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## Implementation of the Sensorimotor Stimulation Protocol in the neonatal unit

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### ABSTRACT

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#### OBJECTIVE

To evaluate pre- and post-training knowledge after implementing the sensorimotor stimulation protocol in the Neonatal Intensive Care Unit.

#### METHODS

Prospective study at the HGG NICU during the month of November, with physiotherapists working in the morning, afternoon and night. A pre- and post-training questionnaire on prematurity and ESM was administered. To analyze the results, the percentage of errors and successes of the participants was evaluated.

#### RESULTS

The sample was composed of 13 physiotherapists with a predominance of female professionals, the majority aged up to 30 years, with completed postgraduate studies and experience of up to 5 years in the area. In general, the score between pre and post training shows that they are useful in training professionals with possible problems that can be adjusted in the way they are applied.

#### CONCLUSION

It was possible to verify a general improvement in the knowledge acquired by the participating professionals, after implementing the protocol and training on ESM, with questions about eligibility and contraindications for the use of ESM and application of the technique being the weakest points. The overload of work and shifts may have hindered the knowledge acquisition process, which reinforces that these events need to occur, but with diversified and programmed approaches, to actually contribute to professionals obtaining more security when carrying out ESM on patients. in the NICU.

#### DESCRIPTORS

Prematurity, Institutional protocol, Premature newborn, Neonatal intensive care.

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## INTRODUCTION

The maternal uterus is a healthy and ideal environment for musculoskeletal and neurological development. Experiences and behaviors in intrauterine environments provide the newborn with the experiences necessary for the normal development of brain systems and function. These experiences have permanent effects on the maturation and formation of synapses and cell differentiation. Newborns born at < 32 weeks of GA have globally reduced brain volume, particularly in the hippocampal and frontotemporal regions that are responsible for voluntary motor skills, behavior, speech and thoughts and the hippocampus is responsible for short-term memory. Furthermore, some postnatal factors can have consequences on neurodevelopment, such as sepsis, bronchopulmonary dysplasia, intraventricular hemorrhage, exposure to steroids, oxygen therapy and the use of sedation<sup>1,2-7,16</sup>.

Early exposure to the extrauterine environment alters musculoskeletal development, nervous system function, and sensory, visual, auditory, gustatory, behavioral and cognitive systems, potentially altering one or more systems<sup>8,15</sup>.

According to the first Brazilian recommendation for physiotherapy for sensorimotor stimulation of newborns and infants in the neonatal intensive care unit (NICU), sensorimotor stimulation (ESM) is an early and therapeutic intervention, which has an important role in the adaptation of these newborns. to the external environment through tactile, vestibular, auditory, visual, olfactory, gustatory stimuli, therapeutic exercises and therapeutic positioning, aiming to improve neuropsychomotor development (NPM). In addition to minimizing the consequences that prematurity causes, ESM maximizes capabilities and organizes the senses<sup>12-14</sup>.

Due to the stress of an ICU environment, these newborns present altered conditions, these systems suffer instability, the selection of babies for ESM demands technical and scientific knowledge for the correct evaluation and conduction of therapy. Stimulation must be performed in babies with eligibility criteria to receive the procedure, the recommendations found in the literature in general are gestational age above 32 weeks, weight above 1,500kg, newborn with increasing weight gain and clinical and hemodynamic stability. Therefore the goal of ESM is to organize these systems and improve DNPM based on the level of functional development<sup>13-15</sup>.

From this context, ESM with criteria becomes essential for preterm newborns (PTNB) especially in the first 12 months of life due to neural plasticity and learning capacity<sup>11</sup>, since the region where the research is applied has high demand for babies born prematurely, in addition to the low percentage of studies on the topic, the importance of approach and training regarding the intervention in question is highlighted. Therefore, the objective of this study is to evaluate and implement the sensorimotor stimulation protocol in the neonatal unit, applying team training with theoretical and practical content and implementation of the standard operating protocol (SOP) aiming at team adherence so that more babies are stimulated by professionals trained in applying the technique.

## METHODS

Prospective, applied, quantitative study in the Neonatal Intensive Care Unit of a Public Reference Hospital in the South Zone of São Paulo/SP, which has 11 beds in the neonatal intensive care unit and 11 neonatal intermediate care beds, composed of a team of 17 physiotherapists with a 12h x 60h shift, with the final sample consisting of 13 professionals due to leaves and vacations.

The study was developed in four stages, the first being the elaboration of the standard operating protocol (SOP), which was validated by the hospital's quality team, which described information about sensorimotor stimulation, indication, description

of the procedure, types stimulation and demonstration with images, the second, application of the questionnaire, developed by the researcher based on the SOP, previously approved by the hospital, to evaluate the professionals' knowledge, the third, the training and implementation of the protocol in the NICU and the fourth, application of the same questionnaire from the second stage to evaluate the knowledge acquired by professionals.

