needed to improve safety and effectiveness.

In this context, the innovation of an instant nesting device becomes highly relevant. This device is designed to be more practical, standardized, and user-friendly, thereby improving infant safety and comfort while also enhancing nursing efficiency. Moreover, its development aligns with the principles of *developmental care*, which have become a global standard in neonatal practice, emphasizing the creation of supportive environments to optimize the growth and development of preterm and LBW infants.

This study aims to develop and evaluate an Instant Nesting Bed as an innovative device to improve the care of low birth weight infants. This research specifically sought to analyze the limitations of conventional nesting practices, design a more practical and standardized prototype, and assess its feasibility and usability through validation by experts and practitioners. Furthermore, the study aimed to revise the prototype based on feedback and conduct limited product trials to determine its potential effectiveness and applicability in neonatal care settings.

2. RESEARCH METHOD

This research employed a Research and Development (R&D) method, which aims to develop an innovation into a product that is beneficial to the community and scientifically validated (Waruwu, 2024). The research stages were adapted from the design developed by Borg and Gall into five phases: problem analysis, product development, expert validation, product revision and final product, and product trial. The study was conducted at Universitas Muhammadiyah Purwokerto and Prof. Dr. Margono Soekarjo Regional General Hospital, Purwokerto.

The sample consisted of two academic experts and two healthcare professionals for validation, and five perinatology nurses for product trial. Although the sample was relatively small, it provided initial feasibility insights for the innovation. Future studies with larger and more diverse samples are required to increase the generalizability of findings (Peterson and Foley 2021). The data obtained is divided into two types: qualitative data consists of critiques and suggestions related to the product and quantitative data refers to the results of the assessment questionnaire completed by the respondents.

The assessment instrument used in this study was a structured questionnaire developed based on a literature review and expert consultation regarding the dimensions of feasibility, usability, and safety of neonatal care devices. The questionnaire underwent content validation by three independent experts in maternal and pediatric nursing using the Content Validity Index (CVI) (Peterson & Foley, 2021). Items with an I-CVI score 1 were retained. Reliability testing of the questionnaire was conducted on a pilot group of five nurses not included in the main trial, and Cronbach's Alpha yielded a coefficient of 0.95, indicating good internal consistency (Tavakol & Dennick, 2011). The questionnaire data results were analyzed using the following percentage formula:

$$P = (F / N) \times 100\%$$

Explanation:
P = Percentage
F = Total score obtained
N = Maximum possible score

Based on the results of the percentage calculation, the outcomes can be categorized into the following five feasibility criteria:

Table 1. Feasibility Criteria

No	Score	Category
1	80% < p ≤ 100%	Highly Feasible
2	60% < p ≤ 80%	Feasible
3	40% < p ≤ 60%	Fairly Feasible
4	20% < p ≤ 40%	Less Feasible
5	0% < p ≤ 20%	Not Feasible

Source: Research Findings, 2024

The research took place from April to June 2024. Ethical approval was granted by the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto under registration number KEPK/UMP/124/IX/2024.

.

3. RESULT AND DISCUSSION

RESULT

3.1. Problem analysis

The first stage of the research and development method involves analyzing problems and collecting information through preliminary studies or literature reviews. In this stage, the researchers conducted preliminary interviews with perinatology nurses regarding the use of conventional nesting. The interviews revealed that arranging the nest using swaddling cloths is time-consuming and easily deformed due to infant movement. Consistent with the literature (Efendi et al., 2019), which highlights that conventional nesting methods, being structurally unstable, often result in suboptimal fit—either too loose or too tight, failing to maintain direct contact with the infant's skin, not fully enclosing the body, and ultimately being unable to provide adequate postural support.

3.2. Product development

The second stage involved product development based on the issues identified in the previous phase. The design process was carried out meticulously to ensure that the resulting prototype effectively addressed the observed problems. The product design incorporated the following key features: (1) adjustable dimensions to accommodate varying infant body sizes; (2) a circular configuration that fully envelops the infant’s body; (3) firm and stable structure, (4) an instant nesting format, allowing application by simply tightening a drawstring and placing the infant on the device; (5) dimensions of 50 cm x 60 cm, aligning with the average size of incubators, allowing use both inside and outside the incubator; (6) fixation straps to support physiological development in infants (Tane et al., 2019), and (7) integrated side and bottom pockets designed to hold warming gel packs as supplemental heat sources when used outside the incubator. This design was subsequently realized as a tangible, functional product.

