

## Improving the recording of anthropometric parameters in NICU babies-A Quality improvement initiative

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### Abstract

Meticulous and regular monitoring of anthropometry of sick babies in the NICU can be challenging in a busy NICU. Often, nurses and doctors tend to miss out on regular monitoring of anthropometry since importance is given to other clinical duties in a busy tertiary NICU. **Objective:** To improve anthropometry recording of babies admitted in a busy neonatal intensive care unit (NICU). **Design:** Quality improvement project over a period of twelve weeks **Setting:** Level III Neonatal Intensive Care Unit. **Participants:** All patients admitted in neonatal intensive care unit (NICU). **Methods:** The Quality improvement project was designed as per Point of Care Quality Improvement (POCQI) model conducted over 12 weeks—6 weeks implementation phase & 6 weeks sustainability phase. After collection of baseline data, a quality improvement (QI) team was formed which conducted six PDSA cycles (PDSA) of 7 days each, followed by a sustainability phase over 6 weeks. **Results:** Measurement of anthropometry parameters improved from 30% to 80% for head circumference, 20% to 80% for length and 80% to 95% for weight during the implementation phase. In the sustainability phase too, the compliance to measurements remained above 80% respectively for head circumference and weight and also above 95% for weight. **Conclusions:** This Quality improvement initiative using POCQI model resulted in a significant and sustained improvement in the recording of anthropometry parameters like head circumference, length and weight.

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### Introduction and Background of the topic

Neonatal anthropometry is an inexpensive, noninvasive and convenient tool for bedside evaluation, especially in sick and fragile neonates. Anthropometry can be useful for several purposes like diagnosis of malnutrition and prediction of early growth failure and postnatal complications thereof, postnatal assessment of growth, body composition and nutritional status, prediction of long-term complications including metabolic syndrome, assessment of dysmorphism and estimation of body surface. Commonly used growth charts are Fenton's chart & Ehrenkranz chart for preterm babies and Intergrowth 21 & World Health Organization (WHO) growth charts for term babies [1-4].

Plotting of anthropometric parameters on these charts starts at birth, followed by daily/weekly plotting till discharge. This helps identify babies with abnormal rates of growth.

Early identification of these growth abnormalities can facilitate the right interventions like adjustments in protein & calorie intake or otherwise. Understanding the growth trajectory can help in prognostication of neonatal outcomes. Recording of anthropometric parameters is missed many a times in a busy NICU due to competing responsibilities. This can lead to late identification of extra-uterine growth restriction (EUGR) which can lead to poor neonatal outcomes. Our unit is a busy Level IIIB NICU with 250 – 300 admissions per month. Admissions consist of preterm infants, extremely low birth infants, infants with perinatal asphyxia, infections, congenital anomalies etc. These neonates are looked after by a team of 10 resident doctors and 4 consultants. We have 4-6 neonatal nurses on the floor at a time. These teams of doctors and nurses work in shifts round the clock and look after critically ill neonates. We observed that anthropometry recording was missed several times. There was a need to ensure that anthropometric measurements are recorded meticulously & a quality improvement initiative could be an answer to this problem.

### Aims and Objective

#### Aim

Improving the anthropometry recording in a busy NICU using a quality improvement initiative: to increase percentage of neonates having a daily weight record, weekly head circumference & weekly

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length record from 80 to 95%, 30% to 80% & 20% to 80% respectively.

**Materials and methods**

A baseline audit of all the patient files in our unit over a period of 4 weeks was done in December 2020 to check the anthropometry records of NICU admissions. We found that percentage (%) of babies having daily weight records was 80%, weekly head circumference was 30% and weekly record of length was 20%. We decided to use a quality improvement initiative to improve the recording of anthropometric parameters in our unit. A team of 6 members was formed which comprised of 3 resident doctors and 2 nurses and 1 faculty member. One of the resident doctors was designated for capturing data of anthropometry documentation.

The team brainstormed and carried out a fish bone analysis to identify potential barriers while taking anthropometry[5]. The fish bone analysis helped us to plan interventions which would help to tackle the potential issues. Weekly plan-do-study-act (PDSA) cycles were

conducted to test the change ideas which were identified by fish bone analysis. Impact of each of these interventions were analyzed at the end of each week[6]. If these indicators showed improvement, the change idea was accepted. If there was no improvement after implementing the change idea, it was rejected & a new change idea was tried in the next PDSA cycle. PDSA cycles were conducted to test the change ideas over 6 weeks. Following the implementation phase, the sustainability of the interventions was observed over the next 6 weeks.