The physiotherapists who agreed to participate in the study, after signing the TCLE, answered the characterization questions (age, sex, time since training and additional training) and specific questions about the application of sensorimotor stimulation in neonatology. The results were analyzed descriptively and expressed in absolute values and percentages.

The study was submitted and approved by the ethics and research committee (CEP) of the Santo Amaro University (UNISA) with CAAE 67012723.4.0000.0081 and opinion no.: 6.230.965 and the Hospital Geral do Grajaú with CAAE 692690230.3001.5447 and opinion no.: 6.288 .307.

## RESULTS

The final sample was made up of 13 physiotherapists, day laborers and firemen, and first-year and second-year residents of the Multiprofessional Residency Program, in the morning, afternoon and evening periods (Table1). There is a predominance of female professionals, the majority aged 30 and with up to 5 years of professional experience.

**Table 1.** Number, percentage, age, sex and characteristics of health professionals working in the neonatal intensive care unit. (n=13).

Variables	n	%
Physiotherapist	13	100%
<b>Sex</b>		
Feminine	13	100%
Masculine	0	0.00%
<b>Age</b>		
18 to 30 years old	7	53.80%
31 to 40 years old	4	30.80%
41 to 60 years old	two	15.40%
Over 60 years old	0	0.00%
<b>Postgraduate</b>		
Multiprofessional residency	6	69.20%
Specialization in pediatrics and neonatology	4	30.80%
Master's degree	0	
Doctorate degree	0	
Other specialization	3	23.10%
<b>Academic training time</b>		
Less than 5 years	9	69.20%
6 to 10 years	two	15.40%
11 to 15 years old	two	15.40%
More than 15 years	0	0.00%

Ten specific questions were asked on the topic - sensorimotor stimulation in the neonatal unit, which was divided into two stages, with the first stage - pre-training, participants responding in accordance with professional practice in the hospital's NICU and the second stage - post-training, consisted of the same specific questions reapplied post-training, with the aim of evaluating understanding of the sensorimotor stimulation protocol. The percentage and description of each question are graphically described below.

Table 2 shows the correct answer rates for the ten questions before and after the specific training on sensorimotor stimulation in the neonatal unit.

**Graph 1.** Hit rates in Pre and Post Training (n=13)

Question	Hit rates (%)	
	Pre test	Post test
1. Prematurity is one of the main causes of death in children under 5 years of age	92	100
2. Early exposure to the extrauterine environment alters the development of the visual, auditory and gustatory system, with no behavioral and cognitive impairments in cases where intraventricular hemorrhages do not occur	100	92

3. The objective of ESM is to adapt this newborn to the external environment and organize systems, through tactile, vestibular, gustatory, olfactory, auditory or visual stimulation.	100	100
4. All premature newborns with GA >32 weeks and weighing less than 1000kg are eligible for sensorimotor stimulation	54	69
5. Absolute contraindications for ESM are hemodynamic instability, clinical lability, use of invasive and non-invasive mechanical ventilation.	62	54
6. Sighing, frowning, sneezing, yawning, swerving, fingers spread are signs of withdrawal for ESM.	92	100
7. Unimodal stimulation is the stimulation of a single system during newborn therapy, while multimodal stimulation is the combination of two or more systems to be stimulated during therapy.	100	100
8. Tactile and kinesthetic stimulation is performed with gentle touches on the baby's skin, and it is important to know the conduction of touch on the newborn, hand temperature and conduction of the movement, which must be carried out cephalocaudally, in the opposite direction of the muscle fibers.	54	54
9. Vestibular stimulation involves rocking the newborn in different positions and slowly, the use of a hammock is very common for this therapy.	100	100
10. Visual stimulation, the premature baby must fix his gaze on the object presented in front of him at a distance of 18 to 21 cm. He must observe the baby's gaze on the object for 1.5 to 2.5 seconds, longer fixation time may cause displacement of the object.	80	100

## DISCUSSION

In the present study, the results were analyzed based on the number of professionals, analyzing the percentage of errors and correct answers in the pre and post questionnaire. It was observed that the majority of the sample was made up of female professionals aged up to 30 years, completed postgraduate studies and 5 years of experience in the area, corroborating with a study that evaluates the performance of physiotherapy in a neonatal unit that shows a profile of professionals similar to that presented in this study by Braga<sup>18</sup>.

