# The use of clinical audit in successfully implementing a change of clinical practice in developmental positioning

This article outlines a clinical audit process to determine whether standards of developmental positioning were being achieved in a neonatal unit. An initial audit of positioning identified a need for change in clinical practice and an evaluation of a new fluidised conformational positioning system was undertaken. Positioning was re-audited and the opinions of nursing staff gathered. The importance of education when implementing a change in clinical practice is considered alongside the results of the audit process.

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**Keywords**

developmental positioning; physiological flexion; audit tool; tortoise fluidised positioning system; education programme

**Key points**

**Hunter A.J.** The use of clinical audit in successfully implementing a change of clinical practice in developmental positioning. *Infant* 2015; 11(5): 155-59.

1. An audit of neonatal positioning was carried out within the neonatal unit of the Princess Royal Maternity Hospital, Glasgow and a need for change in practice was identified.
2. The tortoise fluidised positioning system was introduced following an education programme.
3. The audit process was repeated and results indicated an improvement in neonatal positioning practice.
4. Nursing staff opinions were gathered and revealed a positive response to the new positioning equipment.

## Background

Appropriate positioning in the neonatal period is essential for optimising neurodevelopment outcomes in preterm infants and its importance has been well documented.[1-4]

During a 40-week pregnancy, the developing fetus is protected and supported by a fluid filled environment. The uterus provides the fetus with a confined space in which to develop, free from the effects of the outside world and gravitational pull. During the last trimester of pregnancy, limited intrauterine space encourages a postural bias towards flexion. The developing fetus extends its limbs, pushing against the dynamic boundary of the uterine wall. Limbs are then returned to a resting posture of flexion. This encourages the development of physiological flexion and provides infants born at full term a degree of early motor control.[2]

The last trimester of pregnancy is also a time of rapid brain development. Neural connections and pathways are formed and reinforced by repeated activation. *In utero* development of physiological flexion, through repetition of active movement, strengthens these connections and pathways and a flexor pattern becomes dominant.[5,6]

Interruption of this process through premature birth has a direct impact on brain development and the development of posture and motor control. Extremely preterm infants are deprived of the opportunity to develop physiological flexion *in utero*. Immature physiological, musculoskeletal and sensory systems are further impacted by the effects of illness, energy depletion, the immediate environment and repetitive noxious stimuli. In this group of infants, muscle tone is typically hypotonic with little ability to move against gravity.[7]

Without intervention, the resting posture of an extremely preterm infant will be generally extended, with limbs abducted and externally rotated and head turned to one side. Active movements into extension are not returned to a resting posture of flexion and through time, neuronal connections favouring an extended posture will be reinforced and may lead to significant developmental delay.[4]

All positioning has an impact on neurobehavioural organisation. Poorly positioned infants with extended, unsupported postures often display signs of stress and decreased physiological stability.[7] Supportive therapeutic positioning provides postural stability and promotes self-calming and neurobehavioural organisation. Providing secure contained boundaries encourages the development of flexor patterns of movement and discourages the dominance of extensor postures.

### An audit of positioning at the Princess Royal Maternity Hospital, Glasgow

NHS Greater Glasgow and Clyde (GG&C)

is the largest health board in the UK, serving 1.2 million people and employing 38,000 staff.[8] The Princess Royal Maternity Hospital (PRMH) provides neonatal services to the north and east of the city of Glasgow with approximately 6,200 live births and 600 admissions to the neonatal unit (NNU) per year. The NNU has 34 cots providing intensive care, high dependency and special care services.

Developmental care guidelines established by NHS GG&C promote consistency in clinical practice in all aspects of developmental care across the health board area. Developmental positioning is one of the key components covered by these guidelines.

The purpose of this study was to audit current practice in developmental positioning in the neonatal intensive care unit (NICU) of the PRMH in relation to local developmental care guidelines.