**Outcome Indicators**

**1-% of length recording**-total babies with appropriate weekly length recording / total number of babies admitted in NICU x 100

**2-% of head circumference recording**-total babies with appropriate weekly head circumference recording / Total number of babies admitted in NICU x 100

**3-% weight recording**-Total babies with appropriate daily weight recording/Total number of babies admitted in NICU x 100

**Table 1:Pdsa cycles**

	<b>Plan</b>	<b>Do</b>	<b>Study</b>	<b>Act</b>
Week 1 - PDSA 1	Poor communication between residents and nurses regd when to do anthropometry. Lack of Awareness of importance of anthropometry and the correct technique.	Communication skill workshop and Anthropometry training programme was conducted for all residents and nurses. A written policy created and displayed in the unit	Rates increased to 71 % for head circumference,61% for length and 92% for weight recording respectively	Change idea accepted
Week 2 - PDSA 2	Only one infantometer available across various areas in NICU. Inadequate number of measuring tapes.	Extra infantometers were purchased through department funds and every section was provided with a separate infantometer.  A separate measuring tape was provided for every bed in the NICU.	Rates remained at 70% for head circumference,67% for length and 86% for weight recording respectively.	Change idea accepted
Week 3 - PDSA 3	Doctors and nurses would be preoccupied with several critical care routines and forgot to measure anthropometry on time.	The days and time slots were fixed for measuring anthropometry parameters.  Bright coloured stickers were applied on the back of baby file to serve as a reminder.	Rates increased to 86% for head circumference,83% in length and 95% in weight recording.	Change idea accepted
Week 4 - PDSA 4	Measuring tapes would get misplaced on several occasions. Batteries of weighing scales would drain out and fresh supply was erratic.	Measuring tapes were hung on a hook from every warmer and checked every morning. Rechargeable batteries were procured for the weighing scales and charged every night	Rates increased to 86% in weight,86% in length and 100% in weight recording	Change idea accepted
Week 5 - PDSA 5	Use of CPAP caps and interfaces on the head made measurement of anthropometry difficult	Anthropometry was clubbed with CPAP care bundle.	Rates remained sustained at 86% for head circumference,83% for length and 95% for weight recording	Change idea accepted
Week 6 - PDSA 6	Staff would forget to do anthropometry on certain occasions	Anthropometry was made a mandatory parameter during handing over of babies during change of shifts	Rates remained at 84% for head circumference,78% for length and 86% for weight respectively	Change idea accepted

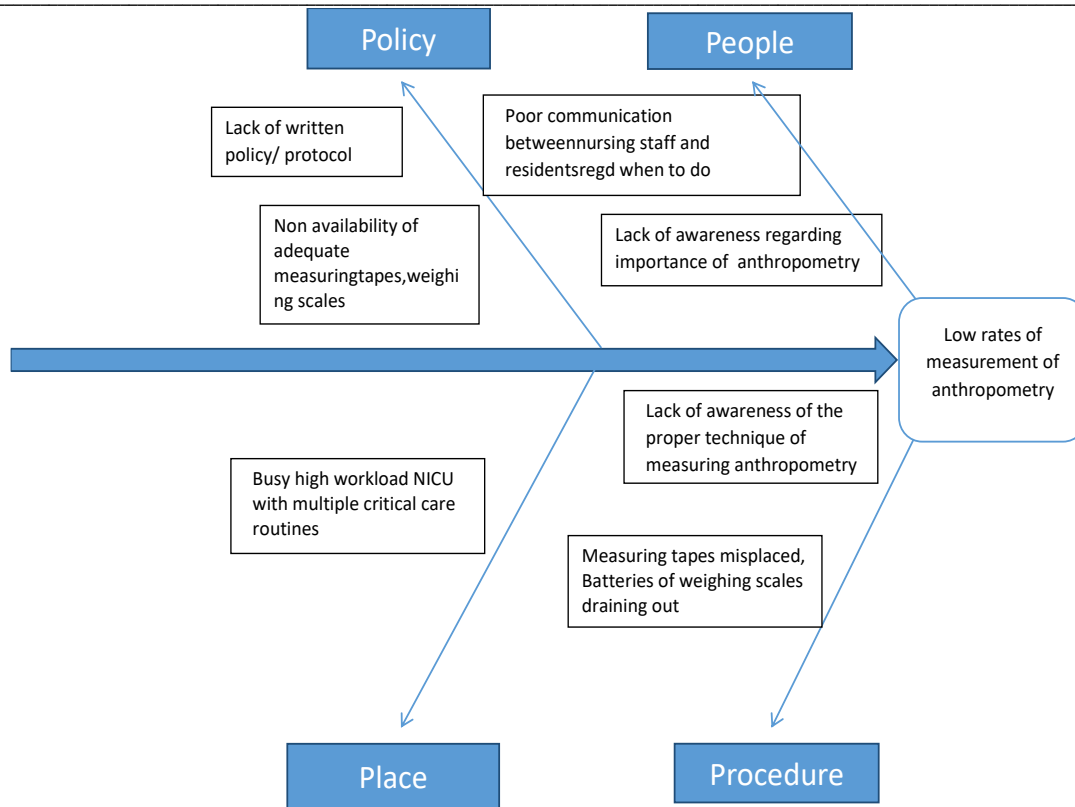


Fig 1: Fish Bone

**Results**

Measurement of anthropometry parameters improved from 30% to 80% for head circumference, 25% to 80% for length and 80% to 95% for weight during the implementation phase. In the sustainability phase, the recording remained above 80% respectively for head circumference and length and above 95% for weight.

