

Axillary Temperatures Recording in Neonates - How Long ?

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Abstract

In the case of the newborn, accurate recording of body temperature is a major responsibility of a nurse. For this purpose, measurement of axillary temperature is considered the safest modality so far. In this observational study, an attempt was made to compare the temperatures recorded at axilla using digital thermometers for varying durations with the skin temperature among surgical neonates. The study was conducted in 13 neonates admitted in surgical intensive care units of a tertiary health care facility for over two months. Analysis of 151 observations showed that temperature recording of neonates using digital thermometers in axilla gives more accurate reading than keeping it for five minutes, and is also correlated with skin temperature.

Recording temperature in newborn is one of the most important activities a nurse performs while taking care of baby in neonatal intensive care unit (ICU). Temperature measurement is done very accurately so that hypothermia in surgical neonate is detected early and managed appropriately. Many devices and anatomical sites have been used to measure the body temperature like mercury thermometer, digital thermometer and skin probe etc. with usual sites being axillary, skin, rectal, pulmonary artery, oesophageal etc.

Any device or technique used for the baby should be cost effective, simple, quick, reliable, safe and reproducible and as close as possible to the core temperature. Currently, measuring axillary temperature is considered to be safest method without any associated risks. However, there is little consensus on how long the thermometer should be left in place to obtain a correct reading. According to IMNCI guidelines, thermometer should be placed for 5 minutes for axillary temperature. In literature, it is recommended to place thermometer in axilla for 3-5 minutes.

Currently all mercury thermometers have been phased out following the recommendation of Ministry of Environment. Digital thermometers are available for checking the temperature of neonates. Some nursing personnel place digital thermometer for three to five minutes as per guidelines and some place digital thermometer irrespective of time, till the beep appears. The present study was conducted to find out which method of axillary tem-

perature in terms of time duration (5 min or till the time beep appears) should be considered for measuring temperature in neonates.

Objective

This study attempted to assess which axillary temperature, using digital thermometer at 5 minutes or till the time beep appears closely reflects the (abdominal) skin temperature as the gold standard in surgical neonates.

Methodology

This prospective pre-experimental observational study design with measurement of left axillary temperature (5 min) and right axillary temperature (till beep appeared) and comparing same with skin temperature (gold standard) was carried out in 13 neonates admitted in neonatal surgical intensive care unit of a tertiary level care facility over a period of 2 months. The target population consisted of stable term and pre-term babies after the surgical intervention admitted during the study in neonatal surgical ICU.

Inclusion criteria was: (i) Stable neonate who had undergone surgical intervention, (ii) Those having stay in the ICU for minimum of 5 days, (iii) Whose parents were willing to give consent. The exclusion criteria was critically sick baby.

Purposive sampling technique was used for the study. The tools used for the study were two digital thermometers (individualised) and the skin probes available at the bedside of the baby. The calibration of the skin probe attach of the radiant warmer is done three monthly by the company as a routine (Atom) and digital thermometers were calibrated with

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Table 1: Mean recorded temperature in neonates from different sites (No. of observations = 151)

Site of measurement	Mean $\pm$ SD	Range
Left axillary (5 min)	36.84 $\pm$ 0.69	34.2 - 34.9
Right axillary (till beep appears)	36.79 $\pm$ 0.69	34 - 39
Skin probe (gold standard)	36.48 $\pm$ 0.65	34 - 39

a mercury thermometer (Hicks) periodically during the study to ensure the agreement within $\pm 0.1^{\circ}\text{C}$. Total number of observations were 151 against the expected observation ($13 \times 3 \times 5 = 195$), as some babies had been shifted out for various investigations at that time.

Axillary temperature using digital thermometer for different time durations i.e. 5 min (left axilla) and till the beep appeared (right axilla) were measured simultaneously in all the admitted surgical neonates at three time points - 8.00 hrs, 10.00 hrs and 12.00 hours for 5 days in a week for a period of two months and simultaneously the abdominal skin temperature was measured using the skin probe attached to the radiant warmer.

Table 2: Correlation between temperatures recorded from axilla and skin probe (No. of observations =151)

Site of measurement	r value	p value
Left axilla and skin probe	0.232	0.004*
Right axilla and skin probe	0.272	0.001*

* Pearson coefficient of correlation test

Before each use the digital thermometers were disinfected by cleaning with sterile spirit swab. All the heat sources within the vicinity of one meter were switched off for one minute before taking the temperature of the neonate. After hand washing two disinfected digital thermometers were placed in both axilla to check the temperature of the baby. Duration of thermometer placed in left axilla was 5 minutes and in right axilla till the beep appeared, simultaneously temperature of the baby was also

Table 3: Comparison of mean difference between temperatures at different sites (No. of observations = 151)

Site of measurement	Paired difference			t value	p value	95% CI of the difference
	Mean	SD	SEM			
Left axilla and skin temperature	0.36	0.83	0.07	5.312	0	0.23-0.49
Right axilla and skin temperature	0.31	0.80	0.07	4.751	0	0.18-0.44

checked using skin probe. Temperatures were noted in the record sheet, and thermometers were disinfected after use and finally procedure was terminated with hand washing.

Statistical Analysis

The data was analysed using Microsoft excel and Epi-info software and statistical analysis was done using mean, SD, Pearson's correlation and paired t test. Bland & Altman statistical method was used to assess agreement between two methods of temperature measurement. The approach is based on graphical technique and simple calculation, the mean difference between two methods of measurement was computed against the average of the pair of measurement and 95 percent limits of agreement i.e. mean difference $\pm$ SD. This tells how far apart measurement by the two methods were likely to be for most babies.

