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Effect Of Guideline On Positioning Of Neonates In The Neonatal Intensive Care Unit

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1. INTRODUCTION

BACKGROUND OF THE STUDY

"All footprints start small, some smaller than others,
The footprint of a premature baby starts smaller than most.
Have patience, watch them grow, because in years to come they
will leave a footprint as large as most"

'Developmental Care', introduced in the mid 1980s provides a strategy to address the environmental concerns. Developmental Care is an approach that was designed to modify the Neonatal Intensive Care Unit (NICU) environment so as to minimize the stress experienced by the preterm infant. Developmental Care is a broad category of interventions that is designed to minimize the stress of the NICU environment. A number of elements are included under the umbrella of developmental care such as control of external stimuli (vestibular, auditory, visual, tactile), clustering of nursery care activities, and positioning or swaddling of the preterm infant so as to provide a sense of containment similar to the intrauterine experience[1].

Due to decreased muscle tone, premature infants are at risk of developing postural problems following a prolonged stay on NICU. Neonatal units worldwide have recognized that correct positioning of premature infants throughout their stay in NICU greatly reduces the long term effects of prematurity such as increased neck extension, inability to draw shoulders into the midline, 'frog-leg' position resulting from lack of postural support under the hips and decreased hand-to-mouth coordination. Similarly, for all infants, supportive positioning results in enhanced comfort, reduced stress, improved head control, stimulate visual exploration of the external environment and enhances development of motor skills, reflexes and postural tone[2].

Pre-term birth is on the rise in India for the last few years, states 'Delivered Too Soon' action report by Indian Foundation for Premature Babies (IFPB). As per the report, India accounts for 23.6% of the global preterm births, out of which 13% are live preterm births. Prematurity is a significant contributor to neonatal and infant mortality rates. The rate of preterm birth in India is approximately 21% of the total birth and is rising. Premature birth and its complications are irrefutably a major crisis that cannot be ignored and according to this report, India is the biggest contributor to the world's prematurity load with almost 36 lakhs premature births each year. The report also raises concern about the financial burden on families to save a premature infant; the maximum burden is seen when the baby is between 28 to 36 weeks. As per a World Health Organization (WHO) fact sheet (2012), India tops the list of 10 nations contributing to 60% of the world's premature deliveries. India has been striving to achieve 'Millennium Development Goal: 4' to reduce the under-5 child mortality, burden of premature birth which requires both focused attention and evidence based intervention[3].

Preterm babies have less muscle tone and are often hypotonic (floppy) compared with babies born at term. Term babies have a curled up or 'flexed' position, while babies born preterm are less flexed and less strong. They tend to allow their arms and legs to fall outward ('frog like' position) and their head to roll to one side. They may find it difficult to move their arms and legs especially now that they must move against gravity and are no longer supported by fluid as they were in the womb. They may also find it difficult to maintain or hold positions and their movements may be jerky and disorganized until they get a little bigger and stronger. Positioning and handling are important for development of movement and to help the baby feel secure. Preterm babies will not automatically learn to adopt the curled up fetal position and have to be shown[3].

Positioning preterm babies in supported positions, ones that encourage flexion (curling up) or that copy the fetal position, can help to promote normal and balanced muscle development and movement patterns, avoid muscle weakness in some areas and develop tighter muscles in others. It also minimizes head flattening, ensures a feeling of calmness and security and reduces stress and energy expenditure. Positioning provides more settled and easier breathing and circulation, preserves energy levels and make baby more comfortable, sleeps and feeds better, and doesn't use vital energy to calm and settle. Positioning improves baby's awareness of their hands which is important for development of fine motor (precise use of hands and fingers) and feeding skills later on. It also encourages babies to bring their hands to the middle or midline (in front of their body) – an important early developmental stage and precursor to gross motor (use of the large muscles of the body) and fine motor skill development. This helps in the development of crawling, standing and walking later[4].

In utero the infant moves freely in the warm amniotic fluid, restricted only by the soft, yielding muscle walls of the womb. The developing fetus adopts an increasingly flexed position with limbs in towards the midline and ability to bring hands to mouth. In contrast the dry, unyielding surface of the incubator mattress and the weak muscle tone of a premature infant, limits his/her ability to move smoothly, to bring limbs to the midline, to maintain stability, conserve energy and counter the effects of gravity. This could lead to a flattened, extended or 'frog-like' posture and an asymmetrical shaped head[4].

The baby is nursed in many different positions throughout his/her stay on NICU in order to ensure optimum outcome. Baby may be contained within a boundary encompassing the whole body using rolled sheets, quilts or gel boundaries. As a result hips and shoulders will be supported to aid development and prevent problems drawing these into the midline as the child grows. Baby may have a soft head boundary, which helps to soothe and calm and prevent head moulding. Cushioned mattresses are used to provide a boundary to support flexion and containment as well as reduce gravity on delicate pressure areas. Baby may be nursed on his/her back in a supported position or side-lying supported with quilts or blankets which helps to encourage hand-to-mouth comfort, as well as providing support for the hips and shoulders, or on his/her tummy (prone). Prone position is especially suitable for infants requiring breathing support as the mattress helps to support the chest wall thus aid in breathing. This positioning is suitable only while baby is being closely monitored due to the increased risk of sudden infant death syndrome (SIDS), and it must be remembered that prone positioning is not recommended when baby comes home[5].

Although developmentally supportive positioning is acknowledged as a key element of care in the neonatal intensive care unit, the definition and standardization of what constitutes evidence-based positioning practices is nonexistent in a formalized format. As postural stability is a foundational milestone for motor development and premature infants are unable to exhibit postural stability without support, standardizing the definition of optimal positioning will lead to consistency in practice[6].

NEED FOR THE STUDY

Developmental care has grown from a theory to a research supported standard of care. Neonatal intensive care units have embraced developmental care principles for infant positioning. Innovation in design to promote development must be paired with care giving practices that support individual infant competency and family integration. This integration of family, infant and environment present a significant challenge to the novice neonatal intensive care unit nurse as well as the experienced staff trained in an open bay unit[7].

The intensive care of the newborn babies has become mechanical or "robotic" and "stereotyped". Instead of being flexible and individualized, technological advances have dehumanized the care of newborn babies. Hi-tech care should be provided, but comfort of the baby should not be ignored. Baby should be reared in NICU, which should simulate the ecology of the womb, to ensure maximum comfort to the baby[1].Demand for neonatal care has risen year on year and currently premature infants accounts for more than 70% of NICU admissions[8].

Three fourth of neonatal mortality in pre urban setting in Bangladesh was attributed to preterm neonates as compared to one third of low birth weight infants. Out of 1322 neonatal deaths, 65.4% were contributed by prematurity as a single cause of death over a three year period study in India where, 26 million babies are born every year, out of which 1.2 million die before completing the first four weeks of life[9]. Basic neonatal care is not available at majority of the centers where neonates are delivered and admitted. Preterm neonates require specialized care in NICU[10].

A descriptive study was conducted among 242 neonatal nurses, 16 neonatal therapists in a Level III NICU in St. Louis Missouri to know the neonatal nurses' and therapists' perceptions of positioning for preterm infants in the neonatal intensive care unit. 99% of respondents agreed that positioning is important for the well-being of the infant[11].

Care giving patterns using flexed midline positioning as well as other nursing interventions including cluster care and diminishing sensory stimulation optimize an infant's ability to self regulate and potentially create the brain pathways in the neocortex needed for neurodevelopment. Supportive positioning is a core component of the Universe of Developmental Care Model, which details a model of care identified as the criterion standard in the neonatal setting. A review of the literature related to appropriate low birth weight infant positioning documents the importance of appropriate positioning to minimize musculoskeletal abnormalities and improve neurodevelopment outcome[12].

Developmental Care is designed to minimize the stress of the neonatal unit environment. Positioning is one of the important aspects of Developmental Care to keep the baby comfortable. A developmental care approach can lead to a number of concrete benefits for the infant; fewer days on ventilation, shorter hospital stay, better growth and other effects[13].

A Randomized Observer Blind Controlled Trial of 123 very preterm infants was conducted in the neonatal intensive care unit of the sole tertiary referral centre in Western Australia to determine the effect of a postural support nappy and/or a postural support roll on neuromotor function in very preterm infants when nursed in a prone position to term equivalent age The result showed that infants nursed with a postural support roll and a postural support nappy demonstrated improved hip posture to term equivalent age compared with infants nursed with either a postural support roll only, or a postural support nappy only. Infants nursed with a postural support roll either with or without a postural support nappy demonstrated improved shoulder posture to term equivalent age[14].

Throughout the course of a single day, the NICU nurse interacts with and repositions the infant potentially eight times. Infants typically should rest for 3 to 4 hours between care episodes. Misaligned positioning persisting over a 3 to 4 hour a period and perhaps an entire 12-hour shift can create pain and decrease the quality of sleep. Proper positioning must account for gestational age, medical fragility and hi-tech interfaces. Balancing the need for proper body alignment with assisted ventilation is particularly stressful for the bedside nurse. Educating multigenerational and experiential staff to implement proper positioning with each set of cares while still accomplishing the many medical tasks mandated has proven difficult for institutions across the country[7].

During the stay in NICU a baby's environment is critical to the growth and development. Developmental care helps neonates with the transition from in-utero to extra-utero[3] Developmental care is the interventions taken to support the behavioral organization of each individual infant, enhancing physiological stability, protecting sleep rhythms and promoting growth and maturation. These interventions include handling and positioning, reduction of noxious environmental stimuli, and cue based care[15].

The simple positioning of low birth weight infants may prevent these dangers to the neonatal life. Prone and head tilted up 45^0 positions are researched in improving the efficacy of oxygenation. Positioning of neonates is a simple and safe therapeutic maneuver with prompt and demonstrable benefit. The preterm neonates often lack adequate muscle tone and are at risk for developing abnormal movement pattern as well as skeleton deformation. Some delays are related to postural problems and improper body mechanics rather than to neurological impairment. Positioning of preterm neonates is basic neonatal nursing care and includes supine, prone and side lying[16].

The skilled nurse in the NICU is responsible for continuous patient care and surveillance. She should be aware of rapidly changing situations. There is a wide gap between the educational preparation and service demands in NICU. Considering the fact that there is an imperative need to equip them with the necessary resources and skills to enable them to work effectively in their own field it is required to devise an alternative strategy of training to enable them to discharge their duties effectively[17].

The staff development programmes for nursing personnel in a clinical area are inadequate in the existing healthcare system. In the event of ever growing challenges in nursing, nurse educators and

administrators should facilitate and encourage nursing personnel to update their knowledge by providing education programme from time to time as an ongoing process[18].

Therefore, the researcher felt a strong need in assessing the positioning of neonates in NICU so that a neonatal positioning guideline is introduced in NICU and its effectiveness is assessed, and if found effective it can be implemented in clinical setting in care of preterm neonates which will help in the growth and development of preterm neonates.

