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Sonicaid® Team3

Blood Pressure Application Guide



Introduction

Huntleigh's Sonicaid® Team3 fetal monitor uses the automated non-invasive blood pressure (NIBP) measurement technology to determine maternal blood pressure.

The blood pressure module included in Team3 is manufactured by an established NiBP original equipment manufacturer, PAR, with over 30 years' experience, whose products are widely used in vital signs and blood pressure monitoring systems worldwide. This module has also been validated for use on pregnant women, including pre-eclamptic patients, and complies with international standards as detailed at the end of this guide.

Like many electronic NiBP devices, Team3 uses the oscillometric technique for determining blood pressure.

The NIBP cuffs used with the system have a conical design. This provides a more anatomically appropriate fit across a range of arm shapes and helps reduce the risk of incorrect cuff sizing, a recognised cause of inaccurate blood pressure measurements.[1]

Accuracy of measurements in pregnancy

There are many factors which can affect the accuracy of NiBP measurement. These include:

- Device make/model
- The software algorithms used
- Cuff design, size and fit
- Correct cuff placement
- User training / expertise
- Measurement technique
- Patient position and movement
- Patient's medical condition

Automated NIBP devices used in maternity care should be clinically validated in accordance with international standards, including EN ISO 81060-2[2], which assesses device accuracy against a trained auscultatory reference method under controlled conditions.

This validation is based on statistical agreement across a population, recognising that individual blood pressure measurements are subject to normal physiological and measurement-related variability.

In pregnancy, and particularly when assessing hypertensive disorders such as pre-eclampsia, accurate blood pressure measurement is essential. However, some variation between individual readings can be expected, even when validated devices and correct technique are used.

In line with MHRA guidance[3], blood pressure measurements should therefore be interpreted **in clinical context, with attention to correct cuff selection and technique, consistency of measurement conditions, and assessment of trends over time, rather than reliance on a single reading or direct comparison between different devices.**

References:

1. P. Palatini and G. N. Frick; Cuff and bladder: Overlooked components of BP measurement devices in the moder era? American Journal of Hypertension. Feb 2012, vol 25. 2; 136-138.
2. Non-invasive sphygmomanometers Part 2: Clinical investigation of automated measurement type.
3. MHRA guidance on blood pressure measurement devices v2.3 Jan 2021.

BP measurement methods

Auscultatory method (manual)

The traditional sphygmomanometer, manual, uses the auscultatory method to directly measure the systolic and diastolic values by listening for the Korotkoff sounds during cuff deflation, and is commonly used as a reference method in clinical practice and device validation. The mean arterial pressure (MAP) can then be calculated from the systolic & diastolic measurements. While the auscultatory technique is clinically well-established and reliable when performed correctly, its accuracy is dependent on operator skill, technique, and interpretation, and is therefore subject to observer variability.[4]

Electronic NiBP devices

Automated electronic NIBP devices, including the NIBP module used in Team3, measure blood pressure using an oscillometric method. It detects the pressure oscillations in the inflated cuff, caused by arterial wall movement during deflation. From these oscillations, MAP is identified, while systolic and diastolic pressures are estimated using proprietary algorithms. Heart rate is derived from the timing of the detected pulses, from which MAP, HR, Systolic & diastolic values can be determined algorithmically.

Different manufacturers employ variations of oscillometric algorithms, which may result in differences in reported systolic and diastolic values, particularly in patients who are hypotensive, hypertensive, or have irregular heart rhythms. In such situations, greater variability between devices and between repeated measurements may be observed.

It is therefore important to recognise that automated NIBP measurements are subject to inherent variability, and that this variability may increase outside normotensive ranges. In maternity care, including the assessment of hypertensive disorders such as pre-eclampsia, blood pressure values should be interpreted in clinical context, with emphasis on consistent measurement technique, use of validated devices, and assessment of trends over time rather than comparison between different devices.

Team3 NiBP module clinical validation study

A clinical study* was performed by PAR to evaluate the Sonicaid® Team3 blood pressure module against auscultatory measurement method, in accordance with the requirements of EN ISO 81060-2.