3.3. Expert validation

Following the completion of the initial prototype, the subsequent phase involved conducting a validity assessment. This validity testing was carried out by maternal and pediatric health experts, including lecturers in maternal and pediatric nursing at Universitas Muhammadiyah Purwokerto. In addition, the product was evaluated by healthcare practitioners, namely a village midwife and perinatology nurses at Prof. Dr. Margono Soekarjo Regional General Hospital, Purwokerto. The evaluation focused on several key indicators: compatibility of the design with both the incubator and the infant’s body, structural durability, ease of use, firmness, ability to fully encircle the infant’s body, efficiency, provision of warmth, and capacity to maintain proper infant positioning. The following are the results of the validity assessment conducted.

Table 2. Validity testing result

Validator	Score	Category
Academic expert 1	90%	Highly Feasible
Academic expert 2	97%	Highly Feasible
Health expert 1	95%	Highly Feasible

Validator	Score	Category
Health expert 2	93%	Highly Feasible
Average Score	93,75%	Highly Feasible

Source: Research Findings, 2024

The average feasibility rating given by each expert was 93.75%. This result falls into the "Highly Feasible" category within the score range of 86% ≤ P ≤ 100%.

3.4. Product revision and final product

The fourth phase involved revising the initial product based on expert feedback to create the final product. Key features included adjustable drawstrings, dacron-filled body for firmness and warmth, washable covers, gel pack heating pockets, extremity fixations, and safety features like cord covers to prevent injury. The revised product is the final version, ready to be tested on a limited sample. The following are the details of the final Instant Nesting Bed product.

Table 3. Final Product Details

Product Details	Description
	Drawstrings to adjust size with inner Dacron padding for durability, comfort, and warmth
	Pockets on both sides and bottom for additional warmers, with an inner liner to allow external cleaning without damaging the Dacron
	Hot gel packs as supplementary warmers
	Fixation mechanisms on extremities to minimize movement and maintain posture, with adjustable ring-tightness
	A closure at the drawstring connection point to protect the infant's feet from entanglement

Source: Research Findings, 2024

3.5. Product trial

The final product was tested by five perinatology nurses. Evaluation criteria included efficiency, structural firmness, complete body coverage, adjustable size and fixation, aesthetic appeal, portability, lightweight, easy maintenance, and compatibility with incubators.

Table 4. Product Trial Result

Respondent	Score	Category
Nurse 1	97%	Highly Feasible
Nurse 2	97%	Highly Feasible
Nurse 3	95%	Highly Feasible
Nurse 4	93%	Highly Feasible
Nurse 5	95%	Highly Feasible
Average	95,4%	Highly Feasible

Source: Research Findings, 2024

The average feasibility rating given by each respondent was 95.4%. This result falls into the "Highly Feasible" category within the score range of $86\% \leq P \leq 100\%$.

DISCUSSION

The development of the Instant Nesting Bed introduces an innovative approach to neonatal care, particularly for low birth weight (LBW) infants who remain highly susceptible to hypothermia, sleep disruption, and physiological instability due to immature thermoregulatory and neurological systems (Fernando, Patricia, & Pebrina, 2021; Indartik, Khasanah, & Wahyuni, 2025). The findings from both expert and practitioner validations demonstrate a high feasibility score, suggesting that the device holds promise for clinical use. This aligns with international studies reporting that structured positioning and developmental care improve physiological stability and neurobehavioral outcomes in preterm infants (Carneiro et al., 2024; Indartik et al., 2025).

A key strength of the Instant Nesting Bed lies in its ability to address shortcomings inherent in conventional nesting. Previous research has shown that traditional cloth-based nesting is prone to deformation, inconsistent sizing, and lack of stability, which may compromise infant positioning and thermal support (Efendi et al., 2019). By incorporating adjustable drawstrings, dacron padding, and fixation mechanisms, the Instant Nesting Bed offers more reliable structural integrity and individualized fit. International studies corroborate that structured positioning interventions enhance thermal stability, oxygen saturation, and sleep quality in preterm and LBW infants (Sumathy, 2020; Suryani et al., 2023; Vadakkan & Prabakaran, 2022). hus, the design advances align with evidence supporting developmental care models that seek to approximate intrauterine conditions.