2. OBJECTIVES

PROBLEM STATEMENT

A Study to Assess the Effect of Implementation of Guideline on Positioning of Neonates in the Neonatal unit of a Selected Hospital, Bangalore.

OBJECTIVES OF THE STUDY

1. To compare the infant positioning assessment scores before and after the implementation of guideline on positioning of neonate.
2. To determine the association between the pre-test infant positioning assessment scores with selected baseline variables.

OPERATIONAL DEFINITION

1. **Effect**: In this study it refers to the extent to which the implementation of guideline on positioning of neonates in bringing changes in the comfort level of the neonates as assessed through infant positioning assessment tool.
2. **Positioning**: In this study positioning refers to providing neonates standardized supine, prone and side lying position as measured by infant positioning assessment tool.
3. **Guideline**: In this study it refers to the set of instructions for practicing correct positioning for neonates.
4. **Neonates**: In this study neonates refers to preterm (<37weeks of gestation) babies between the age of 0-28 days admitted in NICU.
5. **Selected Baseline Variables**: In this study it refers to age, educational status, total years of experience and years of experience in NICU.
6. **NICU**: In this study it refers to specialized unit of St. Johns Medical College Hospital, Bangalore designed and equipped for the care of critically ill neonates.
7. **Infant Positioning Assessment Score**: In this study the score of 12 indicates perfect positioning, a score of 9-12 indicates acceptable positioning and a score of 8 or less indicates need for repositioning.

ASSUMPTIONS

1. The nurses may have some experience in positioning of neonates.
2. Implementation of guideline on positioning of neonates is an accepted strategy that would enhance the correct practices.

DELIMITATION

1. The study is limited to NICU of SJMCH, Bangalore.

PROJECTED OUTCOME

1. The findings will reveal the existing practices of neonatal positioning.
2. The findings will determine the effect of implementation of guideline on positioning of neonates.

HYPOTHESIS

- ❖ H1: There will be significant difference between the pre-test and post-test infant positioning assessment scores of neonates at 0.05 level of significance.
- ❖ H2: There will be significant association between the mean pre-test infant positioning assessment scores with the selected baseline variables at 0.05 level of significance.

CONCEPTUAL FRAME WORK

Conceptual frame work refers to the interrelated concepts or abstractions that are assembled together in some rational scheme by virtue of their relevance to a common theme.

The present study is aimed at developing and evaluating the effect of implementation of guideline on positioning of neonates among the NICU nurses.

The conceptual frame work of this study is based on context, input, process and product (CIPP) model on evaluation developed by Daniel Stufflebeam (1971). It aims to provide an analytic and rational basis for programme, decision-making based on planning, structuring, implementing, reviewing and revising decision each examined through a different aspect of evaluation context, input, process and product. CIPP model provides a comprehensive, systematic, continuous, ongoing framework for programme evaluation.

The concepts of Stufflebeam Evaluation are Context, Input, Process and Product Evaluation.

Context Evaluation: It highlights the environment in which the proposed programme exists. It assesses the needs, problems and opportunities as basis for defining goals, priorities and objectives. It helps in making programme planning decisions. Based on findings of other studies and related literature it is assumed that NICU have inadequate knowledge on positioning of neonates.

Input Evaluation: Input evaluation involves steps and resources needed to meet the goals and objectives. It serves as a basis for structuring decisions.

In the present study input refers to the development of guidelines on positioning of neonates, validation of tool and guidelines by getting the opinion of experts, selection of the samples, frame a research design and prepare appropriate teaching aid.

Process Evaluation: It involves the implementation of plans to guide activities and later to explain outcome.

In the present study it refers to the assessment of positioning of neonates before the intervention, administration of guidelines on positioning of neonates, assessment of positioning of neonates after the intervention

Product Evaluation: It helps to identify intended and unintended outcome to keep the process on track and comparing them to the actual outcome.

In this study product evaluation refers to the comparison of pre-test and post-test score, finding the association of pre test score and selected baseline variables.

This step of the model further leads to recycling decisions and need for modification to terminate which is not in the preview of this study.

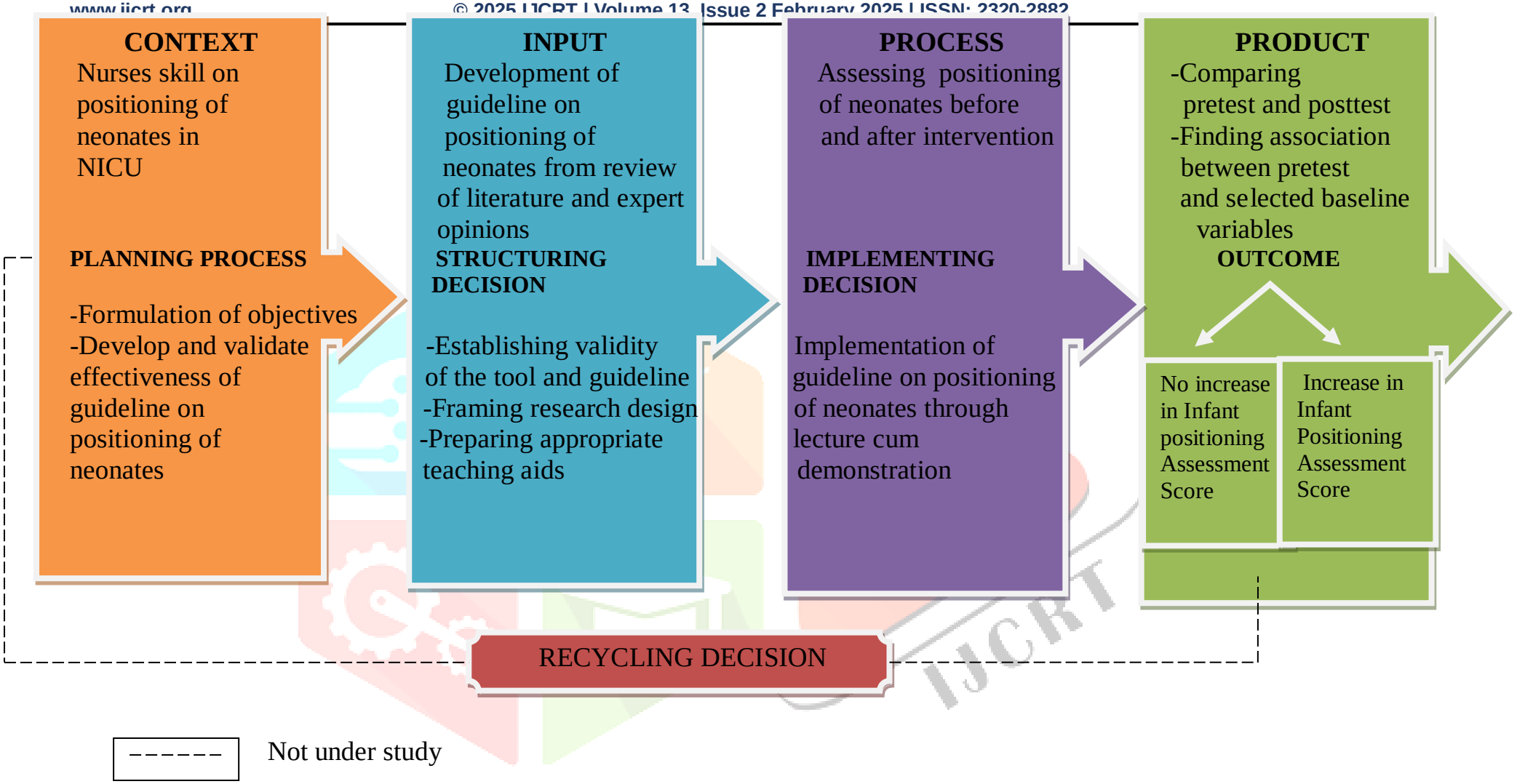

Figure 1: CONCEPTUAL FRAMEWORK BASED ON DANIEL STUFFLEBEAMS CIPP MODEL (1971)

3. REVIEW OF LITERATURE

A literature review is an evaluative report of the information found in the literature related to selected areas of the study. It provides the base for future investigations, gives an insight into the problem, intensifies need for data collection and relates the findings of the study to other studies which would facilitate to establish a comprehensive body of scientific knowledge.

Literature relevant to the present study is mentioned under the following headings

- Literature related to positioning of neonates
- Literature related to practices regarding neonatal positioning

LITERATURE RELATED TO POSITIONING OF NEONATES

Preterm infants face many challenges as they adapt to extra uterine life, and are at risk of developmental delays. These delays may be due to neurological impairment, postural hypotonia or body mechanical problems. Positioning of preterm infants (earlier than 37 weeks gestational age) is widely considered an important aspect of their care, with implications for morbidity and mortality. Studies related to positioning of neonates have revealed that correct neonatal positioning prevents developmental delays and improves physiological parameters.

A study was conducted to investigate short term effects of varied postnatal lying positions in order to prevent neuromuscular and postural abnormalities. 60 low risk preterm infants of 31-36 weeks gestational age were enrolled for this randomized clinical trial. The study revealed that regular changes in posture while retaining correct functional positions allowed maintenance of normal neuromuscular and osteo-articular function and permitted the development of spontaneous and functional motor activity in low risk preterm infants[19].

A prospective study was done to assess the effects of two different lying positions (prone and supine) body supports for physiological and functional positioning. 30 preterm neonates born between 28 and 35 weeks of gestation were eligible. All preterm neonates showed gains in postural development, the study result pointed to the benefits of positioning with a specifically designed support like “coconou” promoting optimal prophylactic neurobehavioral and postural developmental care[20].

A study was conducted to assess the effect of positioning on sleep, heart rate variability and QT interval in preterm infants at one and three month’s corrected age. The study showed that percentage of active sleep was lower in the supine position, the incidents of short, spontaneous; sleep transitions were significantly higher in supine. This study supports “Back to Sleep” as the position of choice not only for term but also for preterm infants[21].

A comparative study was done to see if there is a difference in the ability to lose heat between prone and non prone sleeping infants. The mean heat loss coefficient, measured from the non prone sleeping (0.269w/^{0}c,s.d.0.197) agreed well with the value calculated for supine sleepers with the same level (0.4w/^{0}c) Prone sleep infants were found to have a considerably smaller heat loss coefficient which was approximately 60% of the value for non prone sleeping infants. The study result suggests that infants sleeping in the prone position may be unable to lose heat as rapidly as those infants sleeping non-prone[22].

A study was conducted to determine whether supine sleep positioned infants have delayed motor skills at four and six month’s age, and if delays are associated with decreased exposure to prone position. 22% of the sample positioned in supine had delayed motor development by 6 months and this was associated with limited exposure to awake prone positioning[23].

