

Auscultation – The Action of Listening

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BACKGROUND AND INTRODUCTION

Intermittent auscultation (IA) of the fetal heart during labour is the recommended monitoring modality for well women with uncomplicated pregnancies. Monitoring of the fetal heart is an important component of the midwifery care of women in labour. The purpose is to monitor changes in fetal heart rate (FHR) that provide alert signals, or in other words, FHR monitoring is a screening tool for the detection of FHR abnormalities. Today, IA is recommended as the method of fetal monitoring that should be offered to women who are healthy and have had an otherwise uncomplicated pregnancy (NICE 2001; RANZCOG, 2006; NZCOM, 2005; SOGC, 2007; MIDIRS & the NHS centre for reviews & dissemination, 2003; AWHONN, 2006).

This article describes the history of auscultation and the ability to listen to the fetal heart beat as

a means of determining fetal well-being. It is the beginning story of what we now understand in the 21st century as fetal surveillance. Although any discussion of fetal surveillance must include reference to the advent of the era of electronic fetal monitoring (EFM), it is not our intention, beyond briefly touching on the randomised controlled trials (RCTs) comparing EFM with IA during the 1980's, to provide any detail on this form of fetal surveillance. We explore a timeline beginning in Europe in 1650 up to the present day, to reveal that listening to the fetal heart beating in order to be reassured that the fetus is alive and well, is possibly the earliest and most enduring clinical practice-skill of maternity carers.

A review of the development of listening to the fetal heart is significant as it shadows other developments in the modern history of maternity care. Developments such as asepsis, electronic technologies (ultra-sound and electronic fetal monitoring), hospitalisation of the woman during labour and birth, antibiotics, induction of labour of the post-term pregnancy, training and education programmes for nurses and midwives and increasing improvements in perioperative midwifery, nursing and medical skills and equipment. It is important for the 21st century lead maternity carer (LMC) to understand where practice rituals and behaviours originated and the development of empirical research-based knowledge and how this has impacted on fetal monitoring strategies now utilised.

METHODOLOGY

An integrative literature review was undertaken to explore historical developments to the process of listening to the fetal heart from the initial discovery of the fetal heart sound in 1650 and its rediscovery again in 1818.

The literature search strategy included the location and appraisal of midwifery and obstetric texts and original journal articles from 1903 to 1975. This literature constituted the primary source material on which the review is based. Historical primary source texts were sometimes difficult to obtain, as they were scattered throughout public and private libraries

in centres throughout New Zealand (NZ) and overseas. As a research tool, the internet was also utilised to extend the literary search for historical texts located outside of the usual libraries such as Wellington Hospital Nurses Library, New Zealand Nurses Organisation Library, Otago School of Medicine (Wellington) Library, the Victoria University of Wellington Library and the National Library of New Zealand. Some publications were difficult to obtain as they were reference-only material held in libraries outside of the Wellington area. In addition, searches of the electronic databases of the Cochrane Library, Medline, and CINAHL were conducted to identify more recent publications. Search terms used were: intermittent auscultation, fetal heart rate monitoring, fetal surveillance, intrapartum care, and these were not limited by publication date. Literature that related to electronic fetal monitoring only, was excluded. The review was restricted to literature available in English. All identified documents were examined and those that were relevant were retrieved for inclusion in the review. Reference lists of retrieved documents were then scanned to identify any additional articles of interest. Practice guidelines from NZ, Australia, United States of America (USA), United Kingdom (UK), and Canada were also appraised.

AUSCULTATION – THE ACTION OF LISTENING

We begin the review of the history of listening to the fetal heart sounds by defining auscultation. Auscultation is the action of listening to the noises inside the body. Originally described by Hippocrates, 'immediate auscultation' - direct application of the ear to the patient was the method of listening and was used as part of the assessment of the patient which included the comprehensive physical diagnostics of inspection, palpation, percussion and auscultation (IPPA) (Sureau, 1996). This assessment framework was used throughout many aspects of medicine and is still taught in midwifery and obstetrics. 'Mediate auscultation' meant listening through an instrument.

THE ORIGINS OF THE STETHOSCOPE

Rene-Theophile-Hyacinthe Laënnac (1781-1826), a professor at the Charite hospital and the College de France in Paris, is credited with the invention of the stethoscope in 1816.

