

# Current Physiotherapy Practices in Neonatal Intensive Care Unit

Mansi Milanbhai Kotecha<sup>1</sup>, Mansee Desai<sup>2</sup>

<sup>1</sup>Second-Year MPT Student, JG College of Physiotherapy, Ahmedabad

<sup>2</sup>Lecturer and PG Guide, College of Physiotherapy, Ahmedabad.

Corresponding Author: Mansi Kotecha

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## ABSTRACT

**Background:** Neonatal intensive care unit, being a specially equipped area for critically ill and unstable newborns, requires a variety of healthcare professionals with expertise in neonatal care including a physiotherapist. The ongoing pandemic (COVID-19) has dramatically changed healthcare services and systems including neonatal intensive care units.

**Aim and Objective:** The study's objective was to investigate current cardiopulmonary and neuromuscular physiotherapy practices in the neonatal intensive care unit.

**Methodology:** A cross-sectional study was conducted by sending a validated questionnaire to 250 physiotherapists of different cities across Gujarat through an online survey platform. The link to the survey was sent using various social networking sites such as E-mail, WhatsApp and Facebook.

**Results:** Currently, only 43.2% of physiotherapists are practicing in the neonatal intensive care unit. Out of which 80% of physiotherapists carry out only conventional chest physiotherapy and neuromuscular physiotherapy.

**Conclusion:** At present less than 50% of physiotherapists are involved in practicing in the neonatal intensive care unit. Scarcity of knowledge, as well as the practice of many potent cardiopulmonary and neuromuscular physiotherapy interventions, is present currently.

**Keywords:** neonatal intensive care unit, chest physiotherapy, neuromuscular physiotherapy, online survey, Gujarat.

## INTRODUCTION

A neonatal intensive care unit being a specially equipped area of a hospital, critically ill and unstable neonate receives diagnostic, therapeutic, and life support care interventions for various conditions.<sup>[1]</sup> It is abbreviated to NICU but can also be called a newborn intensive care unit or neonatal critical care unit (NCCU). The NICU admits neonates with low birth weights, have congenital abnormalities, respiratory disorders, neuromuscular disorders, and infant's post-surgery or who are preterm.<sup>[2]</sup> Neonates admitted in neonatal intensive care units have various odds to overcome, ranging from immediately life-saving to

long-term developmental outcomes. Pre-term infants are at risk for delay in all developmental areas (gross motor, fine motor, social, and language) due to the timing of the various bodily systems' maturation and birth. The delay has been shown to directly link with the infant's gestational age, with an earlier gestational age demonstrating a greater risk for developmental delay. This delay ranges from mild learning disabilities to severe and life-long disabilities.<sup>[3]</sup>

A multidisciplinary teamwork approach is an essential component of holistic care. Physiotherapists are part of the interdisciplinary team in the neonatal

intensive care unit. Neonatal physiotherapy is an advanced practice within pediatric physiotherapy<sup>[4]</sup>. Owing to this, physiotherapists who provide care to neonates require advanced clinical skills in the NICU and intermediate care settings. In NICU physiotherapists require skills about the assessment and management of rapidly changing physiological and behavioral stability in neonates, support and education of emotionally charged families, and effective collaboration with other medical professionals regarding plans of care. Physiotherapists must have a variety of skills that can be used to manage neonates to improve outcomes and reduce complications<sup>[4]</sup>.

According to the American Physical Therapy Association, the physiotherapists' roles and responsibilities in the NICU include the following: screening of neonates to determine referral needs, examining neonates, interpreting findings, developing and implementing intervention plans, minimizing the complications of prematurity, and effective collaboration with families and allied professionals to evaluate management plan efficacy.<sup>[4]</sup>

Chest physiotherapy in the NICU commonly includes techniques like percussion, vibration, positioning for postural drainage, and airway suctioning.<sup>[5]</sup> In some hospitals physiotherapist also performs extubation routinely in the NICU protocol.<sup>[5]</sup> Chest physiotherapy is particularly useful in maintaining a clear airway, to re-expand the collapsed lung segments (atelectasis), maintaining adequate levels of oxygenation and poor gaseous exchange, facilitating removal of secretion, and early weaning.<sup>[6]</sup>