A quasi experimental study was conducted to evaluate by Near-Infrared Spectroscopy (NIRS) the effect of different head and body positions and the influence of gestational age (GA) and nasal continuous positive airway pressure on brain hemodynamic in very preterm newborns. 24 stable preterm newborns were studied by NIRS in 6 different postures including head rotation and head inclination in both supine and prone positions. Changes in Normalized Tissue Hemoglobin Index (nTHI) and Tissue Oxygenation Index (TOI) were measured after posture variations. No statistically significant changes in nTHI and in TOI were found in the 6 postures. nTHI variations, expression of cerebral blood volume variations, were influenced by GA. A reduction in nTHI, with a stable TOI, in the less mature infants (with GA < or = 26 weeks), occurred on head rotation; nTHI increased again when the head was de-rotated[24].

Randomized clinical trials were conducted to compare different positions in newborns receiving mechanical ventilation. Twelve trials involving 285 participants were included in this review. Several positions were compared: prone versus supine, prone versus lateral right, lateral right versus supine, lateral left versus supine, lateral alternant versus supine, lateral right versus lateral left, and good lung dependent versus good lung uppermost. Comparing prone versus supine position, an increase in arterial oxygen tension (PO2) in the prone position of between 2.75 and 9.72 mm Hg (95% confidence interval (CI)) was observed (one trial). When % hemoglobin oxygen saturation was measured with pulse oximetry, the improvement in the prone position was from 1.18% to 4.36% (typical effect based on four trials). The prone position was found to slightly improve the oxygenation in neonates undergoing mechanical ventilation[25].

Randomized trials were conducted to determine whether developmental care interventions reduce neurodevelopment delay, poor weight gain, length of hospital stay, length of mechanical ventilation, physiological stress, and other clinically relevant adverse outcomes in preterm infants. This review consisted of 31 studies in 4 categories of developmental care interventions, 19 subgroups, and multiple clinical outcomes. Developmental care interventions showed some benefit to preterm infants with respect to improved short-term growth, decreased respiratory support, decreased incidence of moderate to severe chronic lung disease, decreased length and cost of hospital stay and improved neurodevelopment outcomes[26].

A Prospective study was done in a tertiary neonatal unit among 41 infants (21oxygen dependent), median gestational age 28 weeks (range 24-31 weeks) and birth weight 1120 gm (range 556-1780 g). Infants both supine and prone at two-weekly intervals from 32 weeks' Post Menstrual Age (PMA) were studied until discharge. Each posture was maintained for 1 hour. Overall, lung volumes were higher in the prone than supine position throughout the study period; there was no significant effect of PMA on lung volume. Overall, SpO_2 was higher in the prone than supine position ($p = 0.02$), and the effect was significant in the oxygen-dependent infants ($p = 0.03$) (mean difference in SpO_2 between prone and supine was 1.02%, 95% CI 0.11% to 1.92%), but not in the non-oxygen-dependent infants. There was no significant influence of PMA on SpO_2[27].

A descriptive study was conducted to assess how different infant positions and peak sound levels affected cerebral oxygen saturation over time. 24 premature infants who were born less than 32 weeks gestational age without congenital cardiac, neurologic, and gastrointestinal anomalies were included in the study. Peak sound levels 5 dB above the average ambient sound level did not significantly change cerebral oxygen saturation values. Differences in cerebral oxygenation were significantly less when infants were changed from a supine, head midline position to a right lateral, 15° head elevation compared with a left lateral, 0° elevation position[28].

A randomized, time series with cross-over study was conducted in a neonatal intensive care unit affiliated with a medical center in central Taiwan to describe the changing pattern of gastric residuals over time in the prone and supine position and to examine the effects of position on gastric residuals at different feeding volumes in preterm infants. The rate of decrease of gastric residuals in the prone and supine positions was fastest during the first half an hour post-feeding according to measurements taken at 30, 60, 90, 120 and 150 minutes at feeding volumes of 50 and 100ml/kg/day ($p<001$). Gastric residuals were significantly lower in the prone than in the supine position at the five measurement points[29].

A study was conducted to determine the effect of posture on respiratory function and drive, in prematurely born infants immediately prior to discharge. Overall, tidal volume was higher ($P < 0.05$), but respiratory rate ($P < 0.05$), P(0.1) ($P < 0.05$), and Pimax ($P < 0.05$) were lower in the prone compared to the supine position. There were no significant differences in Ti or Te between the two postures. In oxygen-dependent infants only a minute volume was higher in the prone position ($P < 0.05$). Posture-related differences in respiratory function are present in prematurely born infants studied prior to neonatal unit discharge[30].

A prospective, randomized, clinical trial with 31 intubated neonates was conducted to evaluate the influence of lateral and supine position on bacterial colonization of endotracheal tube in neonates. In the second day of ventilation, positive cultures were recognized in 6.2% of supine group and 6.7% of lateral

group. After 5 days, tracheal cultures were positive in 25% (4 neonates) of supine group and 13.3% (2 neonates) of lateral group which wasn't statistically significant (P=0.9 in second day and P=0.9 in the fifth day)[31].

A systematic review was conducted to determine the best available evidence related to the positioning of preterm infants. The specific review questions addressed were: the physiological outcomes affected by different positioning, and the best position for promoting sleep. Prone positioning was shown to have many advantages for prematurely born infants. But the longer, deep sleep period and the fewer awakenings associated with a prone position would support higher vulnerability for preterm infants to sudden infant death syndrome (SIDS). Therefore, all preterm infants placed in the prone position should have continuous cardio-respiratory and oxygen saturation monitoring. Preterm infants should be placed in a properly supported position to ensure functional support of all parts of the body as well as ensuring physical safety[32].

A study was carried out to provide a comprehensive literature review of neuromotor development and related physiologic effects of positioning in very low birth weight infants and three compelling results emerged: (a) The development of posture and mobility in newborn infants requires an optimal balance between active and passive muscle tone, (b) The prone position is physiologically more beneficial for the preterm infant than supine and lateral positions, and (c) The prone position can lead to short and long-term postural and associated developmental problems[33].

A cross sectional study was conducted to evaluate whether lying in a nest affects the posture and spontaneous movements of healthy preterm infants. 10 healthy preterm infants underwent serial video recording in the supine position, when lying in a nest and outside it, at three ages: 30–33 weeks postmenstrual age (PMA) (early preterm), 34–36 weeks PMA (late preterm) and 37–40 weeks PMA (term). The study revealed that when lying in the nest, the infants more often displayed a flexed posture with shoulder adduction and elbow, hip and knee flexion, and the head was frequently in the midline. The nest was also associated with an increase in wrist movements and movements towards and across the midline and a reduction in abrupt movements and frozen postures of the limbs. The nest did not affect the occurrence of asymmetrical tonic neck posture[34].

A pre experimental one group pre-test-post-test study was conducted to identify the effect of prone position to oxygenation status (FiO2) of babies who received mechanical ventilation at NICU RSUPN Dr. Cipto Mangunkusumo. The result showed that there are no significant differences of Fi02 in babies who received mechanical ventilation before and after receiving prone position. There is a significant difference in measurement before and 2 hours after prone position. Moreover, there is a tendency that the more of baby's weight, the lower of the FiO2[35].

A prospective and crossover study was conducted to observe in very low birth weight infants (VLBWI) the effect of nested and swaddled positioning support in the prone position on heart rate, sleep distribution, and behavior state. A total of 20 VLBWI who were born at a gestational age of 26.5 ± 4 weeks with a birth weight of 709 ± 207 g were studied at an average gestational age of 37.4 ± 0.6 weeks (range 36–39) and a weight of 1590 ± 337 g (range 1192–2372). The study demonstrated that a prone position with nested and swaddled positioning support might facilitate sleep and heart rate stability compared to prone positioning alone in VLBWI[36].

A critical review was carried out to examine the benefits of left lateral body positioning on gastro esophageal reflux disease (GERD) during feeding and post-feeding of the preterm infant. A literature search was performed and the following article types were found: four repeated measures designs and one two-way repeated measures design. Overall, the literature provides optimistic support for placing the premature infant in a left lateral position during feeding and post-feeding in order to reduce GERD[37].

A cross over study on Comparison of the effect of Sleep Positioning on Cardio respiratory Rate in Noninvasive Ventilated Premature Infants which was performed in 2010 on 44 hospitalized 29-34 weeks gestation premature infants who were receiving N-CPAP in Neonatal Intensive Care Unit of Al-Zahra Hospital of Tabriz University of Medical Sciences revealed that there was a significant difference in HR and RR of premature infants who were similar in gestational age and clinical condition and placed in two positions. Premature infants' HR and RR became lower at prone position than supine in both groups. So the findings supported prone positioning for premature infants[38].

A descriptive study was conducted in Canada to assess the influence of prone or supine position on sleep states and on withdrawal and approach reactions of preterm infants. The study revealed that the clinical implications encourage placing the preterm infant in the prone position while in the NICU. This enables important achievements such as longer periods of quality sleep and production of adaptive self-regulatory reactions[39].

A quasi-experimental study was carried out to assess the effect of prone and supine positions on breathing pattern variables, thoracoabdominal motion and peripheral oxygen saturation of hemoglobin of premature newborn infants recovering from respiratory distress syndrome, while breathing spontaneously and in rapid eye movement sleep. Twelve preterms weighing > 1,000 g at enrollment were studied in both positions, in random order. A total of 9,167 respiratory cycles were analyzed. The prone position was associated with significant reductions in labored breathing index (-0.84±0.69; p = 0.001; 95%CI -1.29 to -0.40), phase relation in inspiration (-27.36±17.55; p = 0.000; 95%CI -38.51 to -16.20), phase relation in expiration (-32.36±16.20; p = 0.000; 95%CI -42.65 to -22.06) and phase relation in total breath (-30.20±14.76; p = 0.000; 95%CI -39.59 to -20.82). The prone position resulted in a significant reduction in thoracoabdominal asynchrony, without affecting breathing pattern or peripheral oxygen saturation[40].

A study on the effect of right lateral, supine, and prone postures on ventilation and lung mechanics was conducted in 23 healthy newborn infants, ten preterm and 13 term, "light-for-date," In the preterm group, tidal volume, minute volume, elastic work, inspiratory viscous work, total viscous work, and the total work of breathing were significantly greater in the prone position than in the supine position. Results obtained in the lateral position did not differ significantly from those in the prone or supine positions. Posture did not significantly affect tidal volume or lung mechanics in the light-for-date infants. The prone position is suggested to be the optimum nursing posture for healthy preterm infants[41].

A randomized crossover study was carried out in Australia to investigate the effect of body position on regional ventilation in preterm infants on continuous positive airway pressure ventilator support using electrical impedance tomography. 24 preterm infants on continuous positive airway pressure were compared to six spontaneously breathing preterm infants. Changes in global and regional lung volume were measured with electrical impedance tomography. Although there were no differences between positions, regional tidal volume was increased in the posterior compared with the anterior lung ($p < .01$) and in the right compared with the left lung ($p < .03$) in both the spontaneously breathing infants and in the infants on continuous positive airway pressure[42].

A crossover study was conducted in a neonatal intensive care unit to investigate whether positioning has any effect on the frequency, type, and duration of apneas in preterm infants. The study showed that in addition to improving measures of lung function, the adoption of the prone position for preterm infants may reduce associated problems of apnea of prematurity[43].