It is said that he was examining a young female patient and was embarrassed to place his ear to her chest. Laënnac had observed two children playing in the courtyard of the Louvre with the ends of a long stick close to their ears listening to the transmitted sound when they tapped it. With these thoughts in mind he rolled up 24 sheets of paper, placed one end to his ear and the other end to the woman's chest. He was delighted to discover that the sounds were not only conveyed through the paper cone, but they were also loud and clear. From then on, whenever he was concerned with preserving the modesty of ladies he listened to their chests through a rolled up sheet of paper and so the monaural stethoscope was born (Sureau, 1996). Later Laënnac devised a straight wooden tube for listening to breath sounds and used an adaptor to listen to the heart. A hobbyist wood turner, Laënnac made the first stethoscopes himself. The cylindrical stethoscope was made with three parts fitted together by a wood screw thread and brass tube fitting, with an overall length of 12.6 inches and a diameter of 1.5 inches. Laënnac described his invention in his book

Laennec, R. (1819). De l'Auscultation Médiate ou Traité du Diagnostic des Maladies des Poumons et du Coeur. Paris: Brosson & Chaudé, (O'Dowd & Philipp, 1994).

The development of the obstetric stethoscope permitted the determination of the average fetal heart rate (Sureau, 1996) and it was hoped that auscultation of the fetal heart rate (FHR) would be an effective technique for detecting alterations to fetal health (Parer & King, 2000). Historically, intermittent auscultation meant a very irregular check of the fetal heart beat and the auscultated fetal heart rate was described as a single number in beats per minute i.e 136bpm (Goodwin, 2000). Characteristics of the normal FHR set in the latter part of the 19th century remained virtually unchanged until the 1950's. The same period saw interest and research into the significance of meconium staining of the amniotic fluid as a means of predicting fetal wellbeing. During the first half of the 20th century, auscultation of the FH during labour became a universal 'standard of care' in Europe. In the nearly two centuries that have elapsed since the development of auscultation of the fetal heart, no randomised controlled trials

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(RCT) have been carried out regarding the efficacy of auscultation (Parer & King, 2000) or of the most favourable frequency, timing and duration.

INTERMITTENT AUSCULTATION

The technique of IA, sometimes referred to as periodic listening, generates information by listening to and counting the fetal heart sounds through the maternal abdomen, for a specified number of seconds at a specified time, in relation to uterine contractions (Goodwin, 2000). IA is conducted with either a fetal stethoscope (fetoscope) or a hand-held ultrasound device. Non-electronic auscultation, such as the application of a Pinard's fetoscope to the maternal abdomen for periods of up to one minute or more, allows practitioners to hear the sounds associated with the opening and closing of the ventricular valves in the fetal heart, via bone conduction, with each fetal cardiac cycle. With this type of device, the midwife can hear the actual fetal heart sounds, including any abnormal heart beat rhythms. Electronic devices such as the hand held Doppler applied to the maternal abdomen use ultrasound technology to listen to the reflected and amplified sounds of the motion within the fetal heart, such as the moving heart walls or valves (Feinstein, Sprague & Trepanier, 2008) The information received by the Doppler device is converted into a sound that is heard and displayed as a representation of the fetal cardiac cycle (Goodwin, 2000).

AUSCULTATION OF THE FETAL HEART - THE TIMELINE

1650-1819

Doctors introduced the stethoscope into use for midwifery practice very soon after its introduction by Laënnac in 1819. Previously there had been only two accounts of anyone listening to the fetal heart sounds, and these accounts were not written by the people who had listened. During the 1650's a group of French physicians from Niort, in their local

dialect, wrote satirical poetry, regarding the role and activities of the fetus during pregnancy. One of them, Philippe Le Goust, a physician, made fun of his colleague Marsac, an obstetric colleague, for claiming to hear the heart of the fetus beating 'like the clapper of a mill' (Pinkerton, 1969; O'Dowd & Philipp, 1994).

1818

Nearly 150 years later, François Mayor, a forensic physician in Geneva, rediscovered the technique of immediate auscultation. 'Like the ticking of a watch' is the description of the fetal heart sounds first described by Mayor in the 1818 publication *Bibliothèque Universelle des Sciences et Arts*, Geneva, Switzerland (Mayor, 1818) cited in (Baskett, et al., 2007; Acierno, 1994) when he announced that the pulsation of the fetal heart could be heard in advanced pregnancy by the ear being applied to the abdomen of the mother (Acierno, 1994). He had discovered that he could recognize with certainty, when term is near, whether the infant was alive or not, by applying the ear to the mother's belly. He asserted that if the child is alive the beats of its heart could be heard quite clearly and were easily distinguishable from the mother's pulse (Pinkerton, 1969 & O'Dowd & Phillip, 1994).