Questions 1 and 2 of the questionnaires emphasize knowledge about prematurity and its risks to the baby. It is observed in the data that, in general, physiotherapy professionals have attention and good knowledge about the topic and its possible problems. Specifically on the issue of risks, Sharma<sup>7</sup> state that peri-intraventricular hemorrhages can range from grade 1 to 4, which causes the child to have cognitive and behavioral damage, cerebral palsy and hydrocephalus, due to the inflammatory process and bleeding in the local germinal matrix of greater incidence of bleeding in premature babies.

Still on the second question, the drop in the correct answer rate post-training can be inferred by factors involving interpretation or attention at the time of the questionnaire, in the study by Silva<sup>17</sup> they bring an unfavorable perception of the team regarding training carried out at pre-shift and post-shift times. shifts mainly at night, or in the hospital environment where there are unproductive periods and low team adherence, which is something specific and not related to a lack of knowledge.

Objectives, indications and contraindications of the sensorimotor stimulation technique permeate questions 3 to 7 of the questionnaire. What is observed, in most of them, is the prevalence of an increase in success rates after training. Regarding the age of the premature baby, question 4, Fabrice<sup>10</sup> points out divergences regarding the definition of gestational age, since each system to be stimulated has a maturation according to the gestational age. Such studies cover a large majority from 31 weeks onwards and minimum weight must be greater than 1200kg and in weight gain, babies weighing less than 1100kg do not present criteria for stimulation according to these studies due to the risks associated with low weight and risk of perinatal hemorrhage intraventricular.

In the standard operating protocol (SOP) developed for the study, the patient profile was outlined according to the Hospital's neonatal ICU, with weight above 1200kg and IGC greater than 32 weeks being standardized with findings based on literature<sup>13-14</sup>.

On contraindications to the use of the stimulation technique

Deng and collaborators provide evidence that clinically and hemodynamically unstable babies are not eligible to undergo ESM, as choosing to perform the technique will pose risks to the newborn<sup>14</sup>. This statement is still very debatable and there is little literature on contraindicating or indicating ESM in newborns using invasive and non-invasive mechanical ventilation. Considering the metabolic demand, energy expenditure and irritability of the newborn, it is difficult to measure the cost-benefit of the technique. application of the technique, however, the clinical evaluation of the NB must be carried out thoroughly regarding any decision making to elect the RN for ESM applicability. This discussion may justify the increase in the number of errors in this question after training.

On the other hand, questions 8,9 and 10 concern the application of the sensory motor stimulation technique. In question 8 involving the way of performing tactile and kinesthetic stimulation, it can be noted that there was no difference in the pre and post questionnaire with the same percentage of errors and correct answers. The study by Veiga et al mentions that the feeling of stimulation must be precise and unique due to the sensory cells and microsensors present in the skin.

Questions 1,3,6,7,9 and 10 bring specificities of carrying out the practice of ESM and prematurity. Question 1 addresses prematurity being one of the biggest causes of death in children under 5 years of age, these newborns have a greater risk of death, due to the immaturity of all systems, and the consequences that lead to labor premature birth, and other complications such as bronchopulmonary dysplasia, intraventricular hemorrhage, oxygen therapy, as seen in the study by Ahumada and collaborators<sup>1</sup>, which is known to the majority of study participants.

Question 3 mentions the objective and importance of ESM, as it is to adapt the NB to the external environment in order to stimulate its development, in the study of Zdzienicka<sup>7</sup>, states that the newborn is deprived of stimuli with premature birth, these are fundamental for his development, being taken to an ICU environment which is a totally stressful environment and outside the intrauterine standard.

Question 6 mentions the newborn's behavioral signs during therapy that guide whether the physiotherapist should stop or continue the ESM. These signs must be known at the time of performing the technique. And questions 7,9 and 10 mention how to perform the technique in practice, separation and joining of the systems to be stimulated and the use of objects during practice such as network and visual plates seen in the study by Johnston<sup>11</sup>. The questions addressed above had 100% correct answers in the post-questionnaire, the result corroborates the evidence from the studies cited on the importance of educational training.

This study has limitations, related to poor adherence and collaboration of participants during training, and the turnover of some professionals.

## CONCLUSION

There was a general improvement in the knowledge acquired by participating professionals after implementing the protocol and training on ESM. Specifically on issues about prematurity and contraindication to sensorimotor stimulation, knowledge remains low, signaling the need for recurrent training of these professionals. Furthermore, the workload of professionals involved in the neonatal ICU service, demand for shifts and various activities may justify the lack of adherence to training and, in some cases, the pre and post scores.

In this context, we reinforce the importance of guidance and ongoing education with the implementation of diverse approaches, based on scientific data, as a way of contributing to professionals gaining greater confidence in performing ESM on NICU patients.

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