### *Audit cycle 1: methods*

The GG&C Developmental Care Guidelines (2012)[9] identified a number of criteria essential to therapeutic positioning. An audit tool was developed to audit positioning of preterm infants using a scoring system based on criteria identified in the guidelines (**FIGURE 1**).

An initial audit (audit cycle 1) was carried out within the NICU over a period of 12 weeks from April to July 2013. Audits were made on infants born less than 32 weeks' gestation admitted to the NICU and nursed in incubator care. Infants were positioned using a variety of commercially available neonatal positioning products including flexible boundaries and nests. Audits were made on a random and unannounced basis in order to blind nursing staff to the timing of assessments. Using the audit tool, infant positioning was assessed for side lying/supine and prone positioning. Each position had a possible score ranging from 0-8 with higher scores reflecting better positioning. Scores were further classified as follows:

- 7-8 *Very good* requiring no correction
- 5-6 *Good* requiring minimal adjustment
- 3-4 *Poor* requiring repositioning
- 0-2 *Very poor* providing no containment, requiring immediate repositioning

A total of 34 assessments were carried out during audit cycle 1. All assessments were carried out by the same assessor thereby removing inter-rater error.

**A**

**Date:** **Gestation:** **Corrected gestational age:** **Comments:**

| | 2 | 1 | 0 |
|---|---|---|---|
| Trunk flexion | | | |
| Shoulder girdle and upper limb position | | | |
| Hip and lower limb position | | | |
| Boundary | | | |
| **Total score** | | | |

**Scoring criteria**

**Trunk flexion**
2 Trunk flexed with pelvic and shoulder girdle flexion
1 Trunk semi-flexed with some pelvic or shoulder girdle flexion
0 Inadequate flexion. Trunk generally extended

**Shoulder girdle and upper limb position**
2 Shoulder girdles protracted, upper limbs towards midline. Hands towards mouth
1 Some shoulder girdle flexion but upper limbs not flexed to midline
0 Shoulder girdles retracted, upper limbs extended

**Hip and lower limb position**
2 Hip, knee and ankle flexion with foot bracing
1 Some flexion of lower limbs but no foot bracing
0 Lower limbs extended

**Boundary**
2 Boundary appropriate in size and achieving optimal position and containment
1 Appropriate boundary but not achieving optimal position
0 Boundary wrong size or achieving no containment

**B**

**Date:** **Gestation:** **Corrected gestational age:** **Comments:**

| | 2 | 1 | 0 |
|---|---|---|---|
| Prone pillow | | | |
| Shoulder girdle and upper limb position | | | |
| Hip and lower limb position | | | |
| Boundary | | | |
| **Total score** | | | |

**Scoring criteria**

**Prone pillow**
2 Prone pillow of appropriate size and providing adequate support
1 Prone pillow in place but not providing adequate support
0 No prone pillow or prone pillow resulting in extended posture

**Shoulder girdle and upper limb position**
2 Shoulder girdles protracted round prone pillow with upper limbs flexed and hands towards mouth
1 Some flexion of upper limbs but not achieving optimal position
0 Shoulder girdles are retracted and upper limbs extended

**Hip and lower limb position**
2 Hips and knees flexed, supported by the prone pillow. Foot bracing provided by boundary
1 Some hip and knee flexion but not achieving optimal position and no foot bracing
0 Lower limbs in an extended position

**Boundary**
2 Boundary appropriate in size and achieving optimal position and containment
1 Appropriate boundary but not achieving optimal position
0 Boundary wrong size or achieving no containment

**FIGURE 1** The positioning audit: A) side or supine lying, B) prone lying.

*Audit cycle 1: results*

The results of the initial positioning audit can be seen in **TABLE 1**. The analysis of audit cycle 1 results revealed that although 56% of assessments scored between 5 and 8 requiring minimal or no correction, 44% of assessments scored between 0 and 4 requiring repositioning.

This indicated that the standard of positioning achieved was inconsistent and although some infants were positioned very well, many were receiving insufficient postural support and were not receiving an acceptable standard of therapeutic positioning.