1821

It has been acknowledged that the era of modern obstetrics started in 1821 with the discovery of the use of auscultation by Jean Alexandre Lejumeau, Viscomte de Kergaradec. Kergaradec, who was a friend of Laënnac - the inventor of the stethoscope - was the first doctor to use the stethoscope for auscultation of the fetal heart sounds. He thought he would hear the noise of water inside the uterus of a pregnant woman and be able to identify the position of the placenta. With the new-found technique of identification of the fetal heart sounds via mediate auscultation he theorised on the practical possibilities that could be derived

from auscultation of the fetal heart (Sureau, 1996). Kergaradec is quoted as follows:

One day whilst examining a patient near term and trying to follow the movements of the fetus with the stethoscope I was suddenly aware of a sound that I had not noticed before; it was like the ticking of a watch. At first I thought I was mistaken, but I was able to repeat the observation over and over again. On counting the beats I found that these occurred 143 – 148 times per minute and the patients pulse was only 72 per minute (Pinkerton, 1996, p. 20).

However it was not until 1821, that Jean de Kergaradec read his memoir on auscultation as applied to the study of pregnancy to the Academie Royale de Medecine in Paris. He publicly asked the question: *‘Would it not be possible to judge the state of health or illness of the foetus from the variations in the strength and frequency of the foetal heart beat?’ (O’Dowd & Philipp, 1994, p. 32).*

With the identification of the fetal heart came the reality that the fetus was no longer simply an object; it became a ‘subject’, with its health, interests and needs. It can be stated that ‘fetal medicine’ or the concept of the fetus as a patient began with this discovery. Over subsequent decades, new data gathered from fetal heart rate auscultation were of clinical, patho-physiological, and legal importance. From the clinical perspective, the development of the obstetric stethoscope permitted the determination of average heart beat frequency. It also allowed the discovery of a lack of relationship with the maternal heart rate and made it possible to diagnose fetal life or death and in twins, the determination of fetal presentation and position (Kergaradec cited by O’Dowd & Philipp, 1994).

1825

William Stokes published his book, ‘Introduction of the use of auscultation’, in 1825’ in which he discusses the uses of the stethoscope. Auscultation of the fetal heart was not mentioned in Stokes’ book but the second edition of Laënnac’s Treatise was translated into English by Dr John Forbes in 1827 and contained Kergaradec’s observations on auscultation of the fetal heart (O’Dowd & Philipp, 1994).

1827-1833

John Creery Ferguson, a friend and fellow student of Stokes, developed an interest in auscultation. He travelled to Paris where he met both Laënnac and Kergaradec and on his return to Dublin, Ferguson was the first to use mediate auscultation of the fetal heart in the British Isles, in November 1827. On the instigation of Ferguson, fetal auscultation was

introduced and developed in the Rotunda Hospital Dublin, during the Mastership (1826-1833) of Robert Collins. During that time Nagle (1830), who was one of Collins assistants, reported to the Lancet on the diagnosis of twins by Laënnac’s stethoscope (O’Dowd & Philipp, 1994).

1833

O’Brien Adams, also of the Rotunda Hospital, referred to the almost daily employment of the fetal stethoscope in the hospital (Adams, 1833 cited by Dunn, 1994). Collins, aided by his assistant, O’Brien Adams, was a pioneer in introducing fetal auscultation into obstetric practice. Dunn (1994) attributes the following words taken from his Rotunda obstetric report to Dr Robert Collins (1801 – 1868): (Dunn, 1994)

I know of no case where the advantage derived from the use of the stethoscope is more fully demonstrated, than in the information it enables us to arrive at with regard to the life or death of the foetus, in the progress of tedious and difficult labours. It is, in my opinion, one of greatest improvements that has been made in the practice of midwifery; and what adds much to its value is, that an acquaintance with its application is not so very difficult of acquirement to any one, whose hearing is unimpaired – it being only necessary the ear should be accustomed to the sounds for some time, to be able to apply it with advantage. Heretofore, we were in a great measure ignorant of the time at which death took place; and the practitioner, imagining the child alive, from want of satisfactory evidence of its death, delayed interfering, until his patient was in the greatest possible danger; whereas, had he been assured the child was dead, he would have delivered her before life became actually hazarded, and thus prevented her not only enduring for hours, but even days in some instances, the most torturing pain, the result of which continued suffering was not infrequently death, or what was perhaps worse than death, extensive sloughing of the urethra or of the recto-vaginal septum, establishing a communication between these two cavities, reducing the misfortunate sufferer to a state of extreme misery... I cannot, therefore, too strongly impress on the mind of the junior practitioner, the absolute necessity of making himself acquainted with the use of the stethoscope, considering it, as I do, of the most utmost importance in these cases. I can safely say, I should feel most unhappy without it, in any attendance, where the labour was protracted or severe; I am satisfied there is no mode of diagnosis more truly useful, and feel convinced, that all

who accustom themselves to its application, will eventually agree with me in this opinion” (Dunn, 1994, pp 67-68).

