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ANALYSIS OF THE RESULTS OBTAINED IN THE CALIBRATION OF INFANT WARMER AT A HOSPITAL IN PEKANBARU

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ABSTRACT

Every baby born needs a temperature between 34°C to 37°C accordance to the temperature of the mothers womb. One type of electromedical device that has a function to provide comfort and warmth to newborns is infant warmer. Maintenance and calibration are needed to maintain the health of the device in the hospital. Neonatal deaths in infant warmer have occurred. Reports include design defects resulting in thermostat failure, malfunction, or fire causing the infant warmer to overheat and the baby to overheat. Improperly maintained batteries and unreliable battery gauges can also present a risk of electric shock, poor transport incubator performance, or power failure. Because infant warmer are large and mobile, they are routinely subjected to rough handling which can affect their performance and physical condition. This study aims to analyze the quality of infant warmer at hospital in Pekanbaru based on the result of infant warmer calibration analysis. Tests were carried out at several points under the names T2A, T2B, T2C, T2D and T2M. The instrument is set at 32°C. Each point is read 20 times. According to the data obtained T2A the correction value + Uncertainty (Uc) is 0.67, the T2B point is the correction value + Uc is 1.81, the T2C point is the correction value + Uc is 4.62, the T2D point is the correction value + Uc is 2.30, the T2M point is the correction value + the Uc is 0.81. Based on this research, from the calibration results obtained, it can be concluded that the T2C and T2D measurement points are not suitable for use.

Keywords: Calibration, Infant Warmer, Temperature, Newborn

INTRODUCTION

Every baby born needs a temperature between 34°C to 37°C accordance to the temperature of the mothers womb [6]. Babies who have a body temperature that is less or below 34°C are usually babies born prematurely. Premature babies are babies born with low birth weight. (Andi, 2013). A premature baby has a greater risk of death. One of the causes of premature infant death is hypothermia [8].

Infant warmer is one type of electromedical device that has a function to provide comfort and warmth to newborns using a heater. Infant warmers make the ambient temperature warm with a level of warmth that can be adjusted according to needs (Naufal, 2020). Talking about an infant warmer or also known as a baby warmer, it can be seen that in this infant warmer the most important role is the hot temperature.

Heat if not controlled properly can cause fatal things to happen, especially for patients who use the Infant warmer, namely newborns. If the temperature in the infant warmer exceeds the limit, it will cause the baby inside to burn, which can result in the death of the baby. One of

the causes of the infant warmer not working properly is because it is not calibrated. Calibration determines the difference (deviation) between the measuring instrument and the measured material (as a standard) with the correct (estimated) value (Anom, 2019).

Give everyone the right to obtain safe, quality and affordable health services. To improve the quality and safety of medical services, quality medical devices are needed, especially medical devices with guaranteed accuracy, accuracy and safety in their application its use. Medical devices must have strict performance, including aspects of accuracy, sensitivity, productivity, and safety. Thus, when the medical device is used, it will always be ready to use and there will be technical standards for the use of the medical device. The risk that medical devices that are not tested and calibrated will have inappropriate outputs, causing incorrect diagnostic results and therapeutic doses (Law No. 36 of 2009).

Neonatal deaths in incubators have occurred. Reports include design defects resulting in thermostat failure, malfunction, or fire causing the incubator to overheat and the baby to overheat. Improperly maintained batteries and unreliable battery gauges can also present a risk of electric shock, poor transport incubator performance, or power failure. Because incubators are large and mobile, they are routinely subjected to rough handling which can affect their performance and physical condition.

The reliability of technology in the form of medical devices must be maintained. To maintain the reliability of medical devices both in terms of performance and function, all devices must be calibrated regularly [2].

RESEARCH METHODS

In this study, calibration was carried out on the Infant Warmer with the Medical type MCR-300 brand in a hospital. In the calibration of the Infant Warmer, the first step is to prepare documents, the documents to be prepared are work methods, work instructions, previously designed worksheets referring to the Constitutional Court of the Indonesian Ministry of Health with No.Mk: 026-18, and prepare labels.

The Infant Warmer and calibrator tools are prepared, then data collection is carried out on administrative equipment such as the identity of the examiner, name of the device, brand, model, serial number, room, date of implementation and identity of health facilities. At the time of calibration of the Infant Warmer, the room temperature read 25.9°C while the humidity was 51% RH.

Physical examination on the Infant Warmer tool was carried out on several parameters, namely the body and surface of the device, the devices contact box, power supply cable, safety fuse, switch and control buttons, displays and indicators. After that, electrical safety measurements were carried out. The performance calibration test on the Infant Warmer device is measuring temperature performance by setting the temperature on the infant warmer to 32°C which is carried out at several points on the Infant Warmer for 20 readings at each point, where the points are named T2A, T2B, T2C, T2D and T2M.

After performing performance testing, data processing is carried out by calculating the uncertainty of the measurement. After the uncertainty value is known, then data analysis is carried out so that conclusions can be drawn whether the Infant Warmer device is suitable or not.