To treat neural as well as muscular dysfunction in the neonate, commonly neuromuscular physiotherapy intervention includes positioning, kangaroo care, passive movements, orofacial stimulation, range of motion exercise, surgical scar release through soft tissue mobilization, aquatic therapy (hydrotherapy), and parent education for activities like feeding,

dressing, positioning of infants for sleep, interaction/play.<sup>[2]</sup> Neuromuscular physiotherapy facilitates posture and movement which aids the achievement of developmental milestones. Physiotherapists, therefore, play a beneficial role in the management of neonates and can be recognized as vital members of the NICU healthcare professional team.<sup>[7]</sup>

Many studies have shown that sensory-motor modalities can have an impact on all other developmental systems causing positive change. The results of this study show how physiotherapy can have a positive impact on premature infants and can assist in decreasing the burden of disease on the population by ensuring this population group is given optimal developmental care during an important time of brain plasticity allowing for the improved developmental outcome.<sup>[3,4]</sup> Thus, advancement in knowledge and practice patterns reduces the stay of an infant in the neonatal intensive care unit

Studies carried out previously about intensive care units did not explore the practice pattern of physiotherapists in neonatal intensive care units. A study done in India to identify the role of the physiotherapists in intensive care units demonstrated that physiotherapists were involved in chest physiotherapy and mobilization, but the role of the physiotherapist specific to a neonatal intensive unit was not clear.<sup>[8-12]</sup>

There is a scarcity of literature that explores the practice pattern of physiotherapists in neonatal intensive care units among physiotherapists. Only one study is done regarding Practice patterns of physiotherapists in neonatal intensive care units in India.<sup>[2]</sup>

Therefore, there was a need to identify the current practice patterns in neonatal intensive care units amongst physiotherapists in Gujarat state. The aim of the study was to determine the practice patterns of physiotherapists in neonatal intensive care units in Gujarat state with

regard to cardiopulmonary and neuromuscular physiotherapy.

**METHOD**

250 physiotherapists were approached and questionnaires were sent. Data of 176 physiotherapists from different cities of Gujarat state was collected. Snowball sampling was utilized in this cross-sectional observational research. A self-administered validated questionnaire was administered through Google forms. A self-administered validated questionnaire was administered through Google forms. The link of the questionnaire was sent through WhatsApp and other social media and the link was also Forwarded to people apart from the first point of contact and so on. After they accepted to take the survey, they filled up the demographic details and several questions related to physiotherapy practices in the neonatal intensive care unit.

Participants with Bachelor of physiotherapy and Master of physiotherapy completion, able to understand English, and those who were practicing in neonatal intensive care units were included in the study.

The online self-administrated questionnaire named “Practice patterns of physiotherapists in neonatal intensive care units” was used in the survey. The data Collection was initiated on June 9, 2021, and closed on August 5, 2021.

The questionnaire was divided into two halves, each with 29 questions. These

focused on two key physiotherapy functions in a neonatal ICU: chest and neuromuscular physiotherapy. Chest physiotherapy was largely concerned with evaluation and treatment, whereas neuromuscular physiotherapy was mostly concerned with treatment.

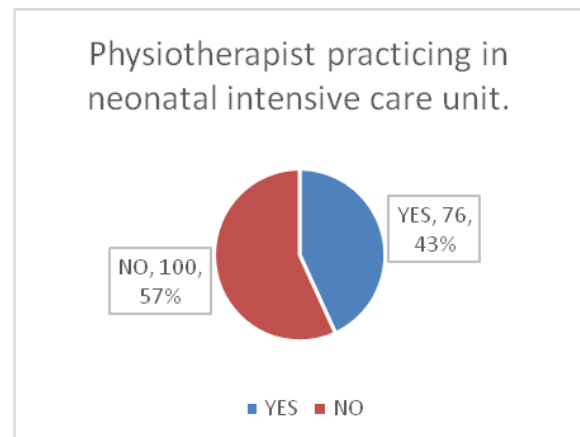
Answers have to be in the following categories: "Always," "Frequently," "Sometimes," "Rarely," or "Never."

Statistical analysis was conducted with Microsoft Excel-2019.