1843

The clinicians of the time saw the development of mediate auscultation as beneficial for determining fetal life and foetal demise. Evory Kennedy was the successor to Robert Collins as ‘Master of the Rotunda’ in 1833 at the age of 27. His mastership was notable for the significant role he played, with Creery Ferguson and Collins, in introducing the stethoscope (first brought to the attention of British Medicine by William Stokes in 1825). Kennedy, cited in Gunn and Wood (1953), was the author of several publications on the fetal heart one of which was published in the British Medical Journal (BMJ) in 1834 (Kennedy, E. (1834), *“Obstetric Auscultation, or Means of Detecting Life or Death of a Foetus before Birth.”*). He lamented in 1843 that for two decades little was heard of the use of the stethoscope in obstetrics. He stated that had auscultation in pregnancy met with more opposition, the more it would have attracted the attention of the profession which was all that is required to establish its utility.

1847

John Moir, a medical officer and teacher of midwifery to nurses and doctors, introduced the practice of foetal auscultation to The Edinburgh Lying-in Hospital after being impressed by its practicality by Fergusson and Kennedy in Dublin.

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Not all practitioners embraced the change to and popularity of mediate auscultation. There were those who challenged the practice of auscultation. In some areas, those who practised auscultation were faced with obstruction and

hostility by those who opposed them. An elderly obstetrician in Edinburgh, at the time of Moirs' introduction of the practice to the Edinburgh Lying-In hospital was recorded as stating it was a 'new-fangled and ridiculous plaything' and '...these toys of ignorance should be abandoned...they [are] truly prejudicial to science' (O'Dowd & Philipp, 1994, p.98). Despite the challenges, the advocates for auscultation faced, the practice was widespread by the 1850's.

FETAL HEART RATE FINDINGS

According to Sureau (1996), the development of the obstetric stethoscope facilitated a greater understanding of the fetal heart rate, including the relationship between accelerations of the fetal heart rate and fetal movements, as well as the lack of influence of maternal efforts such as those associated with ascending a staircase (i.e. the step test). It was further recognised that maternal tachycardia and fever could be linked with fetal tachycardia and that an abrupt fall in the maternal blood pressure could have adverse consequences on the fetal condition. Perception of heart tones constituted an argument in favour of post mortem caesarean section.

Fetal distress was recognised as early as the second half of the 19th century (Sureau, 1996). The different degrees of deceleration were considered 'dangerous' when synchronous with intense contractions or were delayed decelerations, or a progressive or permanent bradycardia, announcing fetal death. Van Geijn and Copray (1994) quote Depaul's notion of the 'physiological' deceleration of the fetal heart rate during labour (DePaul, 1847): "*The compression of the cord, the one of the placenta, the irregular and almost spastic contractions of the uterus finally lead to an identical result, a kind of asphyxia, and the heart is one of the first organs to be exposed to its deteriorative influence*". These notions of DePaul arose out of observations and discussions of Kennedy's work in 1833 describing a link between fetal head compression and fetal heart rate decelerations (O'Dowd & Philipp, 1994). The timing of fetal heart rate auscultation during labour eventually changed over time from being performed during a contraction to being performed from the end of a contraction with an understanding that a decrease in or slow return of the fetal heart to the normal baseline rate after a contraction was more problematic.

The 'modern era' of fetal surveillance was heralded in 1906 with the first fetal electrocardiographic recording by Cremer. For around 50 years, little further progress was made, and the recordings, through the maternal abdominal skin of either fetal ECG's or acoustic signals, remained anecdotal (Sureau, 1996).