Nevertheless, it is important to critically evaluate this innovation alongside well-established interventions such as Kangaroo Mother Care (KMC). Meta-analyses and Cochrane reviews consistently demonstrate that KMC reduces neonatal mortality, improves weight gain, and strengthens parental bonding across diverse healthcare settings (Kapoor, Khan, and Beohar 2021; Sivanandan and Sankar 2023; Boundy et al., 2016). In contrast, the Instant Nesting Bed primarily focuses on thermal regulation and postural support, without directly addressing psychosocial bonding or breastfeeding facilitation. Therefore, rather than being a substitute, the Instant Nesting Bed should be positioned as a complementary strategy to KMC, particularly in contexts where prolonged skin-to-skin contact may be challenging due to maternal health status, cultural barriers, or limited staff support.

Another critical point concerns the use of fixation mechanisms. Fixation on extremities enhances physiological positioning and reduces uncontrolled movement, promoting flexed sleep postures, oxygen stability, and sleep quality (Tane et al., 2019; Vadakkan & Prabakaran, 2022). While the device aims to minimize uncontrolled movement and promote flexed postures that benefit oxygen stability and neurodevelopment, caution must be exercised. Over-restriction of movement has been associated with delayed motor milestones if improperly applied (Ibrahim, Chavez, Smith, Craig, & Pineda, 2024; Ko & Lim, 2023). This underscores the need for training protocols to ensure that fixation is supportive rather than restrictive, and that long-term developmental monitoring accompanies the use of such devices.

In terms of workflow implications, the Instant Nesting Bed may reduce nursing workload by simplifying the nesting process, a benefit aligned with reports that standardized neonatal care tools improve efficiency and consistency in NICU settings (Hallowell, Rogowski, & Lake, 2019). However, unless paired with structured training and parental involvement, variability in application may persist (Upadhyay et al., 2021). Moreover, the device's warming feature, which relies on gel packs, presents limitations in duration and thermal consistency. This aspect may pose challenges in resource-limited settings where incubator access is already constrained, necessitating further refinement of the warming mechanism to ensure sustained thermal support (Dubner et al., 2023).

Methodologically, this study demonstrates feasibility but remains limited by its small sample size and non-randomized design. While expert and nurse validations provide useful initial evidence, they cannot substitute for clinical trials involving infants themselves. Contemporary neonatal device research emphasizes the importance of randomized controlled trials and multicenter studies to establish clinical efficacy, safety, and scalability (Lyu et al., 2024; Thabet & Sayed, 2021). Additionally, this study excluded infants with medical aids such as CPAP, oxygen therapy, or IV lines, yet these represent a substantial proportion of LBW infants in NICU care. Future trials should incorporate this subgroup to assess compatibility and safety in more complex clinical scenarios.

Finally, the broader implications of innovation in neonatal care should be considered. Beyond immediate physiological benefits, developmental care interventions should be assessed for their impact on neurodevelopmental outcomes, parental stress, and length of hospital stay. Integration of family-centered care approaches, as recommended by the American Academy of Pediatrics, will be crucial to ensure that devices like the Instant Nesting Bed complement rather than fragment holistic neonatal care (Dubner et al., 2023). Additionally, cost-effectiveness and ease of large-scale implementation warrant evaluation, particularly for adoption in low- and middle-income countries where LBW prevalence is high.

In summary, the Instant Nesting Bed represents a feasible and innovative contribution to neonatal care, addressing specific weaknesses of conventional nesting. However, its long-term effectiveness, safety across diverse clinical conditions, and role within broader neonatal care strategies require further investigation. Robust multicenter randomized trials, integration with family-centered care models, and technical refinements to its warming function are critical next steps before large-scale implementation can be recommended.

4. CONCLUSION

Based on the research findings and discussion, the following conclusions can be drawn:

1) The development of the Instant Nesting Bed has been proven highly feasible according to expert validation and field testing by nurses. This innovation significantly addresses the limitations of conventional nesting and offers an efficient, safe, and physiologically appropriate solution for LBW infants. The product demonstrates potential to improve sleep quality and thermal stability, contributing to better neonatal care.
2) Beyond its potential clinical benefits, it may reduce nursing workload and enhance consistency in care delivery.
3) Further research is needed to evaluate the direct clinical impact of the Instant Nesting Bed, including its applicability for infants receiving medical interventions.
4) Additionally, future product development should focus on enhancing the durability of warming components and ensuring compatibility with other supportive devices.

