NEWBORN SCREENING FOR CONGENITAL HEART DISEASE: PERCEPTION OF ROOMING-IN HEALTH PROFESSIONALS

ABSTRACT
Objective: to describe the perception of health professionals working in Rooming-in (RI) of high-risk maternity hospitals of Maceió regarding the importance of testing before maturity discharge to early detection of congenital heart disease in critical newborns. Method: descriptive study with qualitative approach, carried out from January to December 2014, in the RI of the two high-risk maternity hospitals in Alagoas / AL. Study population was composed of doctors and nurses. Data were analyzed using the Content Analysis Technique. Results: professionals had superficial knowledge of pulse oximetry as a screening tool. They knew its importance and concepts, but knew little about the technique and analysis of results. Conclusion: this study will contribute to reflection about the importance of the heart test as a routine in RI and the need for implementation of screening and early detection of congenital heart disease in State, and especially in high-risk maternity hospitals.

RESUMO
Objetivo: describer a percepção dos profissionais de saúde do Alojamento Conjunto das maternidades de alto risco de Maceió quanto à importância da realização do teste antes da alta da maternidade para detecção precoce de cardiopatia congénita crítica no recém-nascido. Método: estudo descritivo, com abordagem qualitativa, realizado de janeiro a dezembro de 2014, no ALCON das duas maternidades de alto risco de Alagoas/AL. A população foi composta por médicos e enfermeiros. Os dados foram analisados pela Técnica de Análise de Conteúdo. Resultados: profissionais apresentaram conhecimento superficial sobre a oximetria de pulso como instrumento de triagem; conheciam importância e conceitos, porém sabem pouco sobre a técnica e análise dos resultados. Conclusão: este estudo contribuirá para a reflexão acerca da importância da existência do teste do coraçãozinho como rotina no ALCON e a necessidade de implantação da triagem e detecção precoce de cardiopatias congênitas nas maternidades do Estado, principalmente, nas de alto risco.

Descritores: Enfermagem; Oximetria; Neonatal screening.

ORIGINAL ARTICLE

REVIEW OF NURSING

TRIAGEM NEONATAL DE CARDIOPATIAS CONGÊNITAS: PERCEPCIÓN DOS PROFISSIONAIS DE SAÚDE DO ALOJAMENTO CONJUNTO

CLASSIFICACIÓN NEONATAL DE CARDIOPATIAS CONGÉNITAS: PERCEPCIÓN DE LOS PROFESIONALES DE SALUD DEL ALOJAMIENTO CONJUNTO

Luana Feitosa de Lacerda, Ana Laura Costa Ferreira, Cátia Barros Lisboa, Ingrid Martins Leite Lúcio, Josielma Cavalcante de Lima Batista, Leticia Oliveira de Melo

ABSTRACT
Objective: to describe the perception of health professionals working in Rooming-in (RI) of high-risk maternity hospitals of Maceió regarding the importance of testing before maturity discharge to early detection of congenital heart disease in critical newborns. Method: descriptive study with qualitative approach, carried out from January to December 2014, in the RI of the two high-risk maternity hospitals in Alagoas / AL. Study population was composed of doctors and nurses. Data were analyzed using the Content Analysis Technique. Results: professionals had superficial knowledge of pulse oximetry as a screening tool. They knew its importance and concepts, but knew little about the technique and analysis of results. Conclusion: this study will contribute to reflection about the importance of the heart test as a routine in RI and the need for implementation of screening and early detection of congenital heart disease in State, and especially in high-risk maternity hospitals.

Descritores: Nursing; Oximetry; Neonatal screening.
The term triage originated from the French word triage, meaning selection, separation of a group. In Public Health, screening programs are aimed at early detection of certain pathologies. For this purpose, professionals apply tests on groups of individuals with a high probability of having these conditions.  

The Newborn Screening uses this screening method in the population aged from zero to 30 days of life. It aims to promote the detection of congenital heart disease in the presymptomatic phase in live births, allowing early treatment and thus reducing morbidity, its consequences and mortality generated by the screened diseases.  

The incidence of critical congenital heart disease in newborns is about 1-2 cases per 1000 live births. It is potentially fatal and needs surgical or interventional treatment in the first year of life, accounting for about 10% of infant deaths and for about 20 to 40% of those due to malformations.  