A study on effects of body position on thermal, cardio respiratory and metabolic activity in low birth weight infants revealed that infants sleeping in the prone position exhibited lower metabolic rates than those sleeping in the supine position. Despite this reduction in heat production, central and peripheral surface temperature was higher in the prone than supine position and the gradients between the central and peripheral sites were narrower, implying increased peripheral perfusion. In addition, prone sleeping was associated with higher heart rates, respiratory rates and RQ's[44].

A study was conducted on the effect of positioning on the breathing pattern of preterm infants. The influence of position on the breathing pattern as documented by the pneumogram was studied in 14 stable preterm infants with recent clinical apnea. Oximetry and nasal flow studies were conducted on 10 infants simultaneously with the impedance pneumogram. Each infant had consecutive nocturnal pneumograms, one in the prone, one in the supine position. The infants were kept for more than six hours in the assigned position. A significant increase in apnea density and in periodic breathing was found in the supine v the prone position (mean (SE) 4.5 (0.7)% v 2.5 (0.5)%, and 13.6 (3.2)% v 7.7 (2.2)%, respectively). There was no positional difference in the incidence of bradycardia and prolonged apnea[45].

A cross-sectional study was carried out to verify the influence of preterm infant positioning on respiratory muscle strength, oxygenation and respiratory rate. The study revealed that there was a lower inspiratory pressure and a higher oxygen saturation in prone position when compared to the supine. Concerning the respiratory rate there was no variation between prone and supine position[46].

A study to determine the optimal position for the preterm infant, arterial oxygen tension (Pao2) was monitored in 16 preterm infants by the transcutaneous method with the infants in both supine and prone positions. The study showed that when the infants were prone, Pao2 rose by a mean of 7.4 mm Hg (P less than .001), an increase of 15%. In those infants with residual cardiopulmonary disease a 25% increase was

noted. The higher Pao2 in the prone position was accompanied by a significant decrease in the amount of time the chest wall moved asynchronously[47].

A study was conducted to determine the effects of prone positioning on cardio respiratory stability and weaning outcome of preterm infants during weaning from mechanical ventilation. The study results suggested that prone position is a safe and beneficial procedure during the weaning from mechanical ventilation and may contribute to weaning success in preterm infants[48].

A retrospective descriptive study was carried out among occupational therapists working with infants in neonatal intensive care units for the comparison of motor self-regulatory and stress behaviors of preterm infants across body positions. The study found that the prone position is most favorable, with prone un-nested and side lying nested positions coming in second, for improved state of arousal control (based on occurrence of self regulatory and stress behaviors) in preterm infants[49].

A study was conducted to assess the influence of prone positioning on premature newborn infant stress assessed by means of salivary cortisol measurement. The sample comprised 16 newborn premature infants (56.3% male) with a gestational age between 26 and 36 weeks, postnatal age between 1 and 33 days, birth weight of 935 to 3,050gm, and weight at the time of intervention of 870 to 2,890gm. The study proved that Prone positioning significantly reduced the salivary cortisol level, respiratory rate, and Brazelton sleep score, suggesting a correlation between prone positioning and reduction of stress in preterm infants[50].

A comparative study was conducted to examine the influence of prone and supine position in preterm infants during acute pain of blood collection in a Level III Neonatal Intensive Care Unit. The study showed that prone position promotes deep sleep in preterm neonates at 32 weeks post-conception age when they are undisturbed[51].

LITERATURE RELATED TO PRACTICES REGARDING NEONATAL POSITIONING

Premature babies are more prone to positional plagiocephaly (flat head) and dolichocephaly (long narrow head). To avoid this, it's important to change baby's position regularly, many studies have proved that the practices regarding neonatal positioning have improved the development of preterm neonates.

A direct observational study was conducted to determine the choice of infant position by the neonatal nurse as well as the application and successful maintenance of the position, especially where infants required intensive care support. The maximum number of possible observations was 200. The result of the study showed disturbing trends in the intensive care cots with a significant percentage of positions being ineffectively maintained. A score of two and above demonstrated that an attempt had been made to maintain effective position choice. 17 observations within intensive care achieved a position score of less than 2. This equates to 26.9% of total intensive care members. This study illustrates that possible problems if identified can be addressed, potentially increasing the quality of life for both surviving infants and their families[52].

A study was conducted to develop an Infant Positioning Assessment Tool (IPAT) to standardize best practices in neonatal positioning and to evaluate its effectiveness in teaching consistent positioning practice. Reliability of the tool was established by having four independent reviewers compute IPAT scores for 5 minutes. The IPAT provides a constant reference resource across clinicians within and between NICU sites standardizing positioning practices. As defined by the IPAT, the above study has yielded favorable results regarding consistency in the definition of optimal positioning and the practices of developmentally supportive positioning in the NICU[53].

A study was conducted to examine the effectiveness of one-to-one scripted bedside education paired with IPAT administration improving the positioning consistency across shifts and experiences. This study was done among nurses at a level IIIB neonatal intensive care unit. The study revealed that nurse to nurse education was the best way to get “buy in” from the bedside nursing staff. Nurses were able to witness increased relaxation, reduced respiratory rate, prolonged sleep, self calming in the properly positioned infants further cementing their desire to position well every time[54].

A study was done to explore staff preferences for learning and highlight the importance of recognizing individual learning styles. This study was carried out with 61 nurses in an independent health

and social care provider achieving a response rate of 100%. The study showed that the staff often preferred visual learning style, therefore increased emphasis should be given to work based learning rather than class-room teaching methods[55].

A cross-sectional survey based study was conducted among hospital newborn nursery staff (n=96) and mothers of newborns (n=579) at eight perinatal hospitals in California. Majority of sampled nursery staff (72%) identified the supine position as the placement that lowers the sudden infant death syndrome risk, only 30% reported placing infants most often to sleep in that position[56].

A descriptive study was conducted to explore and describe neonatal intensive care unit (NICU) nurses' knowledge and practice in the NICU, and to determine the content of parent instruction regarding infant sleep position at discharge. Nearly 95% of respondents identified a non supine sleep position as optimal for hospitalized preterm infants. Further, only 52% of neonatal nurses routinely provide discharge instructions that promote supine sleep positions at home. This study suggests that nursing self-reports of discharge teaching practices are inconsistent, and in some cases in direct conflict with the national "Back to Sleep" recommendations, which emphasize that the supine position is the safest position for healthy full-term and preterm infants after hospital discharge[57].

A quasi experimental study was conducted in NICU of St. Joseph's Health Care (J.K.F.), London to determine the effect of different forms of education on nurses' abilities to position neonates in a developmentally supportive way and to determine nurses' perceptions of effectiveness of educational methods to enhance their positioning abilities. The result showed that formal education methods such as in-services and workshops improved nurses' abilities to position neonates in developmentally supportive positions. However, improvements declined in the absence of ongoing education. Nurses perceived workshops, physical therapy in-services, and bedside consultation to be more useful than audiovisual resources, independent reading, or general hospital in-services[58].

A randomized trial was conducted in which elements of developmental care were compared to routine nursery care for infants < 37 weeks gestation and that measured clinically relevant outcomes. This review detected 36 eligible randomized controlled trials involving four major groups of developmental care interventions, 19 sub-groups and multiple clinical outcomes. The results of the review indicate that developmental care interventions demonstrate limited benefit to preterm infants with respect to: decreased moderate-severe chronic lung disease, decreased incidence of necrotizing enterocolitis and improved family outcome. Conversely, an increase in mild lung disease and an increase in the length of stay were demonstrated in infants receiving developmental care compared to controls. There is also very limited evidence of the long-term positive effect of NIDCAP on behavior and movement at 5 years but no effect on cognition. Other individualized developmental care interventions have also demonstrated some effects in enhancing neurodevelopment outcome[59].

A descriptive study was conducted in Children's Hospital, Philadelphia on NICU positioning. This study showed that nursing in 32 of the 35 hospitals was primarily responsible for positioning and positioning recommendations in the NICU. Of the 35 institutions surveyed, 88.6% stated infant positioning was very important in the NICU, but this percentage decreased to 80% when considering discharge planning and positioning. Twenty-nine of the 35 hospitals teach supine or the Back to Sleep program at discharge, and only 5 of the 35 recommended prone positioning at discharge. All of the NICUs surveyed use equipment to aid in positioning, but only 45.7% encourage the use of equipment for home use and of the equipment used at home, 59% were towel rolls. Of the 7 recognized modifiable risk factors for SIDS, only prone sleeping was identified by the respondents greater than 50% of the time. Moreover, only 5 of the 35 institutions (14%) mention a planned transition from prone positioning to supine prior to discharge to accommodate the infant to that position[60].

A study was conducted to determine the congruence of nurses' activity in four areas of developmental care in order to obtain basic information for authorities to provide a programme to achieve related standards in the future. The study was performed on 70 nurses working in NICU in Tabriz, Iran. Nurses answered to a questionnaire retrieved from Robison's developmental programme. The study showed that the congruence of nurses' performance with standards of developmental care still requires more efforts. Therefore, it is necessary to train the staff in this regard and prepare them for structural and functional facilities[61].

A quasi-experimental study was carried out to test the use of a developmentally supportive care (DSC) training programme in the form of videotaped and personalized instruction to increase nurses' cognitive abilities for assessing preterm infant behavioral signals and offering supportive care. The participants were 25 NICU nurses, 13 in the intervention group, and 12 in the control group. The study recommends that in order to improve NICU care quality and the outcomes of preterm infants, the concepts of developmentally supportive care be incorporated into NICU care giving practice by educating nurses[62].

A study was carried out to explore some of the complications associated with the "Back to Sleep" campaign in the U.S. and to discuss educational strategies for perinatal educators. The study recommended that the prone position is the safest position for the majority of infants unless medically contraindicated, for at least the first 6 months of the infant's life. Along with supine sleep position, it is essential to provide supervised prone playtime as well as other position changes during the day to avoid gross motor milestone delays, head molding, shoulder retraction, and tortocollis[63].

4. RESEARCH METHODOLOGY

Methodology is most important in research as it is the framework for conducting a study. This chapter describes the methodology adopted by the investigator to study the effect of implementation of guideline on positioning of neonates among staff nurses. It indicates the general pattern for organizing the procedure, to gather valid and reliable data for an investigation. This includes research approach, research design, variables, setting, population, sample, sampling technique, description of instruments, tool validity and reliability, pilot study, data collection process and data analysis.

RESEARCH APPROACH

The research approach indicates the basic procedure for conducting research study. It assists in answering specific research questions in the most accurate and efficient way possible. An evaluative research approach was adopted in the study to determine the
effect of implementation of guideline on positioning of neonates among staff nurses. This evaluative study was designed to yield data concerning the worth and value of neonatal positioning guideline on the practice of staff nurses.