REFERENCES

Anggari, R. S., Kurniawan, S., & Lamak, M. K. (2022). Perilaku Etis Saat Pelaksanaan Prosedur Invasif: Pengalaman Perawat Pada Perawatan Bayi Prematur. *Jurnal Ilmiah Kesehatan Rustida*, *09*(01), 1–12.

Arfiana, Sarjuningati, S., Idhayanti, R. I., & Saputra, W. J. (2024). Posisi Nesting Terhadap Berat Badan Pada Bayi Berat Lahir Rendah. *MPPK: Media Publikasi Penelitian Kebidanan*, *7*(1), 40–48.

Azim, L. O. L., Sulaiman, E., Sumera, S., Hermin, S., Sandryana Nur, A. D., & Darmin, D. (2022). Faktor-Faktor Yang Berhubungan Dengan Kejadian Bayi Berat Lahir Rendah Di Ruang Nicu Badan Layanan Umum Daerah Rumah Sakit Konawe. *Jurnal Penelitian Sains Dan Kesehatan Avicenna*, *1*(3), 1–13. https://doi.org/10.69677/avicenna.v1i3.17

Blencowe, H., Krasevec, J., de Onis, M., Black, R. E., An, X., Stevens, G. A., … Cousens, S. (2019). National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: a systematic analysis. *The Lancet Global Health*, *7*(7), e849–e860. https://doi.org/10.1016/S2214-109X(18)30565-5

Boundy, E. O., Dastjerdi, R., Spiegelman, D., Fawzi, W. W., Missmer, S. A., Lieberman, E., … Chan, G. J. (2016). Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis. *Pediatrics*, *137*(1). https://doi.org/10.1542/peds.2015-2238

Carneiro, M. M. C., Ribeiro, S. N. S., Menegol, N. A., Okubo, R., Montemezzo, D., & Sanada, L. S. (2024). Nest positioning on motor development, sleep patterns, weight gain in preterm infants: systematic review. *Pediatric Research*, *96*(1), 57–63. https://doi.org/10.1038/s41390-023-02972-w

Damayanti, D. S., Deviana, M., & Primadani, A. K. (2024). Effects of nesting and murottal Al-Qur'an on vital sign change in infants with low birth weight. *Malahayati International Journal of Nursing and Health Science*, *07*(7), 834–844. https://doi.org/10.33024/minh.v7i7

Dubner, S. E., Morales, M. C., Marchman, V. A., Shaw, R. J., Travis, K. E., & Scala, M. (2023). Maternal mental health and engagement in developmental care activities with preterm infants in the NICU. *Journal of Perinatology*, *43*(7), 871–876. https://doi.org/10.1038/s41372-023-01661-0

Efendi, D., Sari, D., Riyantini, Y., Novardian, Anggur, D., & Lestari, P. (2019). Pemberian Posisi (Positioning) dan Nesting Pada Bayi Prematur: Evaluasi Implementasi Perawatan di Neonatal Intensive Care Unit (NICU). *Jurnal Keperawatan Indonesia*, *22*(3), 169–181. https://doi.org/10.7454/jki.v22i3.619

Eliyanti, Y., & Hasta Noeraini, N. (2020). Pengaruh Nesting Terhadap Perubahan Fisiologis Bayi Prematur di Ruang Perinatologi RSUD Dr. M. Yunus Bengkulu. *Jurnal Media Kesehatan*, *13*(2), 120–128. Retrieved from https://jurnal.poltekkes-kemenkes-bengkulu.ac.id/index.php/jmk/article/view/574

Erawati, M., & Ramandhani, R. A. (2021). Pengaruh Pemberian Nesting Terhadap Kualitas Tidur Pada Bayi Prematur: A Literature Review. *Jurnal Ilmu Keperawatan Anak*, (2). https://doi.org/10.26594/jika.1.2.2018

Fernando, F., Patricia, H., & Pebrina, M. (2021). The Effect of Nesting on Changes in Physiological Stress in Low Birth Weight Babies. *Proceedings of the 2nd Syedza Saintika International Conference on Nursing, Midwifery, Medical Laboratory Technology, Public Health, and Health Information Management (SeSICNiMPH 2021)*, 188–192. Atlantis Press. https://doi.org/https://doi.org/10.2991/ahsr.k.211026.035