Critical congenital heart diseases are those whose clinical presentation stems from the closure or restriction of the ductus arteriosus (channel-dependent heart diseases). They can be classified as: heart diseases with pulmonary flow dependent on the ductus arteriosus (pulmonary atresia and similar), heart diseases with systemic flow dependent on the ductus arteriosus (hypoplastic left heart syndrome, coarctation of the aorta and similar) and cardiac diseases with circulation in parallel (transposition of the great arteries).  

Clinical signs of congenital heart disease in the early days of the newborn may not be clearly perceived in the clinical assessment because in the first hours of life newborns have healthy appearance, because the ductus arteriosus is still open. With the closure of it, the hypoxemia occurs, triggering cyanosis, which is difficult to detect in the early levels, and the presence of heart murmur can not be auscultated. Other factors that impair the initial diagnosis are early hospital discharge and failure to assess the NB and the risk identification.  

Due to structural changes of the heart and great vessels present in critical congenital heart disease, the mixing of blood between the systemic and pulmonary circulations occurs which causes a reduction in oxygen saturation. According to a study, 30% of newborns with congenital heart disease receive hospital discharge without diagnosis and progress to shock, hypoxia or early death before receiving proper treatment. In this sense, the measurement of pulse oximetry as a screening measure for neonatal congenital heart disease has become an important tool for the early diagnosis of these pathologies. Several studies highlight the importance of its use as routinely screening method in newborns due to its high sensitivity and specificity for early detection of these diseases.  

Pulse oximetry should be performed in all apparently healthy newborn with gestational age >34 weeks, between 24 and 48 hours of life, before hospital discharge. The test should be performed in the right upper limb and one lower limb, requiring that the NB is with the heated ends and the oximeter monitor evinces a wave of smooth stroke.  

For the result without changes in oxygen saturation (SpO2), the newborn must present peripheral saturation greater or equal to 95% in both measures (upper right limb and lower limb) and difference less than 3% between the measures of the upper right limb and lower limb. An abnormal result is any measure of SpO2 lower than 95% or difference equal to or greater than 3% between the measures of upper right limb and lower limb. In this situation, a new assessment should be carried out after 1 hour. If the result is confirmed, an echocardiogram must be carried out within 24 hours. In these situations, the NB should be referred to a cardiologist pediatrician.  

Teaching hospitals are training centers for professionals in different areas. In assisting the NB, nurses and doctors the are professionals who devote more time with the NB in the RI. The nature of the work of these professionals includes the provision of physical care and implementation of diagnostic and therapeutic procedures, making them key elements in neonatal screening actions to detect congenital diseases in pre-symptomatic stage, allowing early treatment.  

The newborn in RI is an apparently healthy individual with specific features and requirements of this phase. According to studies, 30% of newborns with critical congenital heart disease receive hospital discharge without diagnosis and progress to shock, hypoxia or early death before receiving proper treatment.  

As the perception is personal and untransferable, it is important to check how specific groups experience some phenomena. Thus, in face of the literature discussed here and the importance of the theme, researchers tried to collect data that showed the implementation of the practice of measuring the oxygen saturation of newborns born in...
high-risk maternity hospitals of Alagoas, but, unfortunately, no satisfactory data was fond.

It is known that, in congenital heart diseases, there is reduced oxygen saturation before clinical signs, as cyanosis, appear and the pulse oximetry detects this decrease in saturation. Given this assumption, this research presupposes that health professionals do not conceptualize, implement and conduct routinely the test for lack of training to perform pulse oximetry as a screening tool and consequently lack of knowledge about the importance of screening for congenital heart diseases.

**OBJECTIVE**

- To describe the perception of health professionals working in the RI of high-risk maternity hospitals in the city of Maceió as the importance and feasibility of performing the test before hospital discharge to early detection of congenital heart disease in critical newborns.

**METHOD**

This is a descriptive study with qualitative approach, conducted with health professionals (doctors and nurses) working in the RI of the two reference maternity hospitals for high-risk in Alagoas. Hospital A consists of 48 beds and Hospital B consists of 16 beds.

The Rooming-in is the hospital system in which the healthy newborn remains with the mother soon after birth, 24 hours a day, in the same environment, until hospital discharge. This system makes it possible that the multidisciplinary team provides all the care, favors newborn screening and guidance for mothers and their families about the care of the newborn and herself.