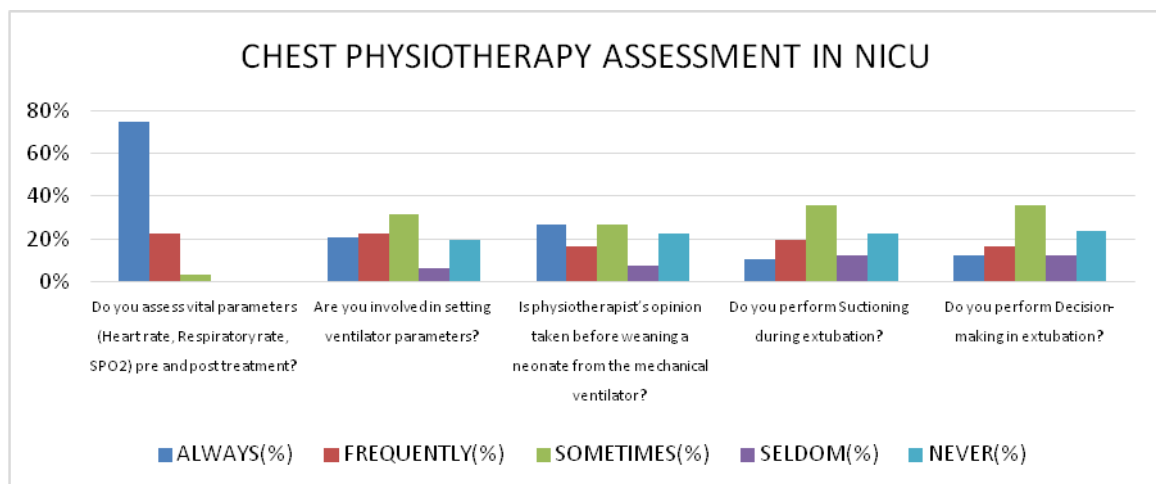
**RESULT**

Out of 250, only 176 responses were received. Therefore, the response rate of this survey was 70.4%.

Figure 1 shows the number of physiotherapists practicing in neonatal intensive care units in 176 responses. Physiotherapist practicing in neonatal intensive care unit is 43%.



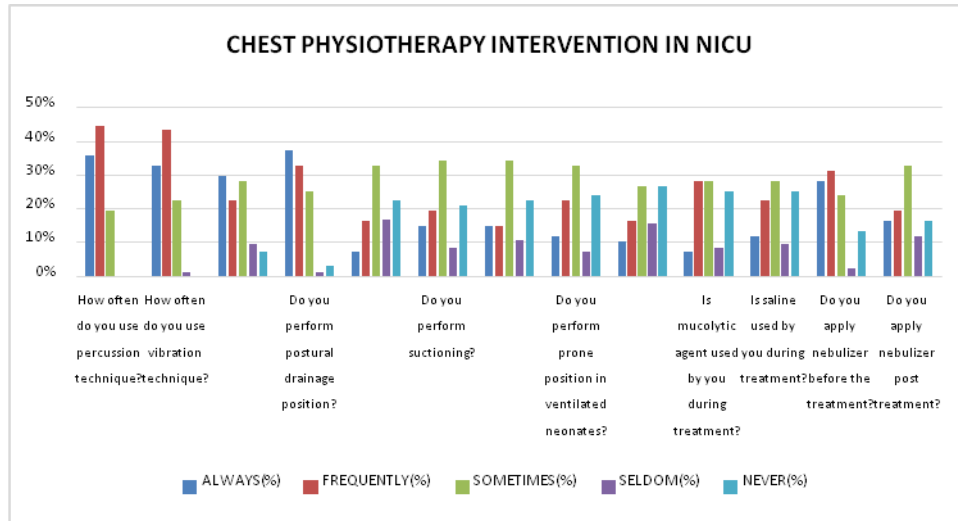
(Figure 1: percentage of physiotherapists practicing in neonatal intensive care unit)



(Figure 2: Chest physiotherapy assessment component)

Figure 2 shows the chest physiotherapy assessment component in the questionnaire. In the chest physiotherapy assessment component, 74.6% always assessed vital parameters, and 23.9% are never involved in decision-making for extubation.