Ginting, C. N., Sari, M. P., Ginting, M., Tobing, M. L., Sigalingging, M., & Suri, M. (2023). Efektivitas Penggunaan Nesting dan Posisi Prone terhadap Suhu Tubuh, Saturasi Oksigen dan Frekuensi Nadi Bayi Prematur dan BBLR di RSU Dr.Pringadi Medan. *Malahayati Nursing Journal*, *5*(7), 2259–2266. https://doi.org/10.33024/mnj.v5i7.9037

Gueye, M., Sow, A., Boiro, D., Ibrahim, Y. M., Bathily, A. C., Amane, B., … Ndiaye, O. (2023). Height and weight development of low-birth-weight infants at 9 months. *Archives de Pédiatrie*, *30*(2), 100–103. https://doi.org/10.1016/j.arcped.2022.11.013

Hadya, R. A. (2023). Kejadian Berat Badan Bayi Lahir Rendah Dilihat Dari Kondisi Anemia Ibu Hamil Di Rumah Sakit Umum Wulan Windi Tahun 2022. *Journal of Health and Medical Science*, 47–53. https://doi.org/10.51178/jhms.v2i2.1386

Hallowell, S. G., Rogowski, J. A., & Lake, E. T. (2019). How Nurse Work Environments Relate to the Presence of Parents in Neonatal Intensive Care. *Advances in Neonatal Care*, *19*(1), 65–72. https://doi.org/10.1097/ANC.0000000000000431

Hamang, S. H., & Nurhayati, N. (2022). Faktor Risiko Kejadian Berat Bayi Lahir Rendah. *Window of Midwifery Journal*, 14–23. https://doi.org/10.33096/wom.vi.331

Hayati, A., Sari, I. P., Murniasih, E., Keperawatan, I., Awal, U., & Batam, B. (2023). Pengaruh Nesting Terhadap Kualitas Tidur Bayi Berat Lahir Rendah (BBLR). *Jurnal Ilmu Keperawatan Anak*, *6*(2), 48–59. https://doi.org/10.32584/jika.v6i2.2434

Ibrahim, C., Chavez, P., Smith, D., Craig, J., & Pineda, R. (2024). Oral motor interventions used to support the development of oral feeding skills in preterm infants: An integrative review. *Early Human Development*, *198*, 106125. https://doi.org/10.1016/j.earlhumdev.2024.106125

Indartik, I., Khasanah, N. N., & Wahyuni, S. (2025). Nesting Technique as a Simple Method for Optimal Outcomes in Premature Infant Care: A Literature Review. *Media Keperawatan Indonesia*, *8*(1), 72. https://doi.org/10.26714/mki.8.1.2025.72-82

Ismail, A., Salaghor, S. M., Alshomrani, S. A., & Almodallal, H. (2024). The Impact of Using Nesting Care on Heart Rate, Oxygen Saturation, and Pain Among Premature Neonates in Neonatal Intensive Care Units in Saudi Arabia: A Quasi-Experimental Study. *Cureus*. https://doi.org/10.7759/cureus.61775

Kapoor, A., Khan, M., & Beohar, V. (2021). Pain relief in late preterm neonates: A comparative study of kangaroo mother care, oral dextrose 50%, and supine nesting position. *International Journal of Applied and Basic Medical Research*, *11*(3), 188. https://doi.org/10.4103/ijabmr.IJABMR_584_20

Kemenkes. (2021). *Profil Kesehatan Indonesia Tahun 2021*. Jakarta.

Ko, J., & Lim, H. K. (2023). Motor Development Comparison between Preterm and Full-Term Infants Using Alberta Infant Motor Scale. *International Journal of Environmental Research and Public Health*, *20*(5), 3819. https://doi.org/10.3390/ijerph20053819

Lyu, T., Ye, R., Li, L. L., Zhang, L. L., Xiao, J., Ma, Y. L., … Hu, X. J. (2024). The effect of developmental care on the length of hospital stay and family centered care practice for very low birth weight infants in neonatal

intensive care units: A cluster randomized controlled trial. *International Journal of Nursing Studies*, *156*, 104784. https://doi.org/10.1016/j.ijnurstu.2024.104784

Noor, M., Hasanah, O., Ginting, R., Studi, P., & Keperawatan, I. (2016). Penggunaan Nesting dengan Fiksasi Mampu Menjaga Stabilitas Saturasi Oksigen, Frekuensi Pernafasan, Nadi Dan Suhu Pada Bayi Prematur Dengan Gawat Napas: Studi Kasus. *Jurnal Ners Indonesia*, *6*(1), 65–76. Retrieved from https://doi.org/10.31258/jni.6.1.64-75