The initial audit highlighted the need for a change in practice and it was decided a different positioning system, the tortoise fluidised positioning system, would be implemented and its use audited within the NICU.

## The tortoise fluidised positioning system

Although new to the UK, the tortoise fluidised positioning system, was already widely established in the USA. The system differs from other positioning devices by using a fluidised medium to provide positional support and containment. This allows the support to be contoured and moulded to adapt to the needs of each infant while also providing pressure care for skin. **FIGURE 2** shows the positioners, with covers, before moulding.

## Education programme

Education and training in the use of the product was essential as nursing staff were required to develop new skills in order to achieve optimum positioning of infants. Therefore, before introduction of the positioning system, an education programme for nursing staff was undertaken to ensure all staff were trained in the correct and appropriate use of the equipment.

A clinical advisor from Sundance Enterprises, facilitated by Talarmade Ltd, delivered initial training for 20 clinical staff. An education programme was then undertaken by the author to ensure all remaining members of nursing staff received appropriate training. This was offered over a six-week period to all available staff. Training was delivered in groups or individual sessions to approximately 50 members of staff. Education took the format of physical demonstration of the product using a training doll and provided the opportunity for staff to practise new skills. The training equipment and doll were also made available to staff outside of the formal training sessions to enable them to become more familiar with the equipment.

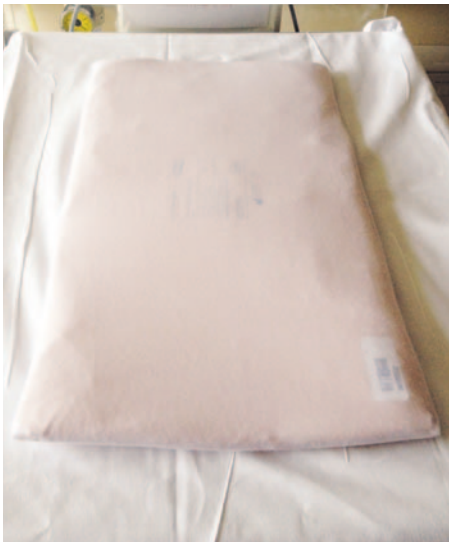
In addition, nursing staff were provided with a document including photographs and written instructions on the correct use of the product.

| Scores | Frequency | % |
|---|---|---|
| 7-8 | 9 | 26.5 |
| 5-6 | 10 | 29.25 |
| 3-4 | 10 | 29.25 |
| 0-2 | 5 | 15 |

**TABLE 1** Audit cycle 1: assessment scores as a percentage of the total.

## Audit cycle 2

Following completion of the education programme, the positioning system was introduced to the NICU. Twenty-five tortoise positioning systems were provided by Talarmade Ltd on behalf of Sundance Enterprises for the purpose of the evaluation. The positioners were used for all infants born at <32 weeks' gestation and continued until the infants progressed from incubator to open cot care. **FIGURE 3** shows how the positioners were used to position infants in side lying and prone positions.