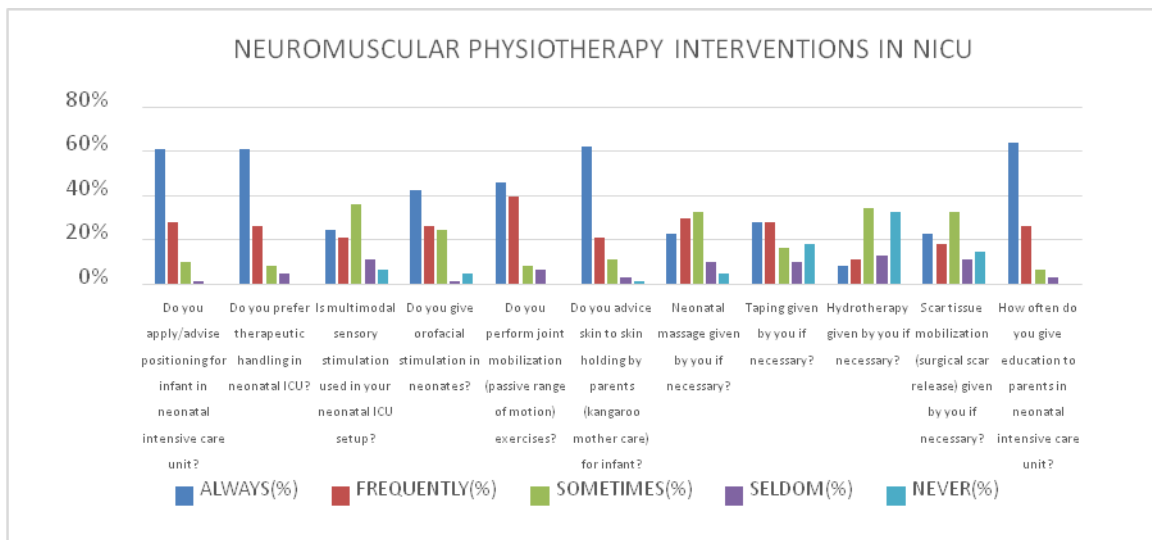
Figure 3 shows the chest physiotherapy intervention component of the questionnaire. In the chest physiotherapy intervention component, 37.3% always perform postural drainage and 26.9% never perform artificial manual breathing units while performing chest physiotherapy and suctioning.



\*AMBU-Artificial manual breathing unit  
(Figure 3: Chest physiotherapy intervention component)

Figure 4 shows neuromuscular physiotherapy intervention in the neonatal intensive care unit. In the neuromuscular physiotherapy intervention component,

63.9% always provide parent education in the neonatal intensive care unit and 32.8% never performed hydrotherapy in the neonatal intensive care unit.



(Figure 4: Neuromuscular physiotherapy intervention component)

## DISCUSSION

The present study evaluated the current physiotherapy practices in neonatal intensive care units of various cities of Gujarat state. We found that, at present

times, 43.2% of physiotherapists are practicing in the neonatal intensive care unit in Gujarat state.

We also found that most of the physiotherapists working in neonatal

intensive care units are involved in intervening infants with conventional chest physiotherapy and neuro-muscular physiotherapy. Our study's primary findings are as follows:

Firstly, considering the role of the physiotherapist in chest physiotherapy assessment 75% assessed vital parameters like oxygen saturation, heart rate, and respiratory rate pre-and post-treatment. 21% were involved in setting ventilatory parameters. 27% of physiotherapists were involved in the decision-making of weaning off a neonate from a mechanical ventilator. 12% were involved in decision-making for extubations and 10% were involved in performing suctioning during extubations.

Secondly, considering the role of the physiotherapist in chest physiotherapy interventions 36% performs percussion techniques. 33% performs chest vibration techniques. 30% prefers to give percussion and vibration (chest manipulation) both together. 37% always performs postural drainage positions. 7% performs head down postural drainage position in ventilated neonates. 15% always performs suctioning. 15% always prefer chest manipulation and suctioning together. 12% always performs the prone position in ventilated neonates. 10% uses an artificial manual breathing unit while performing chest physiotherapy and/suctioning. 7% uses mucolytic agent during treatment. 12% Uses saline during treatment. 28% applies nebulizer before the treatment. 16% applies nebulizer post-treatment.

Lastly, considering the role of the physiotherapist in the neuromuscular interventions 61% applies/advises positioning for infants in the neonatal intensive care unit. 61% prefers therapeutic handling in the neonatal intensive care unit. 25% uses multimodal sensory stimulation in the neonatal intensive care unit setup. 43% gives orofacial stimulation in neonates. 46% performs joint mobilization (passive range of motion) exercises. 62% advises skin-to-skin holding by parents (kangaroo mother care) for infants. 23% gives a

neonatal massage if necessary. 28% uses Taping if necessary. 8% gives hydrotherapy if necessary. 23% gives scar tissue mobilization (surgical scar release) if necessary. 64% gives education to parents in the neonatal intensive care unit.