RESEARCH DESIGN

The research design depicts the overall plan for organization of scientific investigation. It helps the researcher in the selection of subjects and the type of statistical method to be used to interpret the data. The selection of design depends upon the purpose of the study. Keeping in view the objectives of the study, the research design selected in this study was pre-experimental design. i.e., one group pre test post test design to assess the practice of staff nurses before and after the implementation of neonatal positioning guideline.

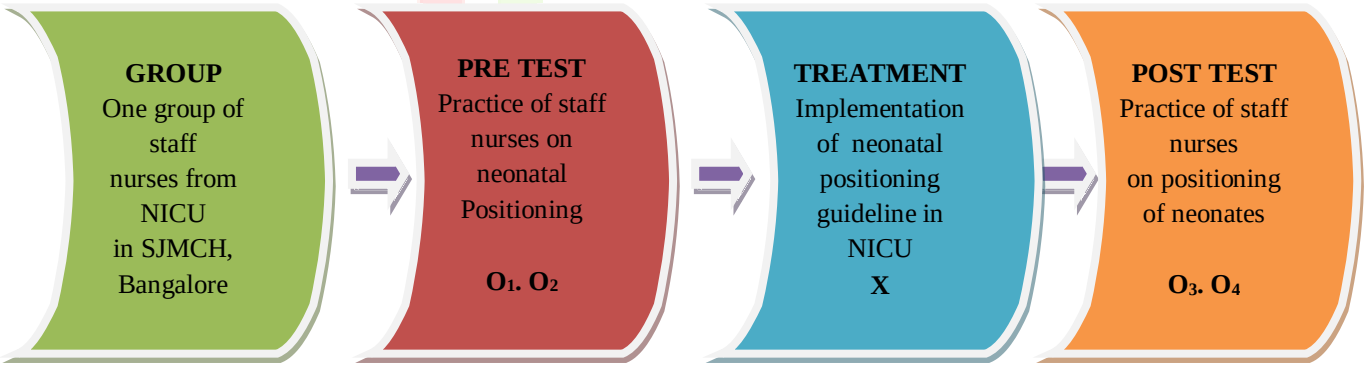

Figure: 2 Schematic Representation of Research Design

O_1 : Observation 1 on practice of staff nurses regarding neonatal positioning before the implementation of neonatal positioning guideline

O_2 : Observation 2 on practice of staff nurses regarding neonatal positioning before the implementation of neonatal positioning guideline

X : Implementation of neonatal positioning guideline by demonstration and lecture

O_3 : Observation 3 on practice of staff nurses regarding neonatal positioning after the implementation of neonatal positioning guideline

O_4 : Observation 4 on practice of staff nurses regarding neonatal positioning after the implementation of neonatal positioning guideline

VARIABLES

The types of variables identified in the present study are:

• **Independent variable:** Use of Neonatal positioning assessment guideline.

• **Dependent variable**: Practice of staff nurses in positioning of neonates.

• **Extraneous variables:** In this study, the extraneous variables includes age, educational status, total years of experience, years of experience in NICU.

SETTING OF THE STUDY

The study was conducted in Neonatal Intensive Care Unit of St. Johns Medical College Hospital, Bangalore. It is a tertiary care teaching institute with 1200 beds.

POPULATION

According to Polit and Hungler, population is defined as the entire aggregation of cases that meet a designated set of criteria. The requirement of defining a population for research study arises from the need to specify the group to which the result of the study can be applied. The population in this study comprises of staff nurses who are working in SJMCH, Bangalore.

SAMPLE

A sample is a small proportion of the population selected to participate in the research study. Based on the study by Jeanson et al, 24 nurses have to be observed to have a difference of 0.9 on the observation score, with 5% level of significance and 80% power. In this study, the sample consists of 25 staff nurses working in the selected NICU.

SAMPLING TECHNIQUE

Sampling refers to the process of selecting a portion of the population to represent the entire population. Purposive sampling technique was used to select the samples for the study.

SAMPLING CRITERIA

Inclusion Criteria:

- Staff nurses working in NICU of SJMCH Bangalore
- Staff nurses who are involved in neonatal care

Exclusion Criteria:

- Staff nurse who are not available at the time of data collection

DATA COLLECTION TOOL

Selection and development of the tool

The tools are the procedures or instrument used by the researcher to collect data. The actual collection of data normally proceeds according to the pre estimated plan to minimize confusion, delay and mistakes. The instruments selected in the research should, as far as possible, be the vehicle that would elicit data for drawing conclusions pertinent to the study.

On the basis of the objectives and conceptual framework of the study, the following instruments were developed to collect the data.

Section 1: Baseline data.

Section 2: Standardized Infant Positioning Assessment Tool.

Section 3: Guideline on Positioning of Neonates.

Development of tool:

The tool was developed based on

- Review of literature on related study.
- Opinion from experts.
- Discussion with health personnel and guides.

Description of the tool:

Section 1: Baseline data including age, educational status, total years of experience and years of experience in NICU.

Section 2: The Infant Positioning Assessment Tool evaluates posture at the head, neck, shoulder, hands, hips and knees/ankles/feet. A two point scoring system is used with a score of:

2: Appropriate positioning.
1: Acceptable alternative positioning.
0: Unacceptable positioning.
Total Score:
12 : Perfect positioning.
9-11 : Acceptable positioning.
08 and lower: Need for repositioning.

Section 3: Guideline for neonatal positioning is a set of instructions for practicing correct positioning for neonates that result in safe and effective developmental care. It includes procedure and rationale, Do's and Don'ts to be followed while positioning the neonates in supine, prone or side lateral position.

TOOL VALIDATION AND RELIABILITY

CONTENT VALIDITY:

Content validity refers to the degree to which an instrument measures what it is supposed to measure.

The neonatal positioning guideline was made from the various review of literature and from the expert opinion and it was validated by the neonatologist. Content validity of the tool was established by requesting 20 experts to go through the content and to give their valuable suggestions and 13 tools were received back. The entire tool and guideline was validated by 11 nursing experts and 2 neonatologists.
The tool was found to be relevant and no modification was made.

RELIABILITY:

Reliability of the research instrument is defined as the extent to which it yields the same results on repeated use of the same instruments. It is then concerned with consistency, accuracy, precision, stability, equivalence and homogeneity. The tool was found to be reliable for the study by interrater reliability method. The reliability score was 0.90 (Reliability and Effectiveness of an Infant Positioning Assessment tool to standardize developmentally supportive positioning practices in NICU by Mary Coughlin, M.B. Lohman, S. Gibbins).

PILOT STUDY

The pilot study was not conducted because the study setting was confined only in NICU and the intervention would contaminate the study.

DATA COLLETION METHOD

The data was collected from 01/5/2014 – 31/7/2014

After obtaining permission from the Management, Head of the Department NICU and Nursing Superintendent.

The informed consent was taken from the subjects

The subjects were identified according to the inclusion and exclusion criteria

Pre-test practices were assessed by taking the average of two observations for each nurse using infant positioning assessment tool

Nurses were provided teaching on positioning of neonates with the guideline which was approved by the neonatologist

After seven days, the practices of staff nurses were assessed by taking the average of two observations for each nurse using infant positioning assessment tool

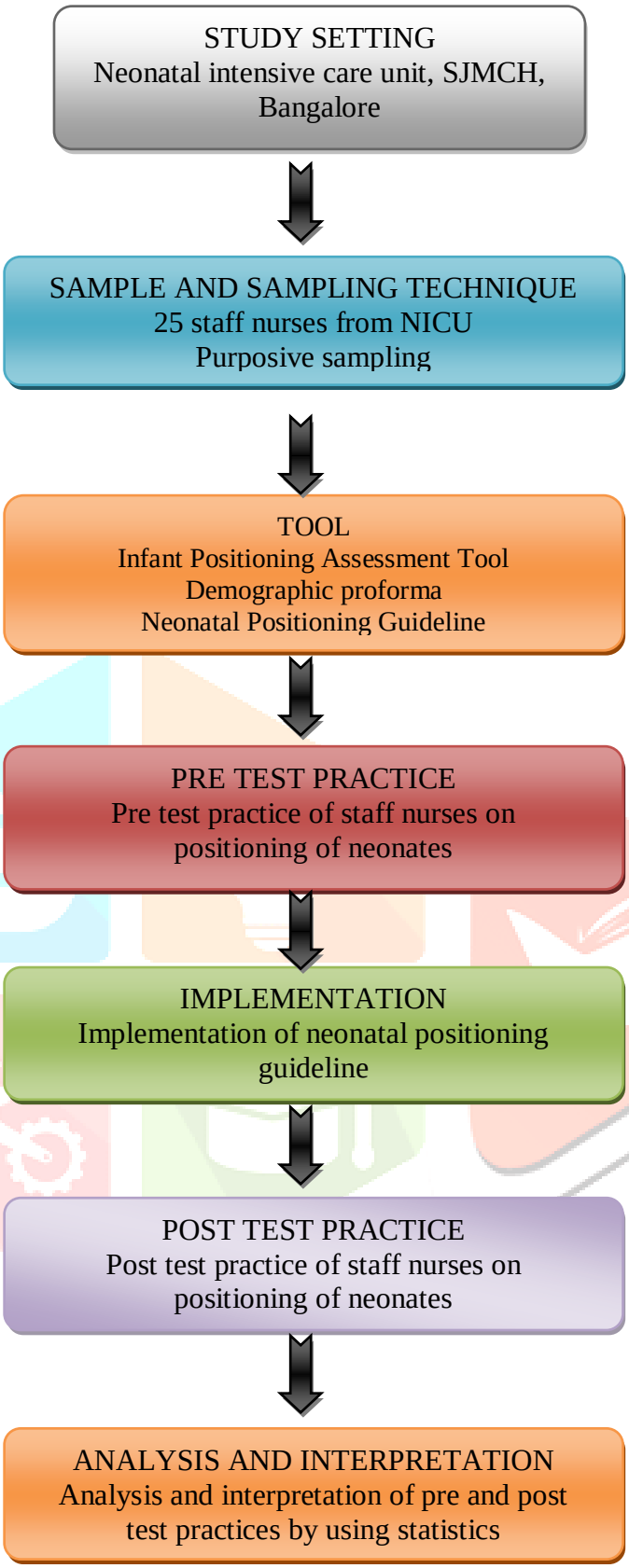

Figure 3: Schematic Outline of Research Plan

DATA ANALYSIS

This study used:

- Frequency and percentage to assess the baseline variables.
- Frequency, percentage distribution, Mean, Mean difference and Standard deviation to find out the significant difference between the practice score.
- Paired 't' test for the comparison of Infant Positioning Assessment Scores before and after intervention.
- Analysis of Variance (ANOVA) to test the association between pre-test score and baseline variables.

5. RESULTS

This chapter deals with the analysis and interpretation of the data collected to assess the practices of staff nurses on neonatal positioning. The analysis and interpretation of the data of this study are based on data collection through observation. The results were computed using descriptive and inferential statistics based on the objectives of the study.