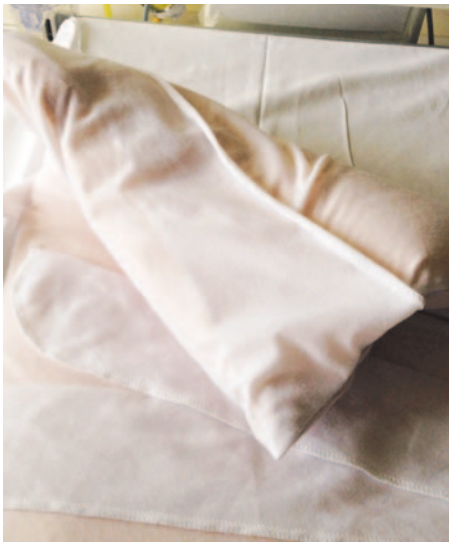
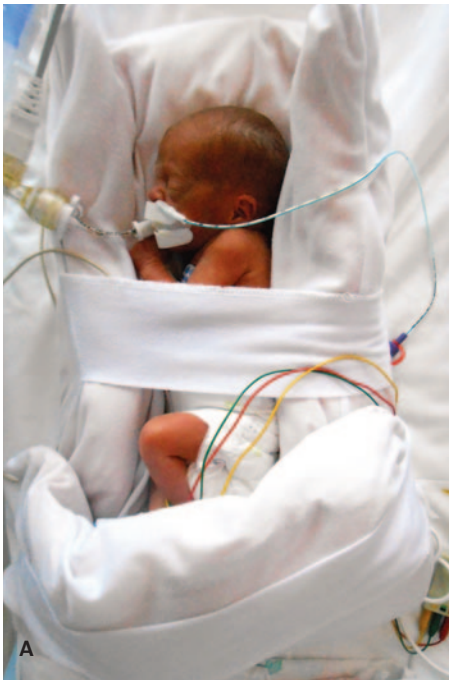


**FIGURE 2** The tortoise fluidised positioning device.



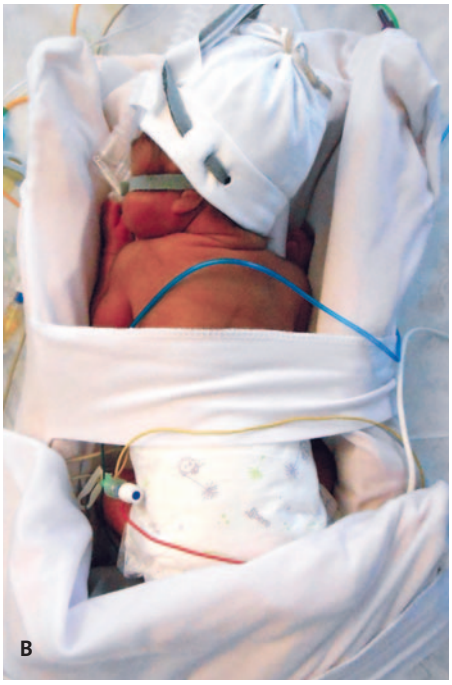




**FIGURE 3** The tortoise fluidised positioning system for (A) side lying and (B) prone positioning.

| Scores | Frequency | % |
|---|---|---|
| 7-8 | 19 | 51 |
| 5-6 | 13 | 35 |
| 3-4 | 4 | 11 |
| 0-2 | 1 | 3 |

**TABLE 2** Audit cycle 2: assessment scores as a percentage of the total.

Audit cycle 2 was undertaken in the same manner as audit cycle 1 with the aim of determining whether the new positioning system was effective and whether use of this system, following an education programme, resulted in improved therapeutic positioning.

*Audit cycle 2: results*

The second audit was carried out within the NICU over a period of 12 weeks from October to December 2013. A total of 37 assessments were completed (**TABLE 2**). The results revealed a positive shift in infant positioning. Eighty-six per cent of the assessments scored in the upper ranges between 5-8, defined as being positioned very well or requiring only minimal adjustments. Perhaps more importantly only 14% were scored as being poorly positioned.

Positioning scores generally improved from the first to the second audit cycles. Scores improved in all positions assessed and fewer infants were poorly positioned following the second audit.

## Feedback from nursing staff

The opinions of nursing staff in relation to both the use of the product and to the training received were determined through completion of an anonymous questionnaire. It was hoped the anonymous format would encourage staff to comment, whether positively or negatively.

Questionnaires were made available to staff for a period of six weeks at the end of the second audit cycle. The questionnaire response rate was approximately 46% with 32 members of staff participating (**TABLE 3**).

Nursing staff were also encouraged to comment on any likes/dislikes and advantages/disadvantages regarding the use of the positioners. Of the 32 questionnaires returned, 29 commented positively in general and three commented mainly negatively.