The phrase 'fetal distress' was introduced in 1908 in Dublin by Hastings-Tweedie and Wrench (1908). Between the introduction of auscultation in 1830 and 1908 there were other significant discoveries in the identification of differing types of fetal heart rates and correlations between those and the outcomes at birth. In 1833, Evory Kennedy identified that an abnormal heart rate pattern indicated poor fetal health; John Moir in 1836 wrote of the effects of contractions on the fetal heart rate; 1843 Bodson described fetal heart irregularities; 1848 Kilian defined the range of what is normal for fetal heart rates, this being between 100 to 180 beats per minute, with purity of tone and with no intermission of tone, (Chalmers, Enkin & Keirse, 1997). In 1855 John Y. Simpson described the slowing of the foetal heart; 1866 at the Rotunda, Fleetwood Churchill used forceps, that he designed and made, to deliver babies with good neonatal outcomes, when there was a weakening of the fetal heart; 1876 McClintock, at the Edinburgh Lying-In, observed poor outcomes in those fetuses with slowing fetal hearts; 1886 Galabin in London observed good outcomes with those fetuses whose heart rate increased 20 beats per minute with movements compared with those whose heart rates did not increase; Jaggard correlated fetal bradycardia following Braxton Hicks contractions with a "puny foetus" in 1888. (O'Dowd & Philipp, 1994). In 1889 Van Wickel refined Kilian's guidelines of normal fetal heart ranges to suggest that fetal heart rates of less than 120bpm and greater than 160 bpm were indicative of distress (Chalmers, Enkin & Keirse, 1997). All of these significant discoveries are aspects of fetal monitoring that we in the 21st century take for granted as events that have known outcomes.

later epidemiological thought and clinical measurement rose in prominence, established in the 1920's by way of antenatal clinics, followed in 1946 by the British Perinatal Surveys.

Attention was drawn to the correlations between maternal physical health, social and economic wellbeing and fetal outcome. Today we utilise this seemingly obvious approach to determine the fetus at risk.

WHAT WERE MIDWIVES TAUGHT IN TEXTBOOKS FROM THE 1900S ONWARDS?

There were few educational texts available for students of midwifery at the turn of the 20th century. Jellett, Chairperson of the Rotunda, Dublin, is quoted in his 1903 text for students of midwifery (meaning at this time medical students studying obstetrics and midwifery) as asserting the optimal mode of detecting the fetal heart is over whatever part of the fetal body is most closely in contact with the anterior uterine wall (Jellett, 1903).

Jellett described the process of auscultation as being carried out either through the intermediary of a stethoscope or by placing an ear directly on the abdomen (which, Jellett suggested, had been covered with a silk or linen handkerchief). He gave no indication as to the frequency or indications for auscultating the FH, other than to determine intra-uterine fetal life. In both 1903 (Jellett, 1903) and 1910 (Jellett, 1910) editions of Jellett's work, there are detailed descriptions regarding the patterns and sounds of the FH and obstetric incidents that may result in some change in FH, but no stress was placed upon the need to further monitor the FHR.

In 1932 Corkill published, 'Lectures in Midwifery and Infant Care: A New Zealand Course' (Corkill, 1932). It is the first text for

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1920s-1946

As soon as the frequent listening of fetal heart sounds commenced in the mid 19th century then the observation that there were irregularities to the heart rate also began to be observed. The term the 'fetus at risk' was one used first by Hippocrates in 430BC (O'Dowd & Philipp, 1994) when he related fetal outcome to the time of year, using epidemiological reasoning. One thousand five hundred years

New Zealand (NZ) students of nursing and midwifery, written in NZ, for the NZ setting. As with Jellett, it remains unclear from reading Corkill (1932), as to how often auscultation of the FH was recommended during suspected episodes of fetal distress nor if action such as a caesarean section was performed in other than a significantly obstructed labour.

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the first change in 150 years. Green (1966) described the fetal electro-cardiogram as very reliable in diagnosing the presence of one or more fetal heart sounds. Green reassured, 'how harmless it is to the mother'. Green described the equipment as an ordinary electrocardiograph machine with a powerful amplifier and that the recording must be made in a room lined with metal to keep out electrical interference. This architectural requirement would place restrictions on the accessibility and availability of such a diagnostic tool.

Green described in detail the techniques and timing of FH auscultation. In his 1966 New Zealand text for nurses and midwives he wrote;

"...the FH should be listened to every half hour if the patient is awake. It should occasionally be recorded during a contraction, slight slowing of the FH usually occurs; marked slowing or failure of the rate to return to normal a few seconds after a pain indicate serious interference with the placental circulation. Any rate outside the limits 120 – 160 must be regarded as abnormal. As a graphic record is far more easily interpreted than a list of figures, the foetal heart rate should be recorded on a modified temperature chart (Green, 1966, p.79).