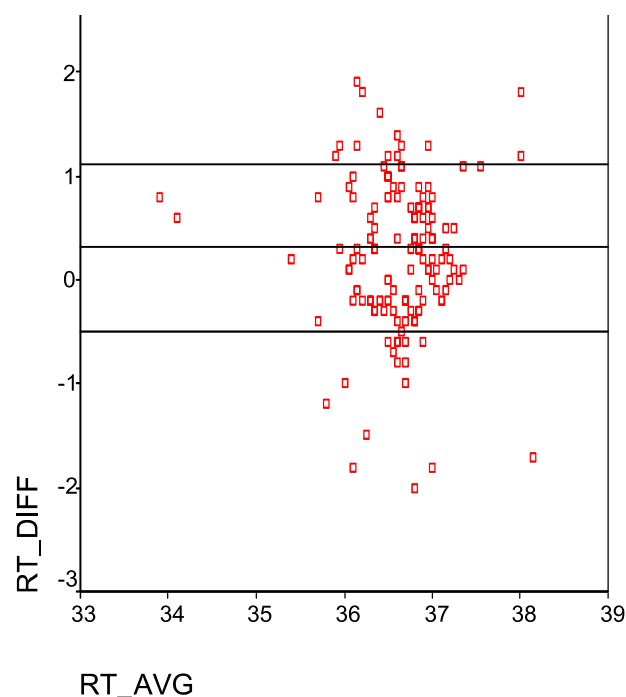
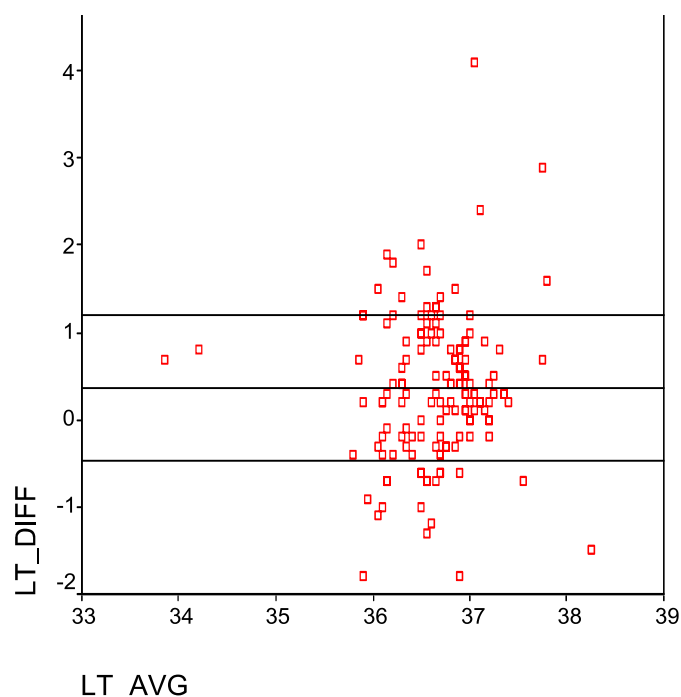
Results

A total of 151 observations from 13 neonates were eligible for analysis. All neonates on whom the observations were made were nursed under the radiant warmer. The mean age of subjects was 6.36 ± 5.86 . Bland & Altman analysis for the agreement between each pair of temperature reading was done. The analysis showed that the mean difference between left axillary temperature and skin temperature was 0.36°C with 95 percent confidence limits of 0.23 - 0.49 and between right axillary and skin temperature reading was 0.31°C with 95 percent confidence limit of 0.18-0.44. The results showed that right axillary temperature was more closely related with the temperature recorded using skin probe (gold standard) than the temperature recorded from left axilla as evident from Tables 1-3 and Figure 1.

Discussion

Measuring body temperature is an important aspect of clinical monitoring of a sick surgical neonate. Accurate measurement of temperature is important for assessing wellbeing of the neonate as well as for ensuring a thermo-neutral environment. The present study looked at different durations of keeping the axillary thermometer (5 min and till the beep appears) and agreement with the temperature recorded using the skin probe. The findings show that right axillary temperature was more closely reflecting the skin temperature significant at 0.001 level of significance as compared to left axillary temperature with skin temperature significant at 0.004 level.

Figure 1 : Comparison of axillary temperature (left and right) with skin temperature (Gold standard)



Though both methods are acceptable but applying digital thermometer till the time beep appears is more appropriate. The beep only appears once the thermometer has sensed the temperature of the baby.

Implications for nursing

The present study has many implications for nursing.

Nursing practice: Neonatal nurse in neonatal surgical intensive care unit (NSICU) plays a vital role in monitoring a sick neonate. She is required to update herself with the new technology of monitoring a sick neonate. Frequent in-service education training programmes can be organised for the nurses working in NSICU at the entry level.

Nursing education: Educational strategies should promote use of digital and electronic gadgets for monitoring the condition of the surgical neonate along with direct human observation and monitoring. One should not forget that the electronic monitoring is to supplement the human observation not a substitute of it. Bed side demonstrations can be conducted for nursing students so as to make them competent in care of sick neonates.

Nursing administration: Institution providing care to sick surgical should review policies and practices related to the care of sick surgical neonates and make the gadgets available for the baby care and monitoring.

Nursing research: The findings of the study can be used as a basis for professional neonatal nurses for

further studies on exploring the other sites of temperature taking in neonates.

Recommendations

The study can be replicated on larger sample with larger observations in other settings like neonatal intensive care unit using different sites of temperature taking in neonatal population.

Conclusion

Recording the temperature of a neonate by placing digital thermometer in axilla till the time beep appears is more accurate than keeping for 5 minutes, and closely correlates with the skin temperature (gold standard).

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