The study period was from January 2014 to December 2014, and the data collection period was during the months of June and July 2014. The sample was composed of professionals working in this sector (Rooming-in), the two high-risk maternity hospitals of Maceio. To determine the sample, it was considered the population of doctors and nurses who worked in this sector, in the services in question, which were 34 professionals. The sample type was by convenience, respecting the availability of professionals.

The inclusion criteria were: health professionals, doctors and nurses who assist the NB in the RI and who agreed to participate by signing the Informed Consent Form (I.C.F.). The exclusion criteria were: professionals who were on vacation, on leave or who refused to sign the Informed Consent Form (I.C.F.), even after being informed of the importance of the research.

The instrument used to collect data after obtaining the Informed Consent Form was a semi-structured questionnaire prepared by the author, which consists of questions regarding the knowledge of the screening test as well as its importance and feasibility of implementation in RI.

The steps for data collection were: 1. Preparatory; 2. Visits to RI; 3. Approach to the professional; 4. Application of semi-structured questionnaire; 5. Organization and preparation of data for analysis.

Data collection was carried out in the months of June and July with the participation of Rooming-in professionals after authorization of the institution, of the Ethics Research Committee, and obtaiment of the Informed Consent Form, respecting the Resolution 466/12.

The data were analyzed by the content analysis technique, following three steps: 1. Pre-analysis, 2. Material exploration and 3. Treatment of results: inference and interpretation.

The ethical principles were followed in all phases of the study, in line with what advocates Resolution 466/12. Throughout the study, authors considered the assumptions of bioethics, configured in its Resolution: autonomy, non-maleficence, beneficence and justice, where the criterion of respect for dignity and the protection of rights and welfare prevailed. The study was submitted to the Research Ethics Committee - Brazil Platform with CAAE number 30777414.8.0000.5013 and approved under Opinion number 663.411. Professionals were asked to sign the Informed Consent Form, in two copies, of which one remained with the researcher and the other was given to the participant. At any time, the professional could refuse to continue participating in the study and also could withdraw consent, without this brought them any penalty or loss.

**RESULTS AND DISCUSSION**

The sample was composed of nurses and doctors working in the RI of MESM and HUPAA. One point to note is that, due to the reform of MESM, this service is working in HUPAA facilities; however, professionals are also working in other services, invalidating part of the data collection.

Another point to note is that some professionals were resistant to the survey,
since the issue in question is not part of the reality of these health services and eight professionals refused to participate in the study.

**Characterization of the subjects**

The sample was comprised of 15 nurses and doctors working in the RI of the institutions concerned. Of these, nine were nurses and five were doctors, and 12 (80.0%) were female and three (14.85%) were male.

### Congenital Heart Diseases

Congenital Heart Diseases (CHD) are common in live births and even more frequent in fetuses, with a high mortality in the first year of life. Its prevalence varies depending on the population studied and may reach up to 1% in the postnatal population.\(^{16}\)

When subjects were asked "What are congenital heart diseases?", all (100%) used the concept of heart malformation present at birth, as can be seen in the answers:

**Heart diseases already present at birth. (L1)**

| Heart diseases that NBs are born with them. (L3)  |
| Pathologies presented in newborns due to changes in the pregnancy, the period of formation of structures. (L4) |
| Malformations ... Tetralogy of Fallot; congenic cardiopaths; heart murmur... (L5) |
| Cardiac pathologies in which the fetus presents since their embryogenesis. (L6) |
| Heart defects already present at birth. (L2) |
| Cardiac abnormalities present at birth in newborns. (L7) |
| Congenital disease that affects the heart structure and function, which is present at birth. (L8) |
| Cardiac alterations acquired during uterine life. (L9) |
| Diseases related to the cardiovascular system; the newborn are already born with them, i.e., acquired during the embryo form. (L10) |
| Malformations that occur in fetal life. (L11) |
| Heart diseases that newborns have at birth. (L12) |
| Changes in cardiac anatomy of the newborn. (L13) |
| Congenital conditions (cardiac structural abnormalities) since birth... (L14) |
| Congenital malformation of the newborn’s heart. (L15) |

There is highlight for the answer: “Malformations... Tetralogy of Fallot; congenic cardiopaths; heart murmur...” (L5), since it goes beyond the concept of cardiac malformation present at birth, citing types of heart disease.