In 1967, Caldeyro-Barcia et al (Day, Maddern & Wood, 1968) introduced a revised method of counting the fetal heart sounds described as follows: "The counting is begun during or immediately before a contraction, and is continued until two minutes after the contraction, the count being taken over 15-second periods with 5 second intervals. This technique might involve the observer in making as many as 10 separate counts (Day, Maddern & Wood, 1968, p.422)".

In an American text titled 'Maternity Nursing', Bleier (1969) provided more explicit interpretations of auscultation (similar to the instructional training guide for midwifery students from the Royal Women's in Melbourne discussed below), showing that there was some recognition of FH patterns following the administration of medications and during contractions and it is clear from the details of the text that it is an expectation that FHR auscultation is the work of the midwife/nurse.

The 1972, 'Notes for Student Midwives' from the Royal Hospital for Women in Melbourne, contained a section 'to observe the progress of labour – condition of the fetus'. These notes were more prescriptive, instructing midwives in the following way:

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The fetal heart must be recorded hourly early in labour, increasing to ½ hourly and more often as labour advances. Changes in the rate (above 160 or below 120) or rhythm (irregular) are a sign of fetal distress and should be reported immediately. Abnormalities of fetal heart rate and rhythm may be first detected immediately after a contraction.

Second stage of labour

Maternal pulse rate is checked every ¼ hour. Fetal condition must be closely supervised by fetal heart checks each ¼ hour until the head comes on view when the heart rate must be checked after each contraction (and charted at least ¼ hourly" (The Royal Women's Hospital, 1972 p.30).

Myles writing in 1975 is very clear about the role, responsibilities and professionalism of midwives and the duties they must perform (Myles, 1975). Comparing the content of the work and role of the midwife by Myles to that of the Nurse-in-maternity-care by Bleier (1969), one would be hard pressed to reconcile the two. Myles' text is accompanied by copious photographic illustrations, portraying the work of the 'modern' midwife and the equipment she uses'. The use of the Pinard's and the electronic bi-aural stethoscope are photographically depicted (unlike previous texts reviewed). Myles also states clearly the antenatal requirements of FH monitoring - "They (FH sounds) should be listened for at every visit after the 20th week of pregnancy".

THE METHODS OF AUSCULTATION INSTRUMENTATION

One piece of equipment commonly in use today is the Pinard's aluminium fetal stethoscope, despite evidence that this is not as accurate as a hand held Doppler for determining the fetal heart rate, based on the papers by Day, Maddern and Wood (1968) and Mahomed, Nyoni, Mulumbo, Kasule, & Jacobus (1994).

THE FREQUENCY, TIMING AND DURATION OF FETAL HEART AUSCULTATION

In the studies comparing IA with EFM, most used a fetoscope or Doppler device with a 1:1 nurse-to-fetus ratio for evaluating the fetal heart characteristics. Assessments are generally conducted at 15 minute intervals throughout the labour, regardless of the risk status, and at 5 minute intervals during the second stage of labour. Although it is not clear what training was received in preparation for the studies, a research nurse generally conducted the IA. Professional organizations have considered protocols used in these studies when making recommendations regarding the use of IA. Some studies recommend that IA should be the primary fetal assessment method for low-risk pregnant women during labour (Feinstein, Sprague & Trepanier, 2008).

THE EVIDENCE

The introduction and use of EFM has led to intermittent auscultation (IA) being used less, and IA now is used less frequently than EFM (Dildy, 1999). The value and efficacy of IA compared to EFM has been questioned and examined in RCTs and meta-analyses (Mahomed et al., 1994; Dildy, 1999; Thacker, Stroup & Petersen, 1998). Cumulatively, studies of these two methods provide evidence that the use of IA and EFM results in similar neonatal outcomes for low risk women.

CONCLUSION

This article has tracked the discovery of the ability to hear the fetal heart sounds during pregnancy and labour and the significance of having this knowledge. Listening to the fetal heart sounds during labour is an important way to determine fetal well-being. Today, professional evidence-based guidelines recommend intermittent auscultation as the appropriate fetal heart monitoring for well women with uncomplicated pregnancies. Although IA has been used for many years, the introduction of EFM in the 1960's resulted

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in decreased use or elimination of IA for fetal heart monitoring over time and is a factor effecting how often or whether auscultation is used as a primary method of monitoring fetal well-being during labour in many health care facilities. As a result, practitioners' experience and comfort level with the IA technique may vary from setting to setting and from individual to individual.

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