Peterson, S. J., & Foley, S. (2021). Clinician's Guide to Understanding Effect Size, Alpha Level, Power, and Sample Size. *Nutrition in Clinical Practice*, *36*(3), 598–605. https://doi.org/10.1002/ncp.10674

Prescott, M. G., Geist, M., Olsson, E., Fiander, M., Soll, R. F., & Bruschettini, M. (2024). Infant positioning for promoting development and preventing morbidity in preterm infants. *Cochrane Database of Systematic Reviews*, *2024*(12). https://doi.org/10.1002/14651858.CD016029

Rabbani, V. (2022). Pengaruh Penggunaan Metode Nesting Terhadap Peningkatan Berat Badan Pada Bayi Berat Lahir Rendah (BBLR). *Journal of Borneo Holistic Health*, *5*(2), 228–245. https://doi.org/10.35334/borticalth.v5i2.2763

Rohmah, M., Saputri, N., & Bahari, J. (2020). Effectiveness Of Use Of Nesting On Body Weight, Oxygen Saturation Stability, And Breath Frequency In Prematures In Nicu Room Gambiran Hospital Kediri Cityr. *STRADA Jurnal Ilmiah Kesehatan*, *9*(1), 119–128. https://doi.org/10.30994/sjik.v9i1.275

Sivanandan, S., & Sankar, M. J. (2023). Kangaroo mother care for preterm or low birth weight infants: a systematic review and meta-analysis. *BMJ Global Health*, *8*(6), e010728. https://doi.org/10.1136/bmjgh-2022-010728

Sumathy, P. (2020). Effectiveness of Nesting Technique on Posture and Physiological Parameters. *Pondicherry Journal of Nursing*, *13*(2), 25–28. https://doi.org/10.5005/jp-journals-10084-12149

Suryani, S. I., Shifa, N. A., & Yuliza, E. (2023). Efektivitas Terapi Sentuhan dan Penggunaan Nesting terhadap Suhu Tubuh Bayi Berat Badan Lahir Rendah. *Open Access Jakarta Journal of Health Sciences*, *2*(3), 623–630. https://doi.org/10.53801/oajjhs.v2i3.121

Tane, R., Rustina, Y., & Waluyanti, F. T. (2019). Nesting with Fixation and Position to Facilitate Quiet Sleep and Oxygen Saturation on Low-Birth Weight Infants. *Comprehensive Child and Adolescent Nursing*, *42*(sup1), 29–37. https://doi.org/10.1080/24694193.2019.1577923

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Thabet, A. M., & Sayed, Z. A. (2021). Effectiveness of the Premature Infant Oral Motor Intervention on Feeding Performance, Duration of Hospital Stay, and Weight of Preterm Neonates in Neonatal Intensive Care Unit. *Dimensions of Critical Care Nursing*, *40*(4), 257–265. https://doi.org/10.1097/DCC.0000000000000475

Upadhyay, J., Singh, P., Digal, K. C., Shubham, S., Grover, R., & Basu, S. (2021). Developmentally Supportive Positioning Policy for Preterm Low Birth Weight Infants in a Tertiary Care Neonatal Unit: A Quality Improvement Initiative. *Indian Pediatrics*, *58*(8), 733–736. https://doi.org/10.1007/s13312-021-2281-8

Vadakkan, A. J., & Prabakaran, V. (2022). Comparison of the Effect of Nesting and Swaddling on Sleep Duration and Arousal Frequency among Preterm Neonates: A Randomized Clinical Trial. *Journal of Caring Sciences*, *11*(3), 126–131. https://doi.org/10.34172/jcs.2022.17

Waruwu, M. (2024). Metode Penelitian dan Pengembangan (R&D): Konsep, Jenis, Tahapan dan Kelebihan. *Jurnal Ilmiah Profesi Pendidikan*, *9*(2), 1220–1230. https://doi.org/10.29303/jipp.v9i2.2141

WHO. (2018). New global estimates on preterm birth published. *Departmental News*.

Xing, L., Zhang, D., Cao, M., & Zhang, J. (2023). The relationship between NICU stress and neurodevelopmental outcomes of preterm infants: A multi-center prospective cohort study in China. *Journal of Pediatric Nursing*, *71*, e90–e96. https://doi.org/10.1016/j.pedn.2023.04.018