

## Neonatal screening: aspects unknown to mothers in a public hospital in Jauja, Peru

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### ABSTRACT

**Objective:** To identify knowledge gaps and the specific aspects that mothers are unaware of regarding neonatal screening in the rooming-in area of the Jauja Public Hospital, Peru. **Materials and methods:** A quantitative, non-experimental, descriptive, cross-sectional study was conducted. The population consisted of 194 postpartum mothers selected through simple random probability sampling. Data collection was carried out using a Likert-type scale questionnaire validated by expert judgment and demonstrating high reliability (Cronbach's alpha of 0.879 for the "attitude" variable and 0.909 for the "knowledge" variable). Data processing was performed using IBM SPSS software, applying descriptive statistics (frequencies and percentages) to characterize the overall level of knowledge and by dimensions, as well as Spearman's rho test for correlational analysis. **Results:** It was found that 78.4% of participants had a medium overall level of knowledge about neonatal screening; however, critical deficiencies were identified in specific dimensions: 86.6% showed a low level of understanding regarding the purpose of the test, and 70.1% demonstrated lack of knowledge about the sample collection procedure. **Conclusions:** Although overall knowledge is at a medium level, significant information gaps persist regarding the utility and procedure of neonatal screening. This underscores the urgency of strengthening educational strategies and health personnel support during the postpartum period.

**Keywords:** knowledge; neonatal screening; postpartum women; neonatal health; metabolic diseases; rooming-in.

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### Scientific contribution:

This study is highly relevant to neonatal nursing practice due to its impact on the health and development of newborns. The results will enable the identification of areas for improvement and strengthen collaboration between healthcare professionals and the newborn's family. Early detection of congenital disorders facilitates early treatment.

## INTRODUCTION

Neonatal screening is a key public health intervention designed for the early identification of metabolic and congenital disorders in the newborn, enabling the timely initiation of treatment to prevent severe sequelae. Recent reviews highlight that modern neonatal screening programs can detect more than 50 disorders, with significant improvements in prognosis and quality of life (1). This test is based on applying tests using a heel blood sample to distinguish metabolic, endocrine, or congenital diseases before clinical symptoms appear. This strategy is essential for reducing morbidity associated with these conditions (2).

The relevance of this intervention lies in the clinical nature of inherited metabolic disorders, which, although relatively rare, may lead to neurological damage, permanent disability, or death if not addressed promptly. A study conducted in Jining, China, evaluated 100,077 newborns and identified, using mass spectrometry, 56 confirmed cases of congenital metabolic disorders, i.e., 1/1,787 births (3). In the same country, a multicenter study, which combined new generation sequencing with mass spectrometry, reported an incidence of inborn errors of metabolism in 1/1287 births (4). These results confirm the importance of early diagnosis. Similarly, a study in Iran involving more than 138,000 neonates confirmed regional variability in these disorders, reinforcing the need to sustain effective early detection programs that, in the long term, may reduce healthcare and social costs (5).

Maternal participation is essential during the screening process, as mothers must authorize the test, facilitate sample collection, and ensure follow-up. In this regard, additional studies have identified significant gaps in maternal knowledge. In Egypt, the implementation of an educational package on neonatal screening significantly improved maternal understanding, with notable increases in knowledge scores after the intervention compared to baseline levels, demonstrating the positive impact of health education (6). In Ecuador, a study involving 200 pregnant women revealed that only 12.5% had a high level of knowledge, emphasizing the importance of delivering clear and accessible information (7). In Peru, a study conducted in Ica showed that 65.3% of mothers had a low level of knowledge about neonatal metabolic screening, while 61.0% were unfamiliar with the screening procedure, highlighting the need to strengthen educational strategies targeting this population (8).

In this context, nursing professionals play a fundamental role in the logistics of neonatal screening, sample collection, maternal counseling, and follow-up of suspected cases. Nevertheless, studies conducted in Brazil have reported limitations such as a lack of resources, inadequate

training, and weak institutional coordination, all of which negatively impact the quality of care (9).