The data are analyzed and organized as follows:
Section 1: Distribution of Baseline Variables of the Study Subjects.
Section 2: Comparison of Infant Positioning Assessment Score before and after intervention.
Section 3: Association between Pre-test Score and Selected Baseline Variables.

Section 1:

This section describes the distribution of sample according to baseline variable such as age, educational status, total years of experience and years of experience in NICU. The data on sample characteristics were analyzed using descriptive statistics such as percentage and presented in figures given below.

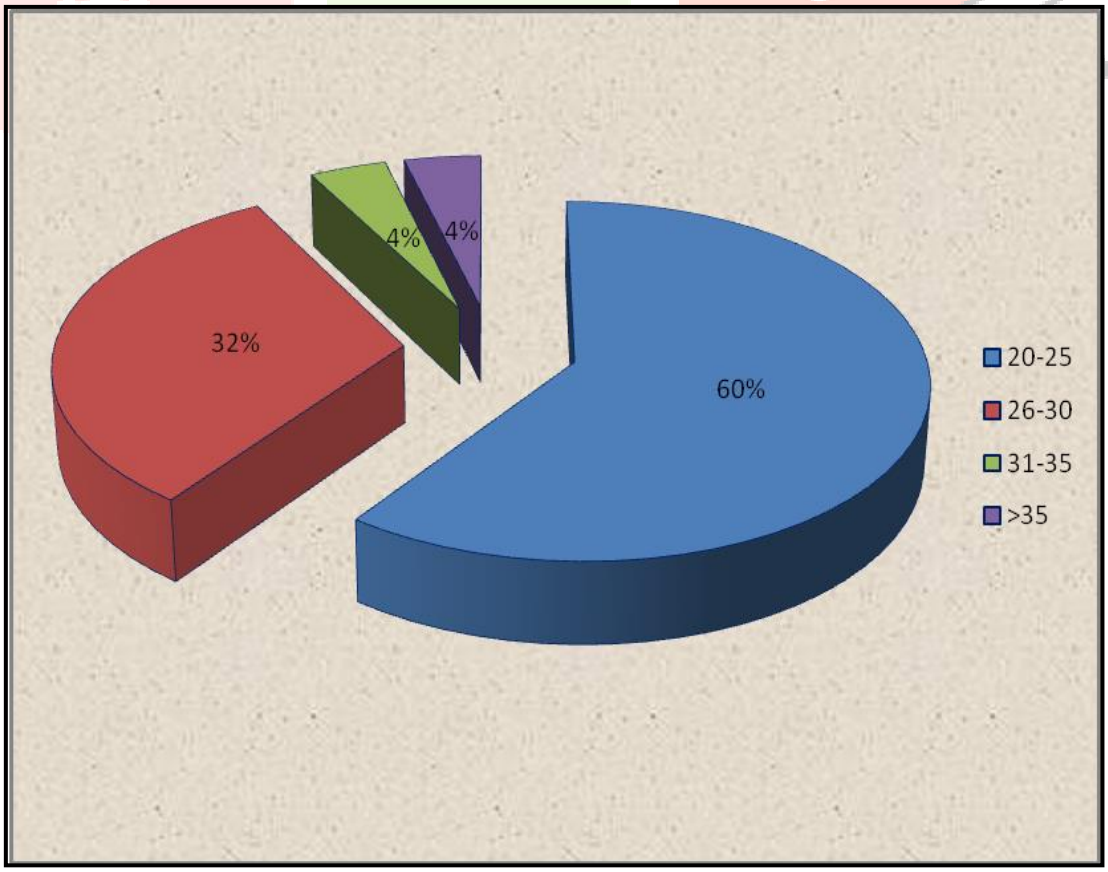

Figure 4: Percentage Distribution of Samples According to Age

It infers that majority 60% (15) of the staff nurses are from the age group of 20-25 years.

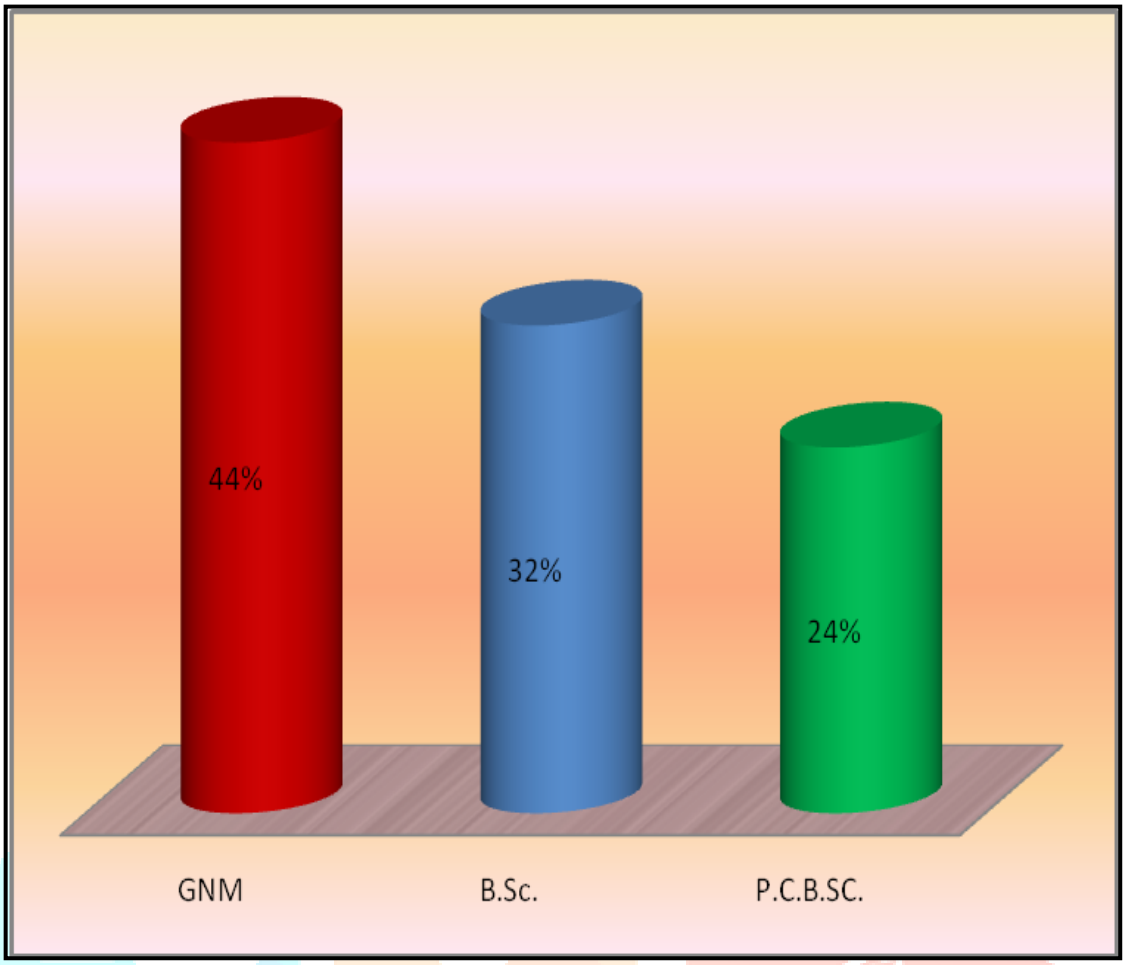

Figure 5: Percentage Distribution of Samples According to Education Status

It shows that most of the staff nurses 44% (11) have completed GNM.

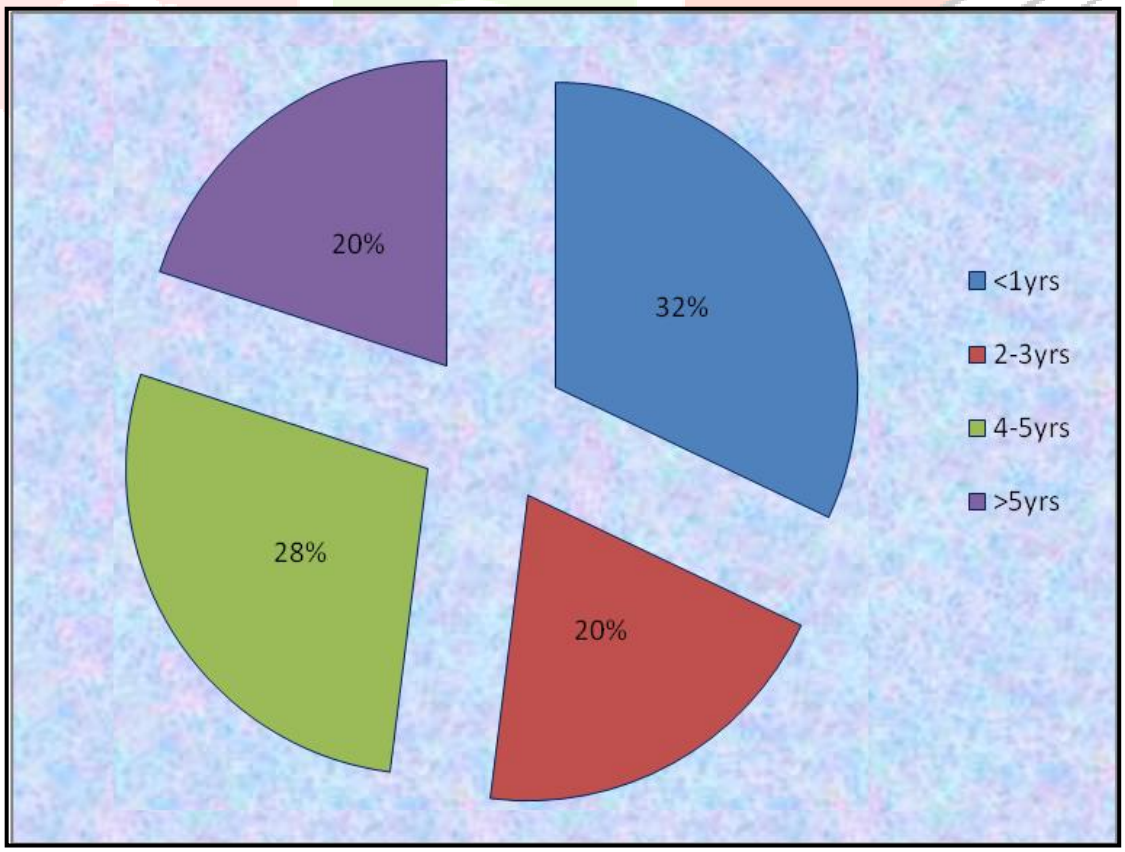

Figure 6: Percentage Distribution of Samples According to Total Years of Experience

It reveals that 32% (8) of the staff nurses have less than 1 year of experience and only 20% (5) of staff nurses have 2-3 years and more than 5 years of experience.

