

***ENHANCING NEONATAL HYPERBILIRUBINEMIA MANAGEMENT: A
COMMUNITY SERVICE PROGRAM AT RSUD AJI BATARA DEWA SAKTI***

***MENINGKATKAN MANAJEMEN HIPERBILIRUBINEMIA NEONATAL:
PROGRAM PENGABDIAN MASYARAKAT DI RSUD AJI BATARA DEWA
SAKTI***

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Abstract

This study details an intervention through a community service conducted at the Regional General Hospital Aji Batara Agung Dewa Sakti, focusing on the improvement of healthcare professional's skills in managing neonatal hyperbilirubinemia. The program conducted in two days, including a one-day socialization and one-day training session. Comprehensive approach was used with a special emphasis on the BiliNorm application. The intervention result shows higher score in post test compared to pre-test, indicating significant improvements ($P < 0.001$) in participant's knowledge and skills. Statistical analysis highlighted the effectiveness of the training program in demonstrating a successful transfer of knowledge on the usage of BiliNorm application, AirBiliSun and AirBiliNest. This study highlighted the positive impact of this program on early detection and management practices.

Keywords: Neonatal Hyperbilirubinemia; BiliNorm Application; Healthcare Professional Training.

Abstrak

Studi ini menguraikan pengabdian masyarakat yang dilakukan di Rumah Sakit Umum Daerah Aji Batara Agung Dewa Sakti, dengan fokus meningkatkan keterampilan tenaga kesehatan dalam menangani neonatal hyperbilirubinemia. Program ini dilaksanakan selama dua hari, meliputi acara sosialisasi satu hari dan sesi pelatihan satu hari berikutnya, dengan pendekatan komprehensif dan penekanan khusus pada aplikasi BiliNorm. Intervensi yang diberikan menunjukkan meingkatnya skor post-test bila dibandingkan dengan pre-test. menggambarkan peningkatan pengetahuan dan keterampilan peserta secara signifikan ($P < 0,001$). Analisis statistik menunjukkan bahwa program pelatihan yang diberikan berhasil mentransfer pengetahuan secara efektif kepada peserta terkait penggunaan aplikasi BiliNorm, AirBiliSun

Received 15 March 2024; Received in revised form 14 July 2024; Accepted 1 November 2024;
Available online 10 December 2024.

 [10.20473/jlm.v8i4.2024.552-559](https://doi.org/10.20473/jlm.v8i4.2024.552-559)



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dan AirBiliNest. Studi ini menekankan dampak positif program ini pada praktik deteksi dan penanganan dini hiperbilirubinemiai.

Kata kunci: Neonatal Hyperbilirubinemia; Aplikasi BiliNorm; Pelatihan Tenaga Kesehatan.

INTRODUCTION

Pediatricians commonly diagnose and manage neonatal hyperbilirubinemia (NH) in various healthcare settings (American Academy of Pediatrics Subcommittee on Hyperbilirubinemia 2024; Kemper 2022; Kuzniewicz 2021; Pan 2017; Porter 2002; Maiseels 2000). Neonatal hyperbilirubinemia is defined as an elevated total serum bilirubin (TSB) level, clinically manifesting as jaundice, and affecting a majority of newborn infants (Pan 2017; Porter 2002). Maisels et al. reported that 60% of neonates over 35 weeks of gestation will experience hyperbilirubinemia, with 80% occurring in neonates under 35 weeks (Maisels 2000). The most severe risk of untreated hyperbilirubinemia is kernicterus, characterized by long-term neurological damage from bilirubin deposits in the brain (Shaughnessy 2020; Bhutani 2010).

Early detection in newborns is crucial to prevent such complications. In 2004, with a recent update in 2022, the American Academy of Pediatrics (AAP) published a Clinical Practice Guideline (CPG) entitled “Management of Hyperbilirubinemia in the Newborn Infant 35 or More Weeks of Gestation” (Kemper 2022). This guideline has served as the primary evidence-based set of recommendations guiding the management of NH across clinical environments. Both the Indonesian Pediatrics Society and the Indonesian Working Group on Neonatology recommend using the AAP guideline for the prevention, diagnosis, and treatment of hyperbilirubinemia in full-term and nearly full-term infants (American Academy of Pediatrics Subcommittee on Hyperbilirubinemia 2024).

Early detection involves a visual examination by pressing the forehead, midsternum, or knee/ankle to reveal skin color and subcutaneous tissue. The examination should take place in a well-lit room or during daylight by opening windows. The results are then assessed using the Kramer method, categorized from levels one to five (Rohsiswatmo 2018; Sampurna 2018). If visual signs of jaundice are observed, treatment according to guidelines is recommended.

Studies in Canada have shown that awareness of and adherence to guidelines on hyperbilirubinemia management help reduce the incidence of severe hyperbilirubinemia (Darling 2014; Sgro 2016). However, a survey conducted in a previous study revealed that awareness and compliance with these guidelines were low among midwives and general practitioners in Indonesia (Sampurna 2018). Only 23% of general practitioners and 29% of midwives indicated the use of the hyperbilirubinemia management guidelines (Petrova 2006). Lack of knowledge may lead to inadequate management, resulting in unnecessarily high rates of severe hyperbilirubinemia and adverse neurological outcomes that could have been prevented.