Several studies have indicated that neonatal screening carries not only biomedical implications but also psychosocial repercussions for parents, closely associated with the level of information and understanding they receive. In this regard, Tluczek et al. (10) conducted a systematic review demonstrating that inadequate counseling regarding the purpose, procedure, and interpretation of screening results may generate parental anxiety, stress, and misinterpretations, particularly in cases of positive or inconclusive results. The authors emphasize that clear communication and timely education are critical factors in promoting program acceptance and minimizing negative emotional impact, which reinforces the educational role of healthcare professionals during the neonatal screening process.

In that sense, the primary objective of this study was to identify knowledge gaps and specific aspects unknown to mothers regarding neonatal screening in the rooming-in unit of a public hospital in Jauja, Peru. In addition, the secondary objectives included describing the overall level of knowledge and knowledge by dimensions (screening test and screening procedure) to generate evidence that contributes to strengthening educational strategies provided by the healthcare personnel, particularly in the field of neonatal nursing.

## MATERIALS AND METHODS

A quantitative, observational, descriptive, and cross-sectional study design was employed. The study population consisted of 194 mothers of newborns treated in the Neonatology Department of a Public Hospital of Jauja, Peru, between January and June 2024. Given that the population size was accessible, it was decided to work with all participants who met the selection criteria ( $n = 194$ ), i.e., mothers of newborns hospitalized in the department who had received medical discharge and voluntarily agreed to participate in the study. Exclusion criteria included mothers who had not yet been discharged, mothers of newborns delivered outside the Hospital of Jauja, and those who declined to participate in the research study.

Data were collected using the survey technique and a Likert-type questionnaire designed to assess maternal knowledge regarding neonatal screening. This instrument—designed by Condori et al. (11) based on prior contributions—was adapted for the present study and comprised items aimed at measuring overall knowledge and knowledge by dimensions (neonatal screening test and screening procedure). The instrument had been previously validated by the authors through expert judgment and pilot testing, achieving a global content

validity coefficient of 0.89. In addition, it demonstrated adequate internal consistency, with a Cronbach's alpha coefficient of 0.909 for the knowledge scale, which indicates high reliability. For the present study, the instrument was used without substantial modifications.

Following authorization from hospital authorities, data collection was conducted in person, individually, and anonymously between January and June 2024. The average time required to complete the questionnaire ranged from 10 to 15 minutes per participant. Subsequently, the data were coded and statistically processed using the IBM SPSS software. For the variable "level of understanding of the national neonatal screening program," score ranges were established based on the total number of correct responses on the questionnaire, with possible scores ranging from 0 to 20. Cutoff points were defined according to the distribution of scores obtained in the pilot test and the recommendation of the authors of the instrument: low (0–9 points), medium (10–15 points), and high (16–20 points). This categorization enabled objective classification of knowledge levels. For inferential analysis and hypothesis testing, Spearman's rho correlation test was applied, a nonparametric statistical method used to measure the strength and direction of the monotonic relationship between two ordinal or ranked variables.

Throughout the stages of the study, fundamental ethical principles were observed, ensuring data accuracy and confidentiality. Participants' autonomy was fully respected, and a coercion-free environment was guaranteed during survey completion. The research protocol

was approved by the Institutional Research Ethics Committee of Universidad Continental under Official Letter No. 0658-2024-CIEI-UC, ensuring compliance with established ethical guidelines.

## RESULTS

For the analysis, knowledge regarding neonatal screening was examined both globally and by dimensions. General knowledge corresponds to the total score obtained in the questionnaire and reflects the overall level of information that mothers have about neonatal screening. This knowledge was disaggregated into two specific dimensions: (i) knowledge of the screening test, referring to understanding of its purpose, benefits, timing, and the diseases it is designed to detect; and (ii) knowledge of the screening procedure, related to operational aspects of the test, such as sample collection, responsible healthcare personnel, prior requirements, and turnaround time for results.

Regarding overall knowledge levels, findings revealed that 78.4% of mothers demonstrated a medium level of knowledge, 21.6% exhibited a low level, and none achieved a high level. Concerning the specific dimensions, knowledge of the screening test was predominantly low (86.6%), while only 13.4% reached a medium level. Similarly, knowledge about the procedure shows a predominance of low levels (70.1%), followed by 27.3% at medium levels and only 2.6% at high levels (Table 1).