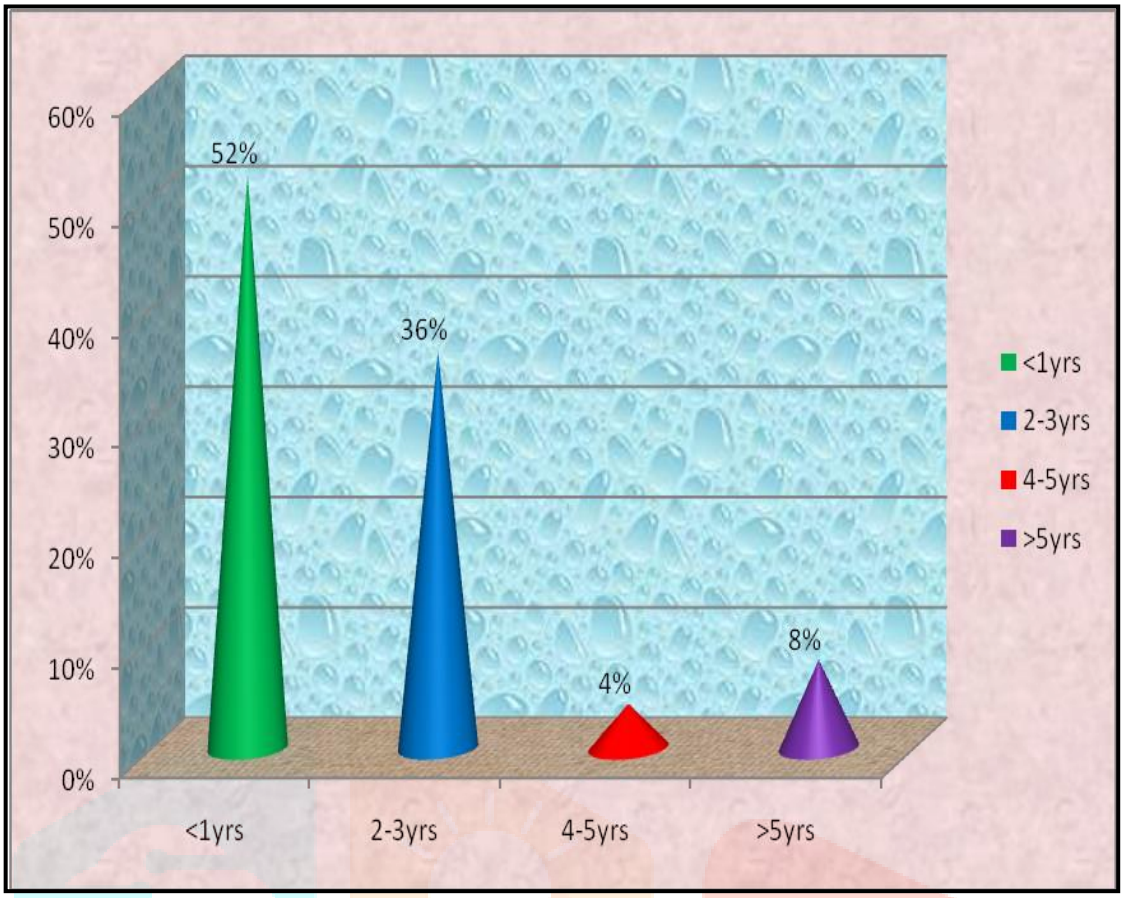

Figure 7: Percentage Distribution of Samples According to Years of Experience in NICU

It infers that majority 52% (13) of the staff nurses have less than 1 year of experience and only 8% (1) of staff has above 5 years of experience.

Section 2: Comparison of Infant Positioning Assessment Score before and after intervention

Objective 1: To compare the pre- test Infant Positioning Assessment Score and post- test Infant Positioning Assessment Score.

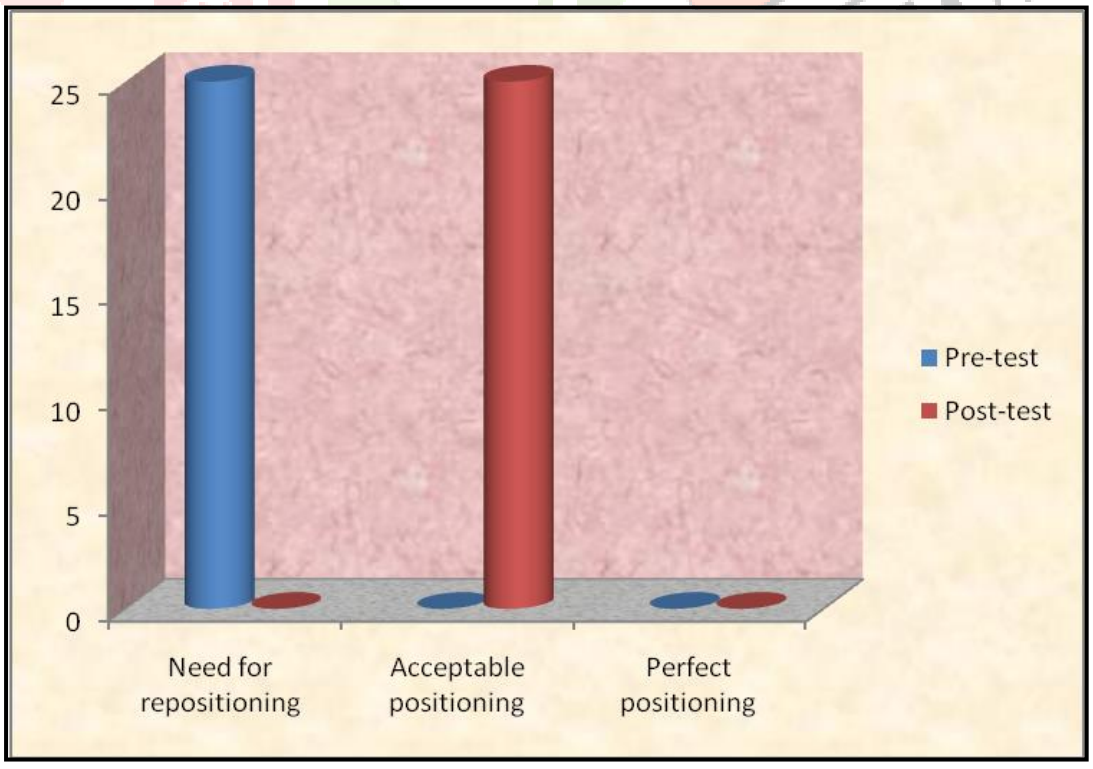

Figure 8: Pre-test and Post-test Infant Positioning Assessment Scores of the Sample

It shows that in pre-test practice 100% (25) of the staff nurses were in the category of need for repositioning and in post-test 100% (25) of the staff nurses were in the category of acceptable positioning.

Table 1: Paired 't' test to find out the effect of neonatal positioning guideline in terms of practice

Hypothesis 1: There will be a significant difference between pre-test and post-test Infant Positioning Assessment Score at 0.05 level of significance.

n=25

	Max Score	Range	Mean	SD	Mean Difference	Paired 't' Test	P Value
Pre-test	12	2.5-6.5	4.14	1.02	6.02	27.51	<0.001
Post-test	12	11-Sep	10.16	0.57`			

Data from the above table 1 reveals that there is significant difference in the mean pre-test and post-test practice score at <0.001 level of significance.

This concludes that the mean score of post-test is higher than mean pre-test practice score. The statistically significant difference was tested with paired 't' test and the value of 't' was 32.09 which is significant at p<0.001 level. Therefore the H1 is accepted, and it can be said that neonatal positioning guideline is an effective method to improve the practice of staff nurses on neonatal positioning.

Table 2: Max Score, Range, Mean, Mean %, Standard Deviation and Paired 't' test of pre- test and post-test of Infant Positioning Assessment according to specific area

n=25

	Max. Score	Range	Pre test Mean	Pre test SD	Post test Mean	Post test SD	Mean Difference	Paired 't' test	P Value
Total score	12	2-12	3.94	0.87	10.16	0.57	6.22	32.09	<0.001
Indicator									
Shoulders	2	0-2	0.94	0.17	1.98	0.10	1.04	26.00	<0.001
Hands	2	0-2	0.22	0.33	1.58	0.34	1.36	14.53	<0.001
Hips	2	0-2	0.52	0.39	1.84	0.24	1.32	14.55	<0.001
Knees/Ankles/ Feet	2	0-2	0.52	0.39	1.80	0.29	1.28	12.76	<0.001
Head	2	0-2	0.90	0.20	1.82	0.28	0.92	16.61	<0.001
Neck	2	0-2	0.84	0.24	1.14	0.23	0.32	5.63	<0.001

Data from the above table 2 reveals that there is significant difference in the pre-test and post-test mean practice score of all the parameters as the level of practice increases at p<0.001 level of significance.

Section 3 : Description of Association Between Pre-test Score and Baseline Variables.

Objective 2: To determine association between pre-test score with selected baseline variables.

Hypothesis 2: There will be a significant association between pre-test score and selected baseline variables at 0.05 level of significance.

Table 4: Description of the Association between Pre-test Score with Selected Baseline Variables

n=25

Sl. No	Baseline Variables	Mean	SD	Test of Significance (ANOVA)	p value
1.	**Age (in years)**				
	20-25	3.80	0.88		
	26-30	4.18	0.96	0.50	0.61
	>30	4.00	0.00		
2.	**Education Status**				
	GNM	4.18	0.84		
	B. Sc.	3.69	0.88	0.79	0.47

PcB. Sc.	3.83	0.93		
3. Total years of experience				
<1yrs	3.31	0.59		
2-3yrs	4.00	0.71	2.69	0.07
4-5yrs	4.35	1.07		
>5yrs	4.30	0.67		
4. Years of experience in NICU				
<1yrs	3.65	0.87		
2-3yrs	4.28	0.56	10.08	0.001
>3yrs	5.83	0.76		

The above table reveals that there is a significant association in practice score with respect to years of experience in NICU at $p<0.05$ level of significance.

It also shows that there is no significant association in practice score with respect to age, educational status and total years of experience at $p>0.05$ level of significance.

This chapter deals with the analysis and interpretation of data collected from the practices of 25 staff nurses. The findings showed that there was significant increase in the post-test infant positioning assessment score compared to pre-test score.

6. DISCUSSION

The neonatal intensive care unit (NICU) provides the medical care required to survive by infants who are at high risk of developmental dysfunction. Due to decreased muscle tone, premature infants are at risk of developing postural problems following a prolonged stay in NICU. Minimizing stimuli and providing containment and support to the fragile preterm infant body through positioning are common interventions used in NICU. Premature infants often lack adequate muscle tone and strength at birth. This often causes them to maintain their bodies in extended positions. This suboptimal position can impact development, and can inhibit self-regulation. These influences on development can impact future and immediate skill acquisition, such as feeding and can interfere with their ability to interact and attach themselves with their caregivers. Neonatal units worldwide have recognized that correct positioning of premature infants throughout their stay in NICU greatly reduces the long term effects of prematurity. To successfully implement developmentally supportive positioning in NICU, a variety of strategies and expertise in education and consultation is needed.