The seven diseases classified as Critical Congenital Heart Disease (CCHD) are hypoplastic left heart syndrome, pulmonary atresia, Tetralogy of Fallot, total anomalous pulmonary venous return, transposition of the great arteries, tricuspid atresia and critical aortic coarctation. NBs with any of these CCHD have a significant risk of death.\(^{17}\)

**Pulse oximetry**

The pulse oximetry has being proposed as an alternative screening method for the detection of congenital heart diseases. It is simple, non-invasive and measures the percentage of hemoglobin in the blood. The measurement of oxygen saturation identifies NBs with mild cyanosis, who have no audible murmur or other signals of heart abnormalities, which are detected in routine clinical examination.\(^{18}\) In this sense, it was asked to research subjects “What is the pulse oximetry?”; the answers can be seen in the following table.
Test to evaluate the newborn oxygenation: (L1)

- It is the measurement of pre and post-ductal oxygen saturation. (L2)
- It is a test that evaluates the likelihood of infants developing some heart disease. (L5)
- It checks saturation. (L7)

Test performed in the newborn to detect heart abnormalities. (L8)

Test that is done, I mean, whether there is the amount of saturation of O₂ in the bloodstream. (L10)

- It is the examination of blood oxygenation. (L11)
- It is a test that checks blood oxygen saturation in newborns. (L13)
- Test that should be performed in the first 24 hours for early diagnosis of congenital diseases. (L14)
- Test that allows screening for early diagnosis of congenital heart disease. (L15)

In this question, four (26.6%) study subjects said they could not conceptualize the pulse oximetry and one (6.6%) individual did not answer to the question. The answers, through the content analysis, were grouped into the following categories:

♦ Examination of peripheral oxygen saturation of the NB:

Pulse oximetry is a simple and painless test that checks blood oxygen saturation. In this sense, there are the following answers:

- Test to evaluate the newborn oxygenation. (L1)
- It checks saturation. (L7)
- Test that is done, I mean, whether there is the amount of saturation of O₂ in the bloodstream. (L10)
- It is the examination of blood oxygenation. (L11)
- It is a test that checks blood oxygen saturation in newborns. (L13)

Also conceptualizing the pulse oximetry in the context of peripheral O₂ saturation in NBs, there is the following answer: “It is the measurement of pre and post-ductal oxygen saturation” (L2). This is a more complete response for referencing the test technique relating the pathophysiology of some diseases.

The ductus-dependent congenital heart disease may not be apparent in the clinical examination of early discharge. On the other hand, the pulse oximetry performed in the first 24 hours of NB cardiac dependent on ductus arteriosus will be within the standards, as this is a strategy that prevents circulatory collapse and death. Its realization has minimal discomfort to the newborn, low cost and excellent detection rates of ductus-dependent heart diseases, which is a strong argument for the implementation of pulse oximetry in the rooming-in routine.9,20-1

♦ Early diagnosis of congenital heart disease

It is known that pulse oximetry is a newborn screening tool for early detection of critical congenital heart disease, which appears in the responses of the subjects when asked “What is the pulse oximetry?”

It is a test that evaluates the likelihood of infants developing some heart disease. (L5)

Test performed in the newborn to detect heart abnormalities. (L8)

Test that should be performed in the first 24 hours for early diagnosis of congenital diseases. (L14)

Test that allows screening for early diagnosis of congenital heart disease. (L15)

Regarding the detection of congenital heart diseases, respondents were asked to judge the sentence as true or false: “Pulse oximetry can detect all forms of congenital heart diseases.” Only the answer “false” was considered correct, since the pulse oximetry is designed to detect alterations in the peripheral saturation of the newborn, so the test only screens critical congenital heart diseases that occur with altered levels of Sp O₂ and cyanosis. Thus, 14 (93.3%) of the professionals answered correctly.