**Table 1.** Overall knowledge level and knowledge by dimensions (screening test and procedure) among mothers regarding neonatal screening in the rooming-in unit of a public hospital in Jauja, Peru

Knowledge	Knowledge Level					
	High		Medium		Low	
	n	%	n	%	n	%
Overall knowledge of neonatal screening*	0	0.0	152	78.4	42	21.6
Dimensions**						
Knowledge of the neonatal screening test	0	0.0	26	13.4	168	86.6
Knowledge of the sampling collection procedure	5	2.6	53	27.3	136	70.1

\* Overall knowledge corresponds to the total questionnaire score.

\*\* Dimensions assessed through the disaggregation of overall knowledge.

Table 2 confirms the marked deficiencies in knowledge regarding the neonatal screening test, as most items show over 80% incorrect responses, corroborating the low level observed in this dimension. In turn, the most critical information gaps were observed in questions

related to the number and type of diseases detected, since 96.9% do not know how many pathologies are identified and what type of diseases the screening evaluates. Similarly, 92.8% do not know the appropriate time to perform the test. The items presented correspond to the

“knowledge of the neonatal screening test” dimension, according to the structure of the questionnaire used. Although some questions address general aspects (defi-

inition and purpose), they are categorized within this dimension because they specifically pertain to understanding the neonatal screening test.

**Table 2.** Mothers’ knowledge of the neonatal screening test, by item.

Indicators of knowledge regarding the neonatal screening test	Correct		Incorrect	
	n	%	n	%
1. What is neonatal screening?	22	11.3	172	88.7
2. What is the National Neonatal Screening Program?	13	6.7	181	93.3
3. Who benefits from this test?	49	25.3	145	74.7
4. What is the purpose of screening your baby?	32	16.5	162	83.5
5. What benefits does neonatal screening provide to your baby?	34	17.5	160	82.5
6. How many conditions does the neonatal screening test detect?	6	3.1	188	96.9
7. What type of diseases does it detect?	6	3.1	188	96.9
8. Which diseases are detected by the neonatal screening test?	7	3.6	187	96.4
9. When should neonatal screening be performed?	14	7.2	180	92.8

The results presented in Table 3 reveal a similar trend, demonstrating widespread lack of knowledge regarding the operational aspects of neonatal screening. 98.5% of mothers do not know if there are any prerequisites for the procedure, and 88.1% do not know which profes-

sional is responsible for taking the sample. In addition, 86.6% do not know how many days it takes to get the results, and 78.4% do not know how much blood is needed to perform the screening test.

**Table 3.** Mothers’ knowledge of the neonatal screening procedure, by item.

Indicators of knowledge regarding the neonatal screening procedure	Correct		Incorrect	
	n	%	n	%
10. Did you receive prior counseling from the nursing staff before the blood sample collection?	52	26.3	142	73.7
11. On what material is the heel-prick blood sample placed for analysis?	47	24.2	147	75.8
12. From where is the blood sample obtained for the test?	75	38.7	119	61.3
13. What amount of blood is required for the test?	42	21.6	152	78.4
14. Is a medical order required to perform this test?	33	17.0	161	83.0
15. Which newborns undergo neonatal screening?	72	37.1	122	62.9
16. Within how many days are you informed whether the result is suspicious or normal?	26	13.4	168	86.6
17. In the event of a suspicious result, do you know how you will be notified?	70	36.1	124	63.9
18. Who performs the sampling collection for neonatal screening?	23	11.9	171	88.1
19. Is there any prior requirement before undergoing neonatal screening?	3	1.5	191	98.5
20. What discomforts could occur after the test?	40	20.6	154	79.4