We also noted the areas where physiotherapists are currently incompetent in are as follows: In chest physiotherapy assessment 23.9% are never involved in decision making for extubation. In chest physiotherapy interventions 26.9% never performs artificial manual breathing unit while performing chest physiotherapy and suctioning. In neuromuscular 32.8% never performed hydrotherapy in the neonatal intensive care unit.

Previous studies and literature have already shown the importance of physiotherapy in the neonatal intensive care unit. Physiotherapy interventions like chest manipulation, postural drainage, and suction. Percussion is used to augment mobilization of secretions by mechanically dislodging viscous or adherent mucus from the airway<sup>[13]</sup> Vibration is generally used along with percussion to help shift secretions from smaller airways to the larger airway.<sup>[13]</sup>

Byrne E et al showed that prone position is useful in facilitating extremity flexion toward the midline, it also limits uncontrolled flailing extremity movement, and causes encouragement of more stable vital signs.<sup>[14]</sup> Shapiro BA et al showed that the importance of nebulization lies in the humidification of inspired gas, the delivery of a medication like a bronchodilator, or in aiding bronchial hygiene. Normal saline (0.9% NaCl) is used for lavage during suction whereas a mucolytic agent is used to reduce the thickness or viscosity of bronchial secretion.<sup>[15]</sup>

Commonly used neuromuscular physiotherapy techniques used by physiotherapists in India for neonates in neonatal intensive care units are positioning, therapeutic handling, passive range of motion exercise, and parent education. Sweeney JK et al suggest that neonates born

preterm have immature musculoskeletal systems that are influenced by positioning. Prolonged exposure to atypical positioning in the NICU has been associated with torticollis, positional plagiocephaly, reduced movement quality, and lower extremity malalignment or deformities.<sup>[4]</sup> Supportive positioning aids in the development of normal/typical skeletal alignment and also provides opportunities for normal/typical movement patterns, such as promoting more optimal cranial molding and preventing plagiocephaly and torticollis.<sup>[16,17]</sup> To increase bone mineral density, reduce congenital joint mobility restriction, to maintain normal joint motion, to prevent contractures and deformities, passive joint range of motion intervention is applied to the infant.

Highest priority activity for neonates and caregivers such as feeding is an integral part of neonatal physiotherapy practice. previous studies showed that orofacial stimulation hastens feeding progression in neonates and decreases the transition time of oral feeding.<sup>[18]</sup>

Studies have shown that multimodal sensory stimulation suggests that sensory stimuli may enhance state regulation, speed transition to full nipple feedings, mitigate stressful environmental stimuli and shorten the length of hospital stay, whereas tactile stimulation alone may improve short-term growth and reduce the length of stay.<sup>[7]</sup>

Adjunct interventions like therapeutic handling and kangaroo care or skin-to-skin holding showed improvement in physiological stability, developing infant-parent attachment, and promoting soft flexion of the infant's arms, legs, trunk, and neck. The short-term benefits for self-regulation may include temperature regulation, improved oxygen saturation, and decreased respiratory rate. Applying neonatal massage to infants has been shown to induce favorable effects to decrease stress levels and improve infant-parent attachment in the neonatal intensive care unit environment.<sup>[3]</sup>

In the neonatal intensive care unit to stabilize the joints or to prevent abnormal movements tapping is used. to reduce restriction occurred due to surgical scars Scar tissue mobilization is employed. Hydrotherapy with a swaddled infant i.e., use of water to create the buoyancy effect and womb-like environment may be a useful adjunct intervention for facilitating self-regulation.<sup>[16,17]</sup>

The possible limitations of this study could be the possibility that participants responded to the survey questionnaire with their perceived ideal answers thus response may not reflect the actual practice patterns of physiotherapists.

## CONCLUSION

At present time less than 50% of physiotherapists from Gujarat state are involved in practicing in neonatal intensive care units. In the chest physiotherapy assessment component majority of physiotherapists are not involved in discission making during extubations. In the chest physiotherapy intervention component majority of physiotherapists are not involved in using artificial manual breathing units were performing chest physiotherapy/suctioning. In the neuromuscular physiotherapy intervention component majority of physiotherapists are not involved in performing hydrotherapy followed by tapping and scar tissue mobilization,

At current times, scarcity of practice of many potent cardiopulmonary and neuromuscular physiotherapy techniques is present.

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**Ethical Approval:** Approved

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