♦ Pulse oximetry as a screening tool

In the group of critical congenital heart diseases (CCHD), there is a mixture of blood between the systemic and pulmonary circulations, which entails a reduction in peripheral O₂ saturation. In this sense, the routinely measurement of pulse oximetry in apparently healthy newborns with a gestational age > 34 weeks has shown high sensitivity and specificity for early detection of these diseases.4

Regarding the use of pulse oximetry in newborns, respondents were asked “Why do they use pulse oximetry to screen for congenital heart disease?” A third of professionals could answer:

Because the low saturation may suggest that the heart is not pumping blood properly and consequently adequate tissue oxygenation is not happening. (L1)

If the oxygen saturation is different pre- and post-ductal > 3% suggests cyanotic heart disease, and O₂ saturation <95%. (L2)

For diagnosis of cyanotic heart diseases. (L6)

Because oxygenation is an important data to evaluate cardiac functioning. (L9)
Because when someone has decreased O₂ saturation, this may suggests heart failure. So we do, I mean, from there we look for further investigation. (L10)

From the other instruments, four (26.6%) subjects when asked about “Why do they use pulse oximetry to screen for congenital heart disease?” could not hit the goal of the question, but alluded to the method be painless, quick, practical and low cost. As can be seen below:

Not to submit NBs to more complex examinations. (L3)
Because it is fast and convenient. (L13)
Because it does not hurt and is low cost. (L14)
It is a painless and fast method that enables the early diagnosis of heart disease. (L15)

Other four (26.6%) individuals brought incoherent answers to the initial question: Through the O₂ levels we can assess the level of oxygenation. (L4)
We do not use it in MESM or at the University Hospital. (L7).
Because it is a way to check the heartbeat. (L8)
Because it is a factor of detecting. (L11)

♦ Technique for performing the pulse oximetry

Regarding the pulse oximetry technique, it was asked “How should the measurement of pulse oximetry be done in order to screen newborns?” Most subjects (66.6%) chose the correct alternative, which states that the assessment should be done in the newborn’s right hand and foot.

Still on the technique, it was asked “When the pulse oximetry should be done”. Thus, it was found that nine (60%) professionals considered as true the option saying between 24 and 48 hours of life. Therefore, these answered correctly, since in the first 24 hours there is a greater number of false positives and, depending on the type of cardiac malformation, from 48 hours on the newborn may present more apparent signs such as cyanosis. In Brazil, the pulse oximetry in newborns should be made between 24 and 48 hours of life of the NB.4

♦ Heart test result

On the evaluation of pulse oximetry results and which values are considered abnormal, this instrument listed five sentences for the respondents judge as true or false. Thus, it was verified the following assertion indices: five (33.33%) subjects chose as true the option that considered as abnormal the peripheral saturation values lower than 95% in either or both measurements; three (20%) considered true the statement that described as abnormal a “difference equal to or greater than 3% between the measurements”; one (6.66%) subject considered the both sentences as true. Therefore, only one (6.66%) professional totally hit the question, eight (53.33%) agreed partially; it is important the fact that six (40%) professionals have totally wrong to question.

When asked to point out the alternative that includes “the procedure to be followed before an abnormal result,” we observed that only five (33.33%) professionals answered correctly the question, since they said they should perform a new measurement in 1 hour.

♦ Prior knowledge of the subject

When asked about whether the pulse oximetry is carried in the RI of the services in question, 15 (100%) subjects answered no. Asked whether they have prior knowledge on the subject, five (33.33%) said yes, in descending order, through internet, articles, conferences and training.

CONCLUSION

It was observed that research participants working in RI had knowledge of pulse oximetry as neonatal cardiological screening tool. However, since this is not a reality in the health services in question and professionals are not trained on the subject, these have superficial knowledge, that is, know the importance of this type of screening and important concepts, but demonstrate a low level of knowledge and lower success in answering questions about the technique and analysis of the test results.

The results showed that: for the cardiological neonatal screening achieves its main objective of early detection, it is required information, training and implementation of the strategy. Thus, the pulse oximetry needs to be known and understood by many health professionals, especially those working with mothers and newborns in RI.

Neonatal cardiological screening routine and teamwork are key factors for early detection of congenital critical diseases, providing reduction in the mortality rate for this cause and consequently higher quality of life for all NBs early diagnosed and referred to specific treatment.

This study may contribute to the reflection about the importance of routine performance of pulse oximetry in RI and the need to implement a routine for screening and early detection of congenital heart diseases in State and, especially, in high-risk maternity hospitals.
REFERENCES