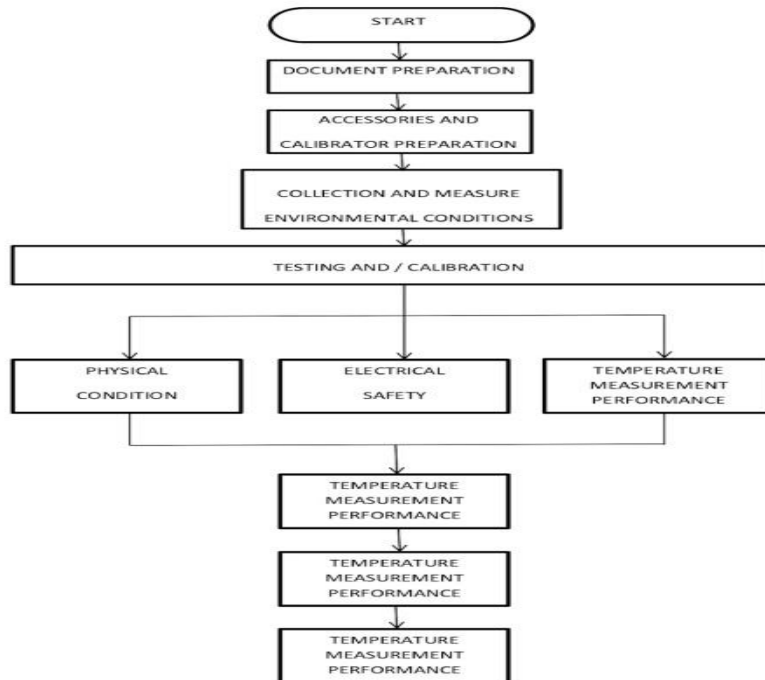


Figure 1. Research flow chart

In this calibration research there are several tools needed so that calibration can be carried out properly. Tools or accessories used are Incubator Analyzer, Thermocouple, Electrical Safety Analyzer and Thermo Hygrometer.

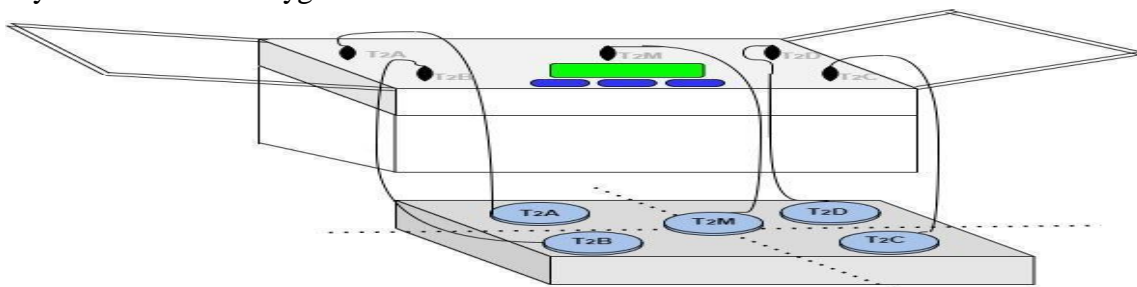


Figure 2. Tools or accessories

RESULTS AND DISCUSSIONS

Measurement results in this study

Table 1. Calibration Results of Infant Warmer

No	Setting Device (°C)	Measurement Point	Correct + Uncertainty (Uc)	±2
1	32	T ₂ A	0,67	2
2	32	T ₂ B	1,81	2
3	32	T ₂ C	4,62	2
4	32	T ₂ D	2,30	2
5	32	T ₂ M	0,81	2

Tests were carried out at several points with the names T2A, T2B, T2C, T2D and T2M. The instrument is set at 32°C. Each point is read 20 times. With 20 readings for each point, the average of these points is found, after the average is found, the correction value and uncertainty (Uc) can be calculated as well as the tolerance value, the tolerance value allowed for calibrating the infant warmer is 2.

In accordance with the data obtained listed in table 1 point T2A with a temperature setting value of 32°C, the correction value + Uc is 0.67, the T2B point with a temperature setting value of 32°C, the correction value + Uc is 1.81, the T2C point with a temperature setting value of 32°C. correction + Uc is 4.62, the T2D point with a temperature setting value of 32°C, the correction value + Uc is 2.30, the T2M point with a temperature setting value of 32°C, the correction value + Uc is 0.81.

So from this data it can be seen that some points are below the tolerance value, namely the T2A, T2B, and T2M points while those above the tolerance value are the T2C and T2D points. the correction value + ID card that is below the tolerance value is declared fit for use while the correction value + ID card that is above the tolerance value is declared unsuitable for use.

CONCLUSION

Based on the results of the research that has been carried out, it is concluded that there are two measurement points that are declared unfeasible, namely the T2C and T2D points because the correction value plus the uncertainty value is above the tolerance value where the tolerance allowed for this calibration is 2. T2C and T2D points are declared not suitable for use.

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