The study demonstrated that the Team3 NIBP module met the ISO 81060-2 acceptance criteria for accuracy, with mean differences and standard deviations for both systolic and diastolic blood pressure within the limits defined by the standard. This indicates good statistical agreement with the reference method across the study population, consistent with international requirements for automated non-invasive blood pressure monitoring devices.*

*A full copy of this paper is available on request from Huntleigh Healthcare.

References:

4. Chen W et al. Quantitative Assessment of Blood Pressure Measurement Accuracy and Variability from Visual Auscultation Method by Observers without Receiving Medical Training. Biomed Res Int. 2017 Dec.

BP measurement in pregnancy

Pregnancy presents a fundamentally different haemodynamic state and there is the potential for sphygmomanometers to work differently, and auscultatory measurement can be difficult[5] due to the presence of sound artifacts. Pre-eclampsia further complicates this and there is evidence that most automated NiBP devices under-estimate BP in this population.[6,7]

Best practice

In view of the many variables in the different techniques and algorithms as detailed above, & the additional challenges with pregnancy, it is strongly recommended that **electronic NIBP devices are only used for trend monitoring. Where practical, the same NiBP make/model should be used consistently for each measurement, throughout a pregnancy to reduce inter-device variability.**

In modern clinical environments, time pressures often prevent clinicians from performing blood pressure measurements in full compliance with established guidelines, as these procedures are time-consuming.

It is therefore common practice, particularly within the context of fetal monitoring during pregnancy, to perform intermittent spot readings without following the correct protocol. While this may be acceptable for determining trends, any trend indicating a possible hypertensive / hypotensive condition that may require clinical intervention, **should be confirmed with a sphygmomanometer measurement conducted in full compliance with the relevant standards & guidelines.**

In addition to these technical considerations, there are many other factors which can also affect blood pressure results, including **patient condition & position, cuff size and placement, as well as environmental factors. National / international guidelines should be followed at all times when using the NiBP function in Team3,** in conjunction with the instructions in this document.

References:

5. Nathan HL, Duhig K, Hezelgrave NL, Chappell LC, Shennan AH. Blood pressure measurement in pregnancy. The Obstetrician & Gynaecologist. 2015;17(2):91-98.
6. Gupta M, Shennan AH, Halligan A, Taylor DJ, de Swiet M. Accuracy of oscillometric blood pressure monitoring in pregnancy and pre-eclampsia. Br J Obstet Gynaecol. 1997 Mar;104(3):350-5.
7. Zhang Y, Gu J, Yu C. Noninvasive blood pressure measurements demonstrated a significant underestimation of blood pressure in a patient with severe preeclampsia: a case report. Int J Surg Case Rep. 2025 Nov

BP cuffs

BP cuffs

The correct selection, & positioning, of cuffs is key in ensuring reliable BP readings. There are three primary factors which must always be considered for each patient measurement episode:

Cuff size

It is essential to ensure that the cuff size is matched to the patient's arm circumference. We currently supply four cuff sizes as standard with the Team3 NiBP option:

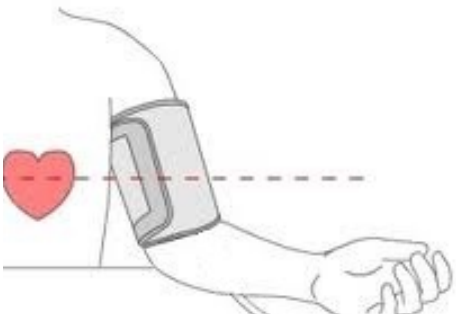
- ACC-OBS-120 Extra-Large Conical BP Cuff (38-46cm)
- ACC-OBS-121 Large Conical BP Cuff (32-42cm)
- ACC-OBS-122 Medium Conical BP Cuff (24-32cm)
- ACC-OBS-123 Small Conical BP Cuff (17-26cm)

Use of an incorrectly sized cuff may result in errors in the BP measurement.

Cuff positioning

To ensure accurate measurement, the cuff must be positioned correctly. It is positioned on the upper arm, and can be applied over light clothing. Any tight, thick or constrictive clothing should be removed.

The cuff must be applied with the hose coming out at the bottom of the cuff, not the top, and should be level with the heart.

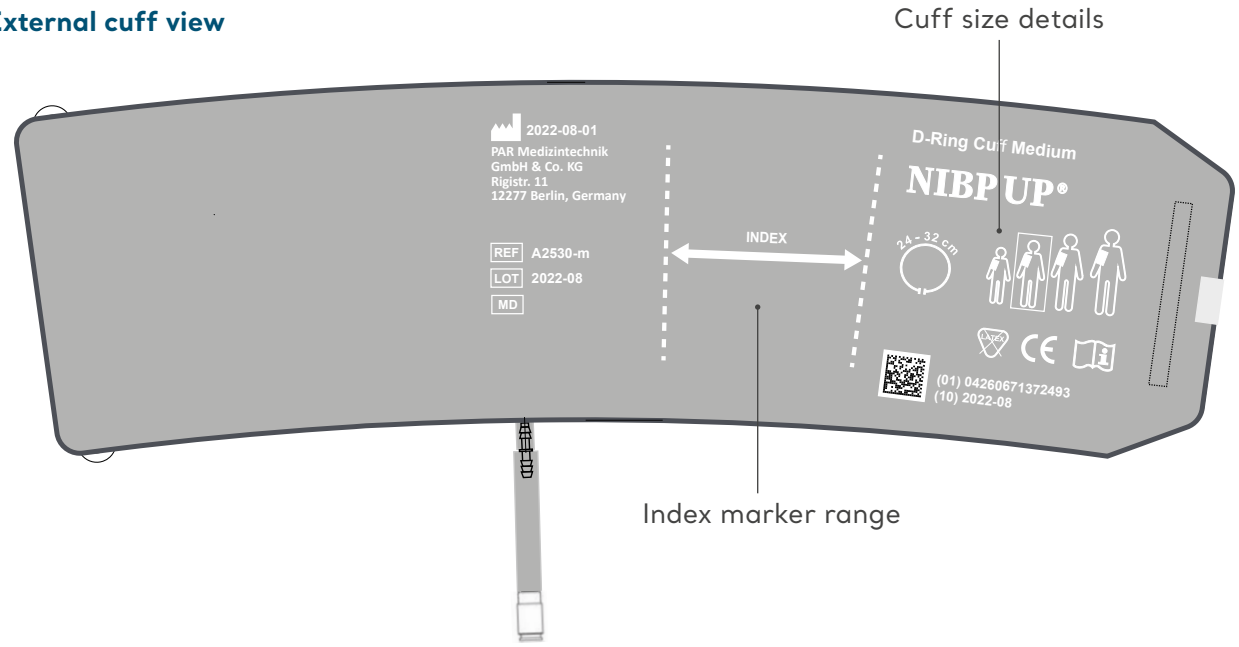


Cuff alignment

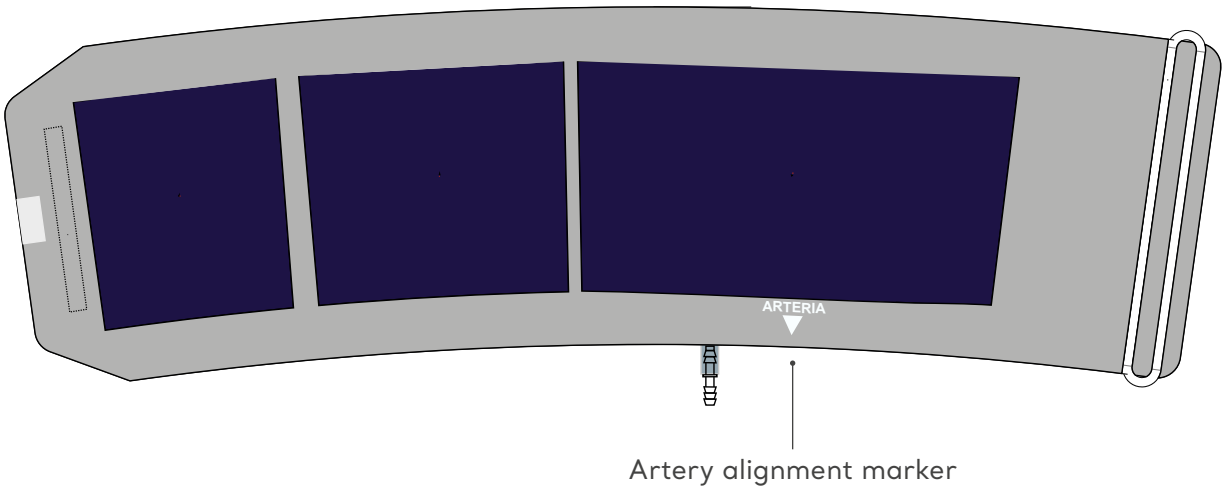
Our cuffs are clearly marked to show the part of the cuff that should be positioned directly over the brachial artery. This mark is positioned at the centre of the inflation bladder to ensure the correct sensitivity – see image opposite.

Also shown are the cuff index markers – the marker in the external cuff view must fall within the index marker range shown in the internal cuff view when secured on the arm. If it falls outside this range, the cuff is the wrong size for the patient – select the correct size cuff.

External cuff view



Internal cuff view



On some makes of cuff, the tube is in close proximity to the alignment mark, and it has become common practice to use the tube for alignment – however, this is not best practice and the printed alignment mark should always be used, not the hose.



An incorrectly aligned cuff may result in errors in the BP measurement.

Other considerations

There are many other factors which can affect BP measurement & reflect best practice against national & international guidelines. It is beyond the scope of this document to cover all of these in depth & all users of the Team3 blood pressure function should be trained in BP measurement procedure.

However, a check list of some of the key factors is provided here:

- The patient should be relaxed & rested – minimum 5 minutes before commencing measurement
- The patient should not smoke, exercise or consume caffeine for 30 minutes before the test
- The patient should be sitting upright, comfortably seated with legs uncrossed and feet flat on the floor, with the back, elbow and forearm supported
- The arm should be raised with the centre of the cuff level with the heart, supported by the practitioner or by other suitable support – it should not be held in position by the patient
- The patient should not move or speak during the test
- Only use cuffs and hoses validated and approved by Huntleigh
- The cuff must be of the correct size & correctly positioned as detailed
- Ensure that the cuff hose is not twisted or in any constricted, & that connections are secure
- Blood pressure measurement should be carried out as per individual hospital guidance and policy and in line with professional standards proposed by the appropriate college.
- In suspected hypertensive disorders of pregnancy clinical practice relating to blood pressure monitoring should include multiple measurements at specific time intervals to ensure that the reading is accurate.
- In those women who are not suspected of having a hypertensive disorder a single measurement is appropriate and should be viewed as part of the overall clinical picture. If on taking that measurement there is suspicion of hypertension, the blood pressure measurement should be repeated after several minutes.
- The patient should be advised that readings can be affected by many factors, including clinical conditions and environmental factors (e.g. temperature, humidity, altitude)
- If there are marked inconsistencies between the above 3x readings, repeat the procedure

Standards & guidelines

The blood pressure module used in Team3 has been validated on pregnant women for compliance to the following standards/guidelines:

- DIN EN 1060-4
- ISO 80601-2
- ANSI/AAMI SP10
- The requirements of the BIHS (British Irish Hypertension Society – formerly the British Hypertension Society (BHS))

The blood pressure module used in Team3 complies with the following safety & performance standards:

- EN 60601-1 (2nd & 3rd edition)
- EN 60601-1-2
- EN 60601-1-6
- EN 60601-2-30
- EN ISO 81060-2
- EN 80601-2-30

For additional information, please consult the Team3 Instruction for use available here: EIFU's and IFU Archive - Huntleigh Healthcare

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