Positive comments included that the positioning system:

- improved infant positioning
- improved comfort
- improved stability of observations
- improved containment
- reduced pressure on the skin.

Negative comments included:

- heavy and bulky to use
- difficulty achieving and maintaining position
- temperature control more difficult to regulate.

Responses to the questionnaire suggested that nursing staff were in general very positive regarding the introduction of the new equipment.

The responses also highlighted the importance of a comprehensive education and training programme when implementing any change in clinical practice within the unit. In order to address any concerns or difficulties experienced, staff were strongly encouraged to ask for further guidance or information on the use of the equipment.

## Implications and conclusions

The results indicated that the introduction and implementation of the tortoise fluidised positioning system improved developmental positioning for infants within the NICU in the PRMH, Glasgow. Nursing staff responded positively to the introduction of the equipment and implemented new skills appropriately.

As with all new skills, some members of staff developed these skills more easily than others. This was reflected both in the results of the audit and also in the questionnaire responses. The majority of staff were of the opinion that the fluidised positioning system offered better positioning and containment and reported that infants seemed more settled and appeared to sleep for longer periods. Anecdotally, well positioned, settled infants also tend to be disturbed less frequently for medical interventions although this was not formally recorded as part of the evaluation.

Parents also reacted very favourably towards the positioners often commenting on how comfortable and settled their infant looked.

These results would tend to concur with a study conducted in Cincinnati, Ohio where the study team investigated the sleep organisational states of infants in the NICU. Sleep was measured using electroencephalography (EEG) and newborn individualised developmental care and assessment program (NIDCAP) observational measures. Results indicated improved sleep efficiency when positioned on the conformational or fluidised positioner as opposed to the mattress. Observational measures were also shown to correlate with EEG results.[10] Although these are not directly comparable studies, both pieces of work reported benefits from the use of the fluidised or conformational positioning system.

## Limitations and further study

This study was limited by several factors, the primary limitation being that this was a descriptive study and not a randomised controlled trial. Prior to the initial audit (audit cycle 1), a similar intensive education programme was not carried out. Although staff should have been proficient in the appropriate use of the equipment being used at that point, an intensive education period alone may also have resulted in improved consistency of positioning standards.

The audit tool used was not a standardised tool however, as it was devised and used only by the author, there were no inter-rater reliability concerns.

| | | Yes | No |
|---|---|---|---|
| Q1 | Do you feel you had adequate training? | 31 | 1 |
| Q2 | Do you feel confident in using the positioner? | 30 | 2 |
| Q3 | Do you find the positioner easy to use? | 24 | 8 |

| | | Always | Usually | Rarely | Never |
|---|---|---|---|---|---|
| Q4 | Do you achieve the position you are aiming for? | 3 | 26 | 3 | 0 |
| Q5 | Does the equipment maintain its shape? | 4 | 25 | 3 | 0 |
| Q6 | Does the infant remain well positioned between cares? | 0 | 29 | 3 | 0 |

**TABLE 3** Nursing staff responses to questionnaire.

Time was also a limiting factor as no additional time or staffing resource was available and all aspects were carried out within the existing clinical remit of the author.

Further study may benefit from including parents' opinions at each stage of the process.

## Conclusion

This process highlighted the importance of formally auditing developmental care practices within the clinical setting to determine whether standards of care are being achieved and maintained.

In this case, the evaluation of new positioning equipment and the education and training process required to achieve this resulted in improved developmentally appropriate positioning within the NICU at PRMH, Glasgow.

The potential for this to have positive impact on improved sleep efficiency has already been documented and the links between improved sleep efficiency and improved long-term neurodevelopment widely acknowledged.[4,11-13]

Further studies are required to ascertain whether the infants using this positioning system will demonstrate improved neurodevelopmental outcomes at long-term developmental follow-up.

## Declaration

Positioning systems were provided by Talarmade Ltd on behalf of Sundance Enterprises for the purpose of the evaluation. AH received funding to attend and present the audit findings at an international neonatal conference.

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