A Guide to Monitoring Contractions with Monica Devices

Monica detects the electrical activity of the myometrium to monitor uterine contractions (UC). Uterine electrical activity, consisting of infrequent and low amplitude EHG (electrohysterography) bursts which occur throughout most of pregnancy, but do not generally result in contractions that are perceived by the patient. In late pregnancy, these bursts often correspond to periods of perceived contractility by the patient (Braxton Hicks contractions). During both term labour and preterm labour, bursts of EHG activity are frequent, of large amplitude, and are correlated with large changes in intrauterine pressure and pain sensation[i].

Monica reliably identifies UC during active labour. Currently it is not able to determine contraction strength[ii]. In established labour, Monica EHG technology is more reliable and has higher sensitivity than tocodynamometry[iii] [iv]. Nevertheless false positive UC can occur on occasion from various sources;

1. Low-level or uncoordinated EHG activity not associated with an increase in intrauterine pressure appear as small irregular deflections from the baseline. These are easily identified during labour among the larger more regular 'true' contractions.
2. Maternal activity or vigorous fetal movement can change maternal abdominal surface contours and produce what appears on the trace to be a UC. This is caused by small changes in the electrode positions in relation to each other and to the underlying skin. This may create confusion particularly during antepartum and early induction monitoring, when regular true contractions are not present.

Before any definitive clinical interpretation of UC information generated by Monica is made, ensure, if possible that the patient is not moving and is in a comfortable and relaxed position. If there is concern about false positive contractions during early labour or induction, it can be helpful to have the patient use the event marker either on the AN24 or Doppler CTG monitor to indicate when she feels a contraction and/or the fetus move.

Irregular high amplitude 'ragged' looking contractions that are coincidental with fetal or maternal movements with no other clinical indication of UC should be discounted. They are unlikely to be real contractions. As such, they should not influence medical intervention unless corroborated by another device.

Using Monica UC provides a wireless and beltless solution that is more comfortable for the patient than tocodynamometry (TOCO). Once the electrodes are on the abdomen they do not need to be readjusted. This is different from TOCO which often requires adjustment of transducer position and belt tension. The belts themselves can be uncomfortable for the patient. In addition, in obese patients tocodynamometry can be very difficult and Monica can offer a solution in monitoring this cohort of women[v]. TOCO does not provide an accurate measurement of the **intensity and duration** of the uterine contractions[vi vii viii ix x].

When using either TOCO or Monica, interpretation of the UC pattern should be done in the clinical context of the patient. It is always good practice to use manual palpation, maternal perception of UC and observation in conjunction with any UC monitoring device.[xi xii]
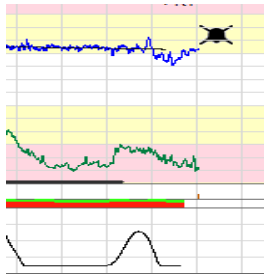
Monica provides information on the:	**Monica cannot be used to assess:**
- Frequency of contractions	- Duration of Contractions
- Timing of the contraction	- Intensity of the contraction
Peak	- Resting tone

Important Features of Monica UC

1. Time delay:	
Monica VS	**Monica Novii (IF24)**
The displayed Monica UC, FHR and MHR are all synchronised. However, to extract the UC waveform there is delay of approximately 25 seconds before the UC is seen.	To extract the FHR, MHR and UC waveform all signals are delayed equally by 10 (15) seconds.

Note: These delays are not significant – thermal printers of fetal monitors can add delays of up to 30 seconds and central viewing stations can vary up to 1 minute.

Monica UC **cannot** be used to coach patients to commence contraction pain coping strategies or actively push in the second stage of labour. Its value lies in providing an accurate picture of the pattern of uterine contractions over time. It is not of value in making instant real time assessment.

2. Flat baseline and smooth UA waveform:
Monica UC has a baseline that is flat and has a relatively smooth contraction waveform even when the patient is actively pushing. Active fetal or maternal movements that shift the abdominal wall may occasionally produce a trace similar to a UC. Clinical assessment will distinguish these movement artefacts from real contractions.

3. UC trace markings when used with:	
Monica VS	**Monica Novii/IF24**
None	An 'M' at the beginning of the recording and a small vertical spike appears every 5 minutes on the UC trace indicates that Monica is being used.

4. Maternal movement indicator when used with:	
Monica VS	**Monica Novii/IF24**
If the AN24 is moved (maternal movement) and lasts for longer than 20 seconds it is highlighted on the UC trace as a change in colour (black to grey). This indicates that caution in making clinical interpretation of the UC and FHR is required.	If the Novii POD or AN24 is in motion for more than 20 seconds due to maternal movement a dark zig-zag line will appear on the UC tracing. This indicates that caution in making clinical interpretation of the UC and FHR during the 20 seconds prior to & during the dark line is required

5. Selecting Monica UC sensitivity and threshold: Antenatal / Induction or Established Labour

This gives the user the choice to best conform with the clinical situation; the Antenatal/Induction mode is less sensitive to UC and removes some of the small deflections that may represent artefacts or inconsequential contractions. It is, however, important to switch to labour mode once the patient is in established labour.

The symbols on the CTG trace - when Novii/IF24 used

The 'M' symbol to highlight, at the start of the recording, that Monica is being used. Only on CTG trace.

Monica Spike every 5 minutes to highlight to the user that Monica is being used

Zig Zig thickening, on CTG trace, or light grey trace, on VS, indicates at least 20 second or longer of maternal movement has occurred (inferred from movement of the POD/AN24 device that the patient is wearing or that is on the bed beside her)

## *Trace examples:*

1. Saturation of the UC

It is recommended that if the patient is in established labour to select the Labour mode on the Novii/IF24, however if there is saturation of the UC then switch to the Induction Mode
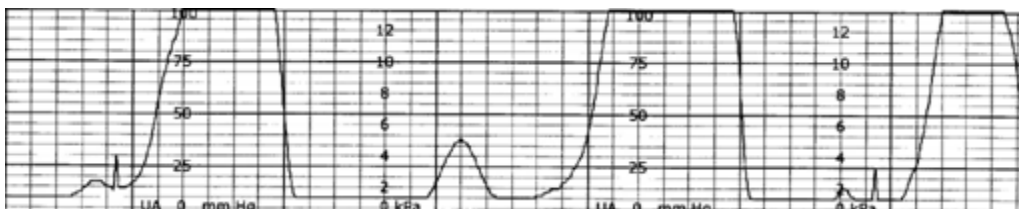
2. Antenatal trace

The Antenatal Monica UC can be concerning to clinicians early in the process of inducing labour or doing an NST. With TOCO there may be very little activity displayed, while Monica, as discussed above, may trace frequent small waveforms on the UC channel. It is important to take into account the clinical findings, use palpation and note if the fetus or patient is moving a great deal. If appropriate, ask the patient to press the event marker on

the Monica device or use the fetal event marker on the EFM to indicate when there is a fetal movement
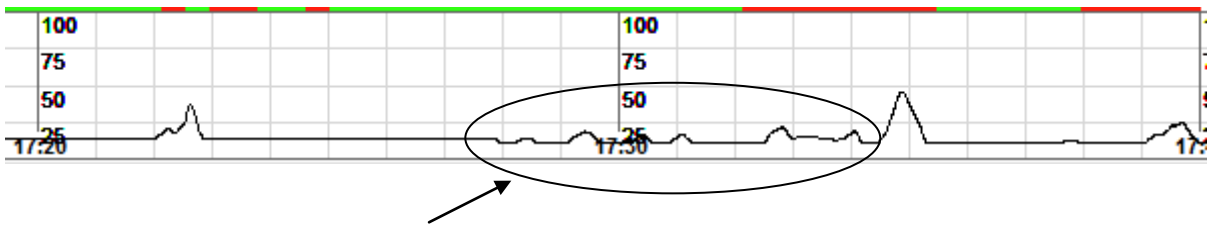
False UC related to, fetal/maternal movement in this antenatal trace

3. Assessment of Monica UC

Users of Monica should be aware that neither the EHG method nor traditional tocodynamometry is useful to judge the absolute or relative strength of contractions and duration of UC reliably. Consequently, Monica (like all other fetal/ maternal monitor manufacturers) cautions against using external UC monitoring techniques to assess contractile force. In this regard transabdominal palpation of the uterus and attention to the patient's pain pattern are necessary and sufficient to judge contraction strength when an external UC monitor is in use. The diagram below shows a comparison of UC contractions by patient, manual palpation and IUPC [10]. The diagram also highlights that contraction duration is variable when using External UC monitors.
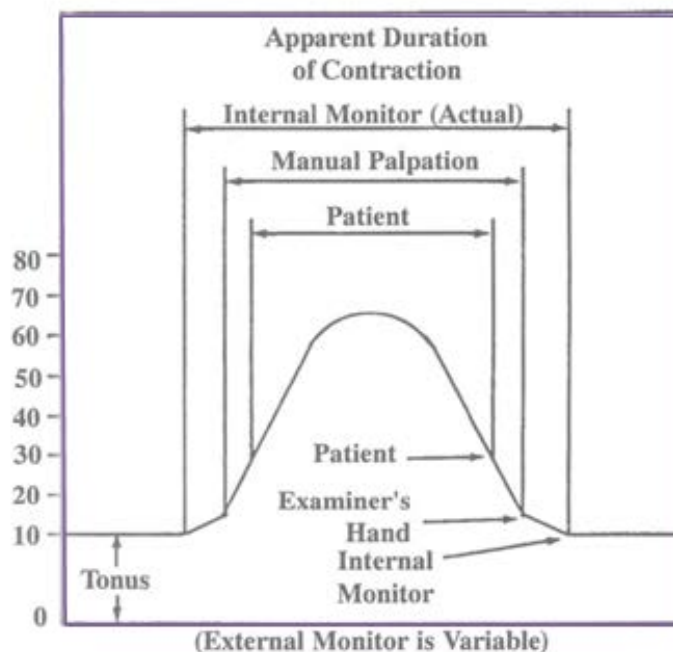
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