Objectives of the study:

- To compare the infant positioning assessment score before and after the implementation of guideline on positioning of neonate
- To determine the association between the pre-test infant positioning assessment score with selected baseline variables

The findings of the present study are discussed in relation to other studies and are organized under the following headings

- Section I: Base line variables of the Staff Nurses
- Section II: Practice of Staff Nurses before implementation of guideline on Positioning of Neonates
- Section III:Comparison of pre-test and post-test Infant Positioning Assessment Scores
- Section IV: Association between practice of Staff Nurses and selected baseline variables

Section I: Baseline Variables of the Staff Nurses

A total of 25 staff nurses were studied, among them 60% (15) of the staff nurses were from the age group of 20-25 years, 32% (8) of the staff nurses were from the age group of 26-30 years and only 4% (1) of staff were from the age group 31-35 years and more than 35 years

In the present study with respect to the educational status 44% (11) of the staff nurses had completed GNM, 32% (8) had finished B. Sc and only 24% (6) had completed P.C.B. Sc.

In view of their total years of experience 32% (8) of the staff nurses had less than 1 year of experience, 28% (7) had 4-5 years of experience and only 20% (5) of staff had 2-3 years and more than 5 years of experience.

Of the 25 staff nurses 52% (13) of the staff nurses had less than 1 year of experience, 36% (9) had 2-3 years of experience 8% (1) of staff had above 5 years and only 4% (2) of the staff nurses had 4-5 years of experience

Section II : Comparison of Pre-test and Post-test Infant Positioning Assessment Score

Implementation of a neonatal positioning guideline in NICU for preterm neonates showed positive outcome in the efficacy of using the guideline in daily care practice for neonates.

Out of 25 staff nurses whose practices were assessed regarding the neonatal positioning 100% (25) of the staff nurses included in the category of need for repositioning before the implementation of neonatal positioning guideline.

A similar finding was observed in a study on one-to-one bedside nurse education as a means to improve positioning consistency depicted that out of 24 staff nurses 90% of them included in the category of need for repositioning[7]

The statistically significant difference in the mean practice score of the staff nurses was found at $p<0.001$ level. There was significant difference ($p<0.001$) in the mean practice score of the staff nurses in areas of positioning like shoulders, hands, hips, knees/ankles/feet, head and neck after the implementation of neonatal positioning guideline. This indicates that neonatal positioning was practiced effectively in NICU after the implementation of neonatal positioning guideline.

A similar finding has been observed in an experimental study (one-to-one scripted bedside teaching) on neonatal positioning, that there was significant difference in the pre test and post-test mean practice score at $p<0.001$ level of significance. There was significant difference ($p<0.001$) in the mean practice score of the staff nurses in areas of positioning like hand and head after the one-to-one scripted bedside teaching [7].

Implementation of guideline was effective in changing the practice of Staff Nurses in NICU. With the support of these findings it can be concluded that neonatal positioning guideline was effective to improve the practice of Staff Nurses.

Section III: Association between Practice of Staff Nurses and Selected Baseline Variables

The association of practice score and baseline variables was done by computing ANOVA test. The variables used for association were age, educational status, total years of experience and years of experience in NICU.

The present study findings reveal that there is no significant association between the pre test infant positioning assessment score and age, educational status or years of experience ($P>0.05$). There is significant association between years of experience in NICU and pre test infant positioning assessment score, it is significant at <0.05 level.

There was a previous study conducted on neonatal nurses and therapists perceptions of positioning for preterm infants in the neonatal intensive care unit. In this study out of 76 samples 41% (31) had >20 years of experience in NICU and showed that perception of positioning for preterm infants was significantly related to years of experience in NICU[9]. Another study[57] which was conducted among 50 staff nurses showed that 90% (45) of them had >5 years of experience in NICU and there was significant relationship between practice of staff nurses and years of experience in NICU.

7. CONCLUSION

This chapter deals with the conclusion drawn based on the findings of the study. The main aim of the study was to assess the effect of implementation of guideline on positioning of neonates among Staff Nurses in the neonatal unit.

The study shows that the mean post-test infant positioning assessment score was (10.16 ± 0.57) higher than that of mean pre-test infant positioning assessment score (3.94 ± 0.87).

The data reveals that there is a significant association in pre-test Infant Positioning Assessment Score with respect to years of experience in NICU at $p<0.05$ level of significance.

IMPLICATIONS OF THE STUDY

Results of the study reveal that the guideline on positioning of neonates can help to standardize best neonatal positioning practice in NICU. The implications made in this study are vital to nursing practice, administration, education and research.

Nursing practice

Nurses are in a key position to enhance knowledge and practice based on the scientific principles. A neonatal nurse can contribute to enhance the care of the neonate. Developing protocols with scientific principles, discussion and various review of literature will help the nurse to provide evidence base and quality care for neonates. Thus a nurse can facilitate quality care to the neonates and their families.

The findings of the study can be used as evidence based practice in clinical setting. The guideline on positioning of neonates can be included in the routine practice.

Nursing Education

Every profession has to satisfy the demands for quality assurance and only through standard education there can be standard practice. Teaching aimed at providing nurses with the knowledge and skill required to manage a sick neonate in NICU is at the very heart of nursing practice. Hence nursing education should aim at preparing nurses who are capable of imparting health information regarding the importance of developmental care in NICU settings. The curriculum should provide opportunity for students to gain knowledge and skill in neonatal positioning and educating parents on positioning of their babies. Infant positioning assessment score can be included in the syllabus.

Nursing curriculum is concerned with the preparation of future nurses who will play a major role in providing individualized, comprehensive care that is family and community based. The findings of the study will serve as a base in clinical practice to improve the neonatal positioning and hence can be included in the nursing curriculum.

Nursing Administration

Nurse Administrator can influence other health team members for inclusion of such guideline in the preterm care. Guideline on positioning of neonates will help in the development of preterm neonates and thus will reduce the long term complications of prematurity and prolonged hospital stay. It can also be included as the topic for discussion during in-service education.

The Nursing Administrator is responsible for facilitating various health teaching programmes to all nurses at both hospital and community level and for evaluating the efficacy of such programmes through periodical survey. She can organize continuing education classes and in-service programmes on the current trends in neonatal positioning to help nurses to update themselves. The neonatal positioning guideline should be displayed in NICU. Innovative methods of teaching, good supervision and evaluation of the care should be provided to help the nurses to understand better the importance of developmental care.

Nursing Research

The role of research in enhancing the body of knowledge is indispensable. Modern nursing care support evidence based practices. The nurses who form an important cadre in the developmental care of neonates should be motivated to conduct research studies to estimate the current practice as well as the knowledge of staff nurses on positioning of neonates. The findings of the study provide data for future research by nurses on neonatal positioning. Various methods can be carried out through research as evidence based practice which would help in improving quality care and promote nursing status and image.

Limitations

- The study was conducted only among the staff nurses working at SJMCH, Bangalore.
- The study was limited only to the practice component.

Recommendations

- A follow up study can be conducted to determine the knowledge of staff nurses.
- A similar study can be replicated on a larger group in order to generalize the findings.
- A comparative study can be undertaken with the control group to compare in knowledge and practice.
- Neonatal positioning guideline can be updated from time to time.
- The Staff Nurses in NICU can use the Infant Positioning Assessment Scoring in their routine care.

8. SUMMARY

This chapter presents a brief summary of the study. The main aim of the study was to assess the effect of implementation of guideline on positioning of neonates among Staff Nurses in the neonatal unit of a selected hospital, Bangalore

OBJECTIVES OF THE STUDY

1. To compare the infant positioning assessment score before and after the implementation of guideline on positioning of neonate
2. To determine the association between the pre-test infant positioning assessment score with selected baseline variables

ASSUMPTIONS

1. The Nurses may have some experience in positioning of neonates
2. Implementation of guideline on positioning of neonates is an accepted strategy that would enhance the correct practices

The conceptual framework adopted for this study was based on context, input, process and product model (CIPP model). This model helped the investigator in approaching the research problem in a systematic and comprehensive manner. A detailed review of literature was done in the areas related to neonatal positioning aspects and practices. The extensive review enabled the investigator to adopt an appropriate methodology to study, to plan for data analysis and to interpret the study findings in an appropriate manner.

In view of the problem and the objectives of the study, a quantitative survey research approach with pre-experimental 'one group pre-test – post-test research design' was used for the study. The variables in the study were practice of staff nurses and the effect of neonatal positioning guideline. The baseline variables were age, educational status, total years of experience and years of experience in NICU. The setting of the study was NICU of SJMCH, Bangalore. The population under study was all the staff nurses working in NICU. Purposive sampling was used to select the samples of 25 Staff Nurses.

The data collection instrument consisted of a structured questionnaire for collection of baseline variables of staff nurses, infant positioning assessment tool which consist of different areas like head, neck, shoulder, hands, hips and knees/ankles/feet and guideline for positioning of neonates. Following tool preparation, content validity was established by sending the tool to experts. The tool was found to be reliable for the study by interrater reliability method. The reliability score was 0.90 based on the study: Reliability and Effectiveness of an Infant Positioning Assessment tool to standardize developmentally supportive positioning practices in NICU by Mary Coughlin, M.B. Lohman and S. Gibbins. The pilot study was not conducted because the study setting was confined only to NICU and the intervention would contaminate the study. Data for the final study were obtained from 25 staff nurses working in NICU at SJMCH, Bangalore using infant positioning assessment tool and structured questionnaire for baseline variables.

Descriptive and inferential statistics were used to analyze the obtained data in terms of the objectives of the study. The study reveals that 60% (15) of the Staff Nurses were from the age group of 20-25 years, 44% (11) of the Staff Nurses had completed GNM, 32% (8) of the Staff Nurses had less than 1 year of experience and 52% (13) of the Staff Nurses had less than 1 year of experience in NICU. It also shows that in pre-test infant positioning assessment 100% (25) of the Staff Nurses included in the category of need for repositioning and in post-test 100% (25) of the Staff Nurses included in the category of acceptable positioning. The mean post test practice score (10.16) is higher than that of mean pre test practice score (3.94). The standard deviation of the pre-test practice and post-test practice are 0.84 and 0.57 respectively.

The study findings depict that Staff Nurses had improved their practice regarding neonatal positioning which is statistically significant at $p<0.001$ level of significance.

There is significant difference in the mean practice score of the Staff Nurses in areas like shoulders, hands, hips, knees/ankles/feet, head and neck as the level of practice increases at $p<0.001$ level of significance. The study also reveals that there is a significant association in practice score with respect to years of experience in NICU at $p<0.05$ level of significance.

This study benefited the investigator with a wholesome experience. It helped to assess the practice of staff nurses on neonatal positioning. Thus the study motivated the investigator to prepare a neonatal positioning guideline for Neonatal Intensive Care Unit.

The constant encouragement, timely correction and direction from the guide and co-guide, co-operation from the Nurses and Doctors and support from the Management contributed to the successful completion of this study.

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