Our collaborative efforts with RSUD Aji Batara Dewa Sakti through the Community Partnership Program aimed at addressing these challenges. A comprehensive campaign and training initiative was conducted, focusing on treatment outcomes in neonatal jaundice using the BiliNorm application. This community service program aims to

improve understanding of neonatal hyperbilirubinemia management, thereby enhancing the quality of services in cases of jaundiced infants in Balikpapan.

COMMUNITY SERVICE METHOD

This community service initiative took place on July 20, 2023. The activities, including socialization and training, were conducted at the Regional General Hospital Aji Batara Agung Dewa Sakti in Samboja, Balikpapan, East Kalimantan. As the partner of RSUD Aji Batara Agung Dewa Sakti, it was mandatory to delegate doctors, midwives, and nurses responsible for the management of neonatal hyperbilirubinemia and treatment outcomes in cases of neonatal jaundice. The community service comprised three stages: preparation, implementation, and evaluation, with a total of 7 participants. The trainers (training team) were the community service execution team.

The methodology used for the community service activities utilized a participative approach, incorporating training and mentoring through interactive and demonstrative methods. The seven participants actively engaged in the program, gaining knowledge and practical skills for neonatal hyperbilirubinemia management.

To ensure the sustainability of the program in the field after the community service activities concluded, a reassessment of the knowledge and skills of doctors and midwives at RSUD Aji Batara Agung Dewa Sakti was conducted. This evaluation aimed to gauge the lasting impact of the program and identify areas for potential improvement or further support.

RESULTS AND DISCUSSIONS

This community service initiative is conducted with the aim of enhancing the understanding and skills of healthcare professionals at the Regional General Hospital Aji Batara Agung Dewa Sakti to carry out the management of neonatal hyperbilirubinemia. This effort is part of an overarching strategy to improve the quality of services and treatment outcomes in cases of neonatal jaundice. The process involves a one-day socialization event followed by a one-day training session, both conducted in-person. Participants in both the socialization and training are required to take a pre-test before the activities and a post-test after the completion of the program.

The success of the program was highlighted by the involvement of 20 representatives from RSUD Aji Batara Dewa Sakti, with the distribution of characteristics being shown in Table 1.

Table 1. *The Distribution of Participants' Characteristics.*

Characteristics	n	Frequency (%)
Age		
• 20-29 years	4	20
• 30-39 years	8	40
• 40-49 years	8	40
Gender		
• Male	4	20
• Female	16	80
Highest Education		

• DI, DII, DIII	8	40
• Professional Education	8	40
• Specialist and Postgraduate (S2)	4	20
Profession		
• Midwife	6	30
• Nurse	6	30
• General Practitioner	4	20
• Neonatologist	4	20
Years in Healthcare		
• 1-5	6	30
• 6-10	7	35
• 11-15	4	20
• 16-20	1	5
• > 20	2	10

The data presented in the Figure 1 outlines the distribution of scores categorized by performance level, comparing pre-test and post-test results. In the pre-test assessment, there were two participants who fell under the classification of 'Very Poor', while three participants (15% of the total) were categorized as 'Poor'. Notably, the 'Adequate' performance category saw significant improvement, with 75% of participants initially falling into this bracket in the pre-test, reducing to 30% in the post-test. Conversely, 'Good' performance was not observed in the pre-test, but after the intervention, 55% of participants demonstrated proficiency in this category. Similarly, 'Excellent' performance was attained by 15% of participants post-intervention, contrasting with no such instances in the pre-test.

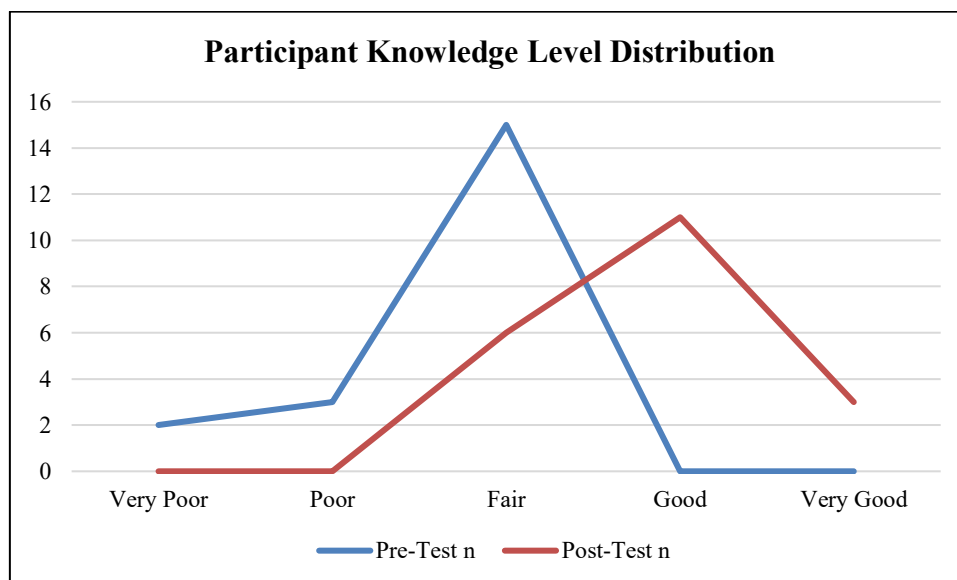


Figure 1. The Distribution of Value Categories according to Participants' Knowledge.

Statistical analysis using the Wilcoxon Signed Rank Test indicated a significant difference between the pre-test and post-test scores, with a p-value of <0.001. This result underscores the effectiveness of the training program in enhancing the participants' knowledge and proficiency in neonatal hyperbilirubinemia management. The substantial

increase in average scores indicates a successful transfer of knowledge and skills, highlighting the positive impact of the community service program on the healthcare professionals involved.

The improvement in knowledge and skills among the healthcare professionals is particularly noteworthy as it contributes to better early detection and management of neonatal jaundice. The training's focus on the use of innovative tools, such as the BiliNorm application and bilirubin measurement devices, likely played a pivotal role in equipping the participants with practical skills for more effective diagnosis and treatment.

The BiliNorm application is a digital tool designed to assist healthcare professionals in managing neonatal hyperbilirubinemia effectively. Developed based on the Indonesian National Guideline on Hyperbilirubinemia, the application is accessible in both Indonesian and English languages through <https://www.bilinorm.babyhealthsby.org>. Upon opening the app, users input essential patient data, including gestational age, date and time of birth, birth weight, total serum bilirubin (TSB) level, and various risk factors.

The incorporated risk factors align with the American Academy of Pediatrics (AAP) guidelines and encompass ABO/Rhesus incompatibility, hemolysis, other illnesses (such as asphyxia or infection), and hypoalbuminemia. The BiliNorm app then utilizes this data to generate a TSB nomogram, displaying treatment thresholds for phototherapy (PT) and exchange transfusion over time. Caretakers are provided with recommendations, ranging from no treatment to immediate initiation of intensive PT or consideration of exchange transfusion.

The application includes different nomograms tailored to infants with a gestational age of more than 35 weeks and preterm infants, categorized by birth weight. Additionally, BiliNorm offers information on potential complications due to acute bilirubin encephalopathy (ABE), assessed through the BIND-M scoring system. The app advises follow-up examinations at outpatient clinics, particularly considering the possibility of kernicterus spectrum disorder (KSD), which assesses various factors to categorize the risk of kernicterus.

Recognizing the importance of communication with patients' families, the BiliNorm app includes an educational checklist, adapted from NICE guidelines on neonatal jaundice. This checklist aids healthcare workers in effectively conveying essential information to families, addressing a crucial aspect often overlooked in low- and middle-income countries like Indonesia. Overall, BiliNorm serves as a comprehensive and user-friendly tool, integrating guidelines, risk assessment, treatment thresholds, and educational support for the effective management of neonatal hyperbilirubinemia.

Furthermore, specialized training was conducted on the use of AirBiliSun, presenting a practical solution for regions with abundant sunlight and limited access to electricity. With AirBiliSun, infants are placed in a basket with acrylic shielding to filter unnecessary sunlight, ensuring a controlled environment.



Figure 2. *Atmosphere During the Socialization Session at RSUD Aji Batara Agung Dewa Sakti.*

Additionally, a valuable aspect of the initiative involved raising awareness through a socialization session on the use of AirBiliNest, a light-emitting technology incorporated into swaddling, providing light therapy to jaundiced infants while maintaining close contact with their mothers.



Figure 3. *Healthcare Professionals Fully Engaged in the Training on Airbilinest Usage.*

These supplementary training and awareness sessions further enriched the knowledge and skills of healthcare professionals, contributing to the substantial improvements observed in the post-test scores. The holistic approach, encompassing both educational interventions and practical training on innovative tools, demonstrates the program's effectiveness in equipping the healthcare team at RSUD Aji Batara Dewa Sakti with enhanced capabilities for neonatal hyperbilirubinemia management.

CLOSING

Conclusion. In conclusion, the results suggest that the combination of educational interventions, including both socialization and training sessions, significantly enhanced the healthcare professionals' capabilities at RSUD Aji Batara Dewa Sakti. The positive outcomes observed in the post-test scores indicate a successful intervention that holds promise to reduce the incidence of severe hyperbilirubinemia and enhance early detection and management practices.

Suggestions. Future research endeavors could explore the sustained impact and long-term outcomes of the comprehensive community service initiative at RSUD Aji Batara Dewa Sakti. A longitudinal study could assess the continued proficiency of healthcare professionals in neonatal hyperbilirubinemia management, tracking their performance over an extended period post-training. Additionally, investigating the influence of the BiliNorm application and other innovative tools on clinical decision-making and patient outcomes would provide valuable insights.

ACKNOWLEDGEMENT

The authors sincerely express their gratitude and appreciation to RSUD Aji Batara Dewa Sakti for this collaboration and participation in this community service initiative.

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