**Anthropometric parameters (in %) over weeks in tabular format**

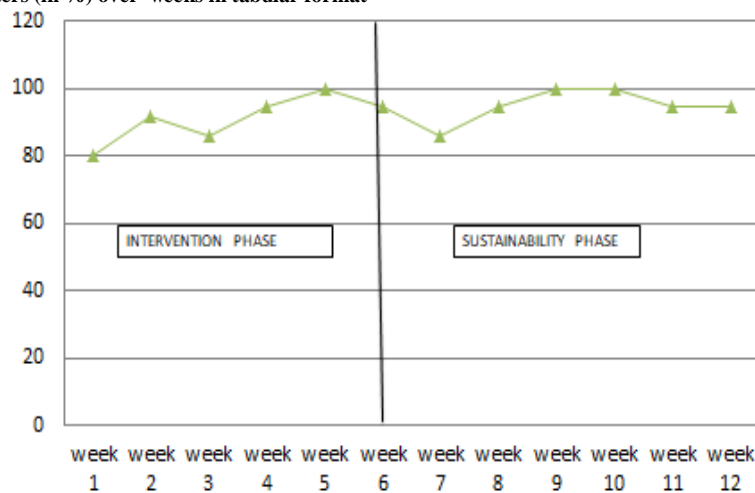


Fig 2: Run chart of % of weight recording over weeks

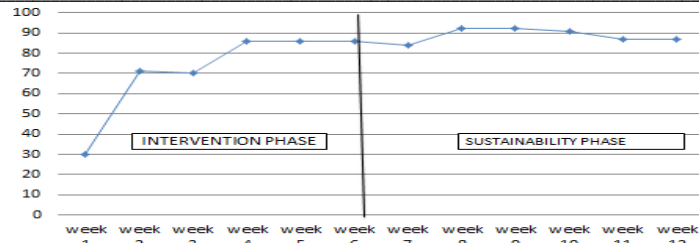


Fig 3: Run chart of % of head circumference recording over weeks

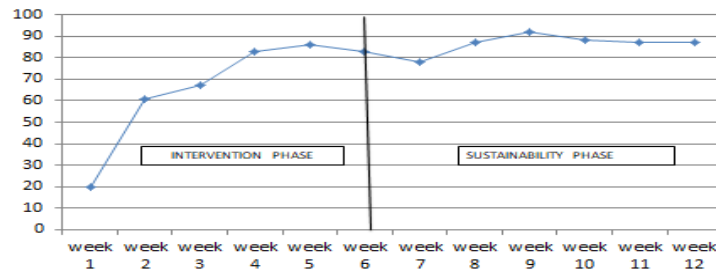


Fig 4: Run chart of % of length recording over weeks

#### Discussion

Growth monitoring of neonates is imperative for early identification of neonates at risk of growth faltering and intervening early for better outcomes[7]. It helps identify EUGR early and plan appropriate nutritional interventions[7]. It also helps identify catch up growth in babies and their response to nutritional interventions. It is inherently difficult to record the anthropometric parameters in sick NICU babies because of various attachment like wires, probes, catheters to the babies. Weight is easier to measure even in sick and critical babies. What gets ignored is the serial length and HC measurements. Serial HC measurements help in early detection of micro/macrocephaly so that timely investigations and interventions can be planned. Length measurements can predict disorders of linear growth like metabolic bone disease or inadequate nutrition.

In our study our baseline rates for weight, length and head circumference measurement were 80%, 20% and 30 % only. There was a felt need to improve these percentages. We adopted a quality improvement approach to improve the anthropometric measurements in the unit. Over the 6 PDSA cycles, the rates improved to 95%, 83% and 86% for weight, length and head circumference measurement. This was sustained for the next 6 weeks and the rates remained over 80%. There can be several barriers to anthropometry measurements. Very often, NICU staff complain of competing clinical priorities because of several critical care interventions needed for NICU babies. Staff shortage also contributes to poor compliance of anthropometry measurements. We also found that there was a lack of awareness about importance of regular measuring of anthropometry and lack of knowledge of correct technique and the equipment required. Once these factors were addressed, the rates of measurement started increasing. It is also essential to provide reminders to NICU staff to ensure that regular anthropometric parameters are recorded. Repeated trainings about the correct technique also aids in better compliance.

Thus this study showed that by implementing simple change idea after testing, there can be significant improvement in recording of anthropometric measures, which is an essential part of neonatal care. This quality improvement resulted in significant improvement in

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anthropometry and also sustainability of recording was observed well in this quality improvement initiative.

#### What we already know?

Anthropometry is an integral part of neonatology. Recording of anthropometry can help in accessing growth and development of newborns. It helps in accessing overall well-being of newborns in subsequent follow up visits.

#### What this study tells?

In spite of knowing the importance of anthropometry, recording of anthropometry was always missed in the busy NICU. By applying some successful interventions, recording of anthropometry was improved. Compared to baseline data, there was significant improvement in anthropometry recording and plotting.

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