## DISCUSSION

The study showed that 78.4% of mothers have an intermediate level of overall knowledge regarding neonatal screening. This finding indicates that, although mothers recognize the existence of neonatal screening, they do not fully understand its purpose and scope. This situation partially aligns with findings reported in China, where parents have basic knowledge but demonstrate significant gaps concerning the clinical purpose of the procedure (12). Similarly, the Latin American study by Jimenez and Pastor (8) confirms moderate levels of understanding, suggesting a persistent regional issue. From Nola Pender's health promotion model, knowledge constitutes the foundation for the adoption of healthy behaviors (13). Within this framework, insufficient or intermediate levels of knowledge may limit informed decision-making. Consistent with this perspective, the scoping review conducted by Zerrouki et al. (14) found that insufficient or intermediate knowledge levels regarding prenatal screening restrict pregnant women's ability to make informed decisions, which reinforces the importance of structured educational interventions. While overall knowledge was predominantly at a medium level, the specific dimensions showed a marked predominance of low levels of knowledge, revealing a substantial gap between general knowledge and detailed understanding of the screening test and procedure. These findings underscore the need to strengthen more structured educational interventions during both the prenatal and postnatal periods.

Limited understanding of test-specific aspects—such as the diseases detected, the number of conditions screened, and the appropriate timing of the test—suggests that the information provided is not being truly understood. This pattern is consistent with recent studies conducted in Flanders, Belgium, where, despite well-established programs, significant gaps persist in understanding the purpose and utility of neonatal screening (15). Research studies in Peru, such as the study by Condori et al. (11), report similar trends: mothers are generally aware of the existence of neonatal screening but lack full comprehension of its clinical implications. According to Nola Pender's health promotion model, specific knowledge is essential for recognizing benefits and barriers, directly influencing participation in and acceptance of screening programs (13). In this context, the results suggest the need to improve the clarity, relevance, and accessibility of educational materials provided to mothers.

The predominance of low knowledge regarding the screening procedure—with 80% to 90% of mothers unaware of prerequisites, responsible personnel, and result turnaround times—reveals an operational weakness that may compromise the continuity of the process. This finding is comparable to reports from

Morocco, where similar deficiencies have been identified, affecting adherence to and understanding of the procedure (16). At the regulatory level, Law No. 29885 establishes the legal framework for the implementation of the Universal Neonatal Screening Program in Peru (17). In this regard, the National Maternal and Perinatal Institute (INMP), as the national referral center, emphasizes the importance of education, information, and counseling directed toward mothers and families to ensure effective coverage of neonatal screening as a public health strategy (18). Similarly, recent literature indicates that program acceptance depends on the clarity with which benefits, safety, and procedural stages are communicated. Studies show that parents who receive adequate information and effective communication are more likely to accept screening programs and adhere to them effectively (19). The limited understanding observed in this study highlights the need to standardize the counseling provided by nursing specialists and to strengthen communication strategies within the rooming-in unit.

From the perspective of Nola Pender's health promotion model, knowledge is recognized as a fundamental prerequisite for the adoption of healthy behaviors. In this sense, the levels observed reveal opportunities for improvement in the guidance provided by the healthcare personnel—particularly nursing professionals, whose role is decisive in communication, sample collection, and support throughout the screening process.

Regarding limitations, the cross-sectional design does not allow for causal inferences, and the use of self-report questionnaires may have introduced social desirability bias. Furthermore, as the study was conducted in a single public hospital in Jauja, the generalizability of the results to other settings is limited. Although the instrument demonstrated adequate validity and high reliability, comprehension of certain items may have been influenced by the mothers' educational level. Additionally, it was not possible to assess the actual quality of counseling provided during clinical care.

## CONCLUSIONS

The study demonstrated that most mothers have an intermediate level of general knowledge regarding neonatal screening; however, significant gaps persist in their understanding of the specific components of the test and the screening procedure. These deficiencies indicate that the information currently provided is insufficient to ensure adequate comprehension of the purpose, benefits, and stages of neonatal screening, which could affect decision-making and timely follow-up in the event of suspicious results. Findings are consistent with international and regional literature, reinforcing the need to strengthen educational processes aimed at

postpartum women using a clear, structured, and accessible approach.

Overall, the results underscore the necessity of enhancing prenatal and postnatal education through clearer, more didactic, and standardized strategies. It is advisable to implement accessible information materials, periodic

training for nursing staff, and monitoring mechanisms to ensure the proper transmission of key information about screening. Furthermore, future studies could incorporate multiple healthcare centers, employ mixed-methods designs, and explore healthcare professionals' perspectives to achieve a more comprehensive understanding of the screening process.

#### Conflict of interest:

The author declares no conflict of interest.

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#### Ethics approval:

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