

Medicine for Managers

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The Foetal Monitor

Foetal monitoring is an area which has changed hugely in a practising lifetime (mine!). In the early 1970s, we had only the senses by which to assess the pregnancy and delivery of any woman. For those complicated deliveries where we were worried about outcome, we could only look, feel and listen with a foetal stethoscope to assess the health of the about-to-be delivered child.

The management of pregnancy had changed little in 100 years between 1860 and 1960.

It had probably changed virtually not at all for the 500 years before that. It is true that foetal heart sounds had been heard in the 1600s and it had been realised that they were associated with foetal wellbeing. In 1818, Mayor realised that he could hear foetal hearts by placing his ear on the maternal abdomen.

In 1833 Kennedy linked foetal sounds with foetal distress and in 1893 Von Winkel described criteria for foetal distress which remained until the arrival of electronic foetal monitoring.

However, such change as there was, was also in significant part due to Dr Adolphe Pinard, a French obstetrician.

Born in 1844, the son of a peasant farmer, he developed an interest in obstetrics early

in his medical career and became professor of Clinical Obstetrics at the *Faculté de Médecine* in Paris at the age of 45.

He laid down principles of examination and a technique of external version of an infant (turning a baby inside the uterus, when in a difficult position, by applying pressure to the abdomen).

A method of delivery of breech presentation infants still bears his name.

However, his name remains principally associated with the Pinard stethoscope (originally called the Pinard horn) which is a device used to listen to the foetal heart.

Made of wood or metal it is about eight inches long with a flat earpiece at one end and a wide horn shaped end which is placed on the abdomen. The device has been used

continuously since it was invented and it is



The Pinard stethoscope

still to be found all round the world. It is safe, cheap and reliable.

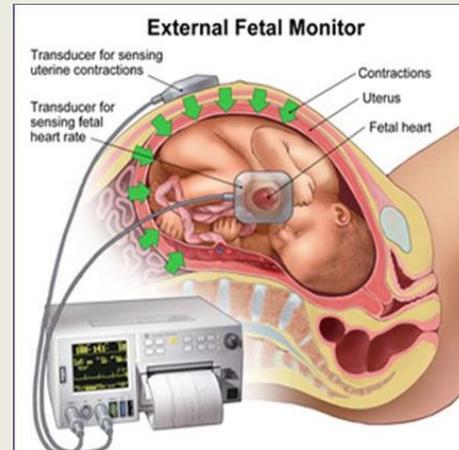
In fact, given its shape and function, it is possible that Pinard's stethoscope was in fact created using the shape of Laennec's original stethoscope, first described in 1815, some sixty years earlier, and itself in turn modelled on an ear trumpet.

The bell end simply collects and amplifies sounds which are directed along the tube to the ear.

More 'electronic' devices for listening to foetal hearts had been tried but without notable success in the first half of the twentieth century but the revolution came in the form of the first **Electronic Foetal Monitor (EFM)** was devised in about 1960 and the first machines were made commercially available in America in about 1968.

External FHM uses a device to record foetal heartbeat through the abdomen. One type is the Doppler ultrasound device, which monitors heart rate during labour and the birth.

A transducer is fastened to the abdomen, connected to a computer which produces a continuous visual display which



can be printed on paper. There is usually an additional transducer which senses uterine contractions also displayed or printed.

The **Internal Foetal Heart Monitor** uses a transducer fixed to the foetal scalp. The transducer gives better readings because it is not affected by movement but can only be used when the amniotic sac has ruptured (the 'waters have broken') and the cervix (neck of the womb) is open to allow the device to be placed.

The wire from the transducer passes through the cervix to a computer.

Foetal heart monitoring is a very useful monitoring tool, especially for women at higher risk of complications of the pregnancy, such as diabetes, high blood pressure or those that are

small for dates. As labour progresses, the midwifery staff can monitor the changes visually to give early warning of complications.

FHM is able to display the maternal changes and how they affect the foetus. Factors such as uterine contractions, medication administered during labour (for pain or anaesthesia) and the effects of pushing during the second stage can be carefully observed.

The device does have the disadvantage that it is often necessary to stay in bed whilst it is being used. Accuracy of readings may also be adversely affected if the mother is obese or if the foetus is in an unfavourable position or if there is too much amniotic fluid.

If there are concerns about the progress of the pregnancy or the labour, there are now also other investigations including scans and endoscopic techniques which allow the baby to be much more closely monitored.

The technology has contributed to the reduced foetal and maternal death rates.

Recent figures now show that the maternal death rate is about 1 in 10,000 (that is deaths directly or indirectly related to the pregnancy). The perinatal mortality rate (the number of stillbirths and deaths in the first week following delivery/1,000 births, from the 24th completed week of pregnancy to seven days post delivery) has also fallen to about 6/1,000 births.

I started this article by saying that childbirth had changed dramatically in my practising lifetime. The foetal monitor represents only one aspect of that change and a considerable number of

factors have influenced the way in which maternity care is delivered.

Key factors include:

- The technology used in pregnancy and birth
- The availability of analgesia
- Changes associated with research
- Women's expectations of childbirth

Undoubtedly the hazards of childbirth have diminished considerably and these days a woman can reasonably expect that both she and her child will experience a safe pregnancy with a good outcome.

This has coincided with a reduction in the number of pregnancies per mother and an increasing age at which the first pregnancy occurs.

Pain control has improved significantly. The development of spinal anaesthesia in the 1950s and the more judicious use of narcotic and other analgesics has allowed women to be less sedated and much more involved, gradually reclaiming autonomy for their own deliveries.

The technology of pregnancy has made the whole process much safer. Not only has the foetal monitor given much earlier warning of changes of concern during the labour but all the ante-natal tests, taken for granted these days, have produced huge advances including;

- Array of screening and diagnostic tests
e.g. Down's syndrome screen
- Amniocentesis
- Ultrasound scans

It is now possible to diagnose complications and increased risks in pregnancy more quickly and more efficiently than ever before. However, this

means that women and their families will have decisions to make. They must decide, for each test offered, whether they want it and what they will do based on the results. Undoubtedly, screening tests lead to an increase in anxiety and any test that could indicate a potential problem results in increased stress.

What has changed for the better is medical ethics and the disappearance of paternalism. The concept of 'the doctor/midwife knows best' which was still the standard approach only 20-30 years ago has been replaced by autonomy for the patients so that all the relevant information must be provided and a valid consent must be provided.

It is interesting, however, to consider what an eighteenth century obstetrician might think of today's practice. Probably a mixture of fascination and horror. No discussion of obstetric development is complete without mention of William Smellie.

Born in Lanarkshire in 1697, he trained at Glasgow but went to London to learn obstetrics. He designed components for forceps and laid down rules for using them which are remarkably similar to those taught today. His *Treatise on the Theory and Practice of Midwifery* was published in 1752.

No course on midwifery is likely to be completed without mention of the *Mauriceau-Smellie-Veit manoeuvre*, the name of which is memorised by every medical student. Named after Frenchman Francois Mauriceau, Smellie and Gustav Veit, it is an assisted technique for breech deliveries, only relatively rarely used today.

I wonder how Smellie would have viewed the change from:



To



The next fifty